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SUPPLEMENTAL SITE-SPECIFIC ENVIRONMENTAL BASELINE SURVEY, BUILDING 606

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PRC ENVIRONMENTAL MANAGEMENT, INC.

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

SUPPLEMENTAL SITE-SPECIFIC ENVIRONMENTAL BASELINE SURVEY BUILDING 606 HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

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THE FOLLOWING APPENDICES ARE NOT AVAILABLE:

- APPENDIX A – PROPERTY-SPECIFIC ENVIRONMENTAL BASELINE SURVEY DATED FEBRUARY 1996, SUB-APPENDICES A, B, C, AND D

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC SOUTHWEST RECORDS OFFICE TO LOCATE THE MISSING APPENDICES.

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ABBREVIATIONS AND ACRONYMS

ACM	Asbestos-containing material
AEC	Atomic Energy Commission
AST	Aboveground storage tank
bgs	Below ground surface
CARB	California Air Resources Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CTO	Contract task order
DERP	Defense Environmental Restoration Program
DOD	U.S. Department of Defense
EFA WEST	Naval Facilities Engineering Command, Engineering Field Activity West
EPA	U.S. Environmental Protection Agency
FFA	Federal facility agreement
FOSL	Finding of Suitability to Lease
FS	Feasibility study
HLA	Harding Lawson Associates
HPS	Hunters Point Shipyard
IR	Installation Restoration
IRP	Installation Restoration Program
LFI	Levine-Fricke, Inc.
MINS	Mare Island Naval Shipyard
mg/kg	Milligram per kilogram
Navy	U.S. Department of the Navy
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NRDL	Navy Radiological Defense Laboratory
PA	Preliminary assessment
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal

ABBREVIATIONS AND ACRONYMS (Continued)

RI	Remedial investigation
ROD	Record of decision
SARA	Superfund Amendments and Reauthorization Act
SFPD	San Francisco Police Department
SFRA	San Francisco Redevelopment Agency
SI	Site inspection
SSEBS	Site-specific Environmental Baseline Survey
SVOC	Semivolatile organic compound
TOG	Total oil and grease
TPH	Total petroleum hydrocarbons
Triple A	Triple A Machine Shop
TRPH	Total recoverable petroleum hydrocarbons
UST	Underground storage tank
VOC	Volatile organic compound
VSI	Visual site inspection

EXECUTIVE SUMMARY

The U.S. Department of the Navy, Naval Facilities Engineering Command, Engineering Field Activity West intends to lease Building 606 at Hunters Point Shipyard (HPS) to the San Francisco Redevelopment Agency, who, in turn, will sublease the property to the San Francisco Police Department (SFPD). The SFPD plans to use Building 606 as an office and staging facility. Building 606 was built in 1989 and was formerly leased to Skellington Productions, a movie company.

This document is a supplemental site-specific Environmental Baseline Survey (SSEBS) for Building 606. The purpose of the SSEBS is to evaluate the environmental condition of Building 606 and recommend its suitability for lease. This SSEBS is based on a visual site inspection conducted on September 27, 1996, previous SSEBS reports prepared for Building 606 (EFA WEST 1994; 1996), the draft final HPS Parcel D Remedial Investigation (RI) report (PRC 1996a), and the draft HPS Parcel D Feasibility Study report (LFI 1996). The SSEBS presents information regarding the historical and current uses of HPS and Building 606. It describes previous and ongoing environmental investigation and remediation activities. This SSEBS also includes an assessment of properties and utilities contiguous or adjacent to Building 606 that could pose environmental concerns or affect the property. In conclusion, this SSEBS recommends conditions for the lease of Building 606 to protect the health of the tenants.

The lease boundaries for Building 606 are shown in Figure ES-1. The lease area includes the interior of Building 606 and the parking area at the north side of the building. The lease area also includes parking along the east and west sides of the building up to the fenced area on the south end of the building.

This SSEBS concludes that there are no known health risks associated with the short-term use of Building 606. No known sources of hazardous substances exist in the interior of Building 606. RI results indicate that soil and groundwater in the vicinity of Building 606 contain polychlorinated biphenyls, metals, polynuclear aromatic hydrocarbons, and petroleum hydrocarbons at concentrations above screening criteria. Contaminated soil areas are paved with asphaltic concrete and, in some cases, are fenced off from the lease area; therefore, no direct pathway for human health exposure exists. Provided the tenants of Building 606 do not use groundwater for drinking or building operations, no pathway for groundwater contaminant exposure exists. Building 606 is currently suitable for lease to the SFPD.

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC), received Contract Task Order (CTO) No. 0012, Modification No. 3, under the Comprehensive Long-Term Environmental Action Navy Contract No. N62474-94-D-7609 from the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command, Engineering Field Activity West (EFA WEST). PRC was tasked under this modification to the CTO to prepare a supplemental site-specific Environmental Baseline Survey (SSEBS) and Finding of Suitability to Lease (FOSL) for Building 606 at Hunters Point Shipyard (HPS). EFA WEST intends to lease Building 606 to the San Francisco Redevelopment Agency (SFRA). The SFRA will sublease the use of the interior of the building to the San Francisco Police Department (SFPD) for office administration and staging. The purpose of this supplemental SSEBS is to evaluate the environmental condition of Building 606. Conclusions presented in the Building 606 SSEBS will be used to support the FOSL.

In 1994, EFA WEST prepared the original SSEBS for Building 606 to support the license of the building to Skellington Productions, a movie company. In February 1996, the SSEBS was updated to support the lease of Building 606 to the SFPD. These documents are provided as Appendix A of this SSEBS. This SSEBS presents information describing the current physical and environmental conditions of Building 606. This supplemental SSEBS summarizes previous findings and incorporates new information presented in the draft final Parcel D remedial investigation (RI) report dated October 25, 1996 and draft Parcel D feasibility study (FS) report dated September 26, 1996.

Section 2.0 of this SSEBS presents the history and current status of HPS, environmental investigations at HPS, and Building 606. Section 3.0 describes the survey methodology used to collect information for this SSEBS. Section 4.0 summarizes previous Building 606 SSEBS findings and presents new information from the draft final Parcel D RI and draft FS reports. Section 5.0 presents the environmental findings for sites adjacent to Building 606. Section 6.0 summarizes the information presented in this SSEBS with regard to the environmental condition of Building 606 and presents recommended lease conditions. Section 7.0 is a statement of certification of this SSEBS.

2.0 HISTORY AND CURRENT STATUS

The following sections describe the history and current status of HPS, environmental investigations at HPS, and Building 606.

2.1 HUNTERS POINT SHIPYARD

HPS is in southeast San Francisco on a peninsula extending eastward into San Francisco Bay (Figure 2-1). HPS property comprises about 965 acres; about 500 acres are on dry land and the rest are submerged in San Francisco Bay (Freitas 1994). HPS is bounded on the north and east by San Francisco Bay and on the south and west by the Bayview Hunters Point district of San Francsico.

HPS was operated as a commercial drydock facility from 1896 until 1939. The Navy took over ship repair facilities at HPS and purchased the property in 1940. Designated as a U.S. Naval Shipyard on November 30, 1945, HPS served as a ship repair and construction facility until its closure in 1974. During this time, HPS was used for personnel training, limited radiological operations, research and development, ship design, and nonindustrial services for Navy personnel and their families (PRC 1996b).

Between 1935 and 1975, the Navy expanded HPS through the condemnation and purchase of adjacent property. Fill materials were placed in San Francisco Bay to increase HPS land area from less than 100 acres to about 500 acres. Materials from a ridge in the northwestern portion of HPS were used to fill the lowlands and construct building pads. The landfill located near the southwestern boundary of HPS was created with native materials mixed with industrial debris and refuse (PRC 1996b).

HPS was deactivated in 1974 and remained relatively unused until leased by Triple A Machine Shop (Triple A) in May 1976. Triple A operated a commercial ship repair facility at HPS and also subleased portions of HPS to private warehousing, industrial, and commercial firms. Triple A vacated the facility in 1987 after the San Francisco District Attorney's Office filed a lawsuit alleging that Triple A illegally disposed of large quantities of hazardous wastes at HPS. In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal (PRC 1996b).

In 1986, the Navy resumed occupancy of HPS and docked and repaired Navy surface ships at the facility. During this time, many of Triple A's tenants acquired leases with the Navy through legislation by Congresswoman Nancy Pelosi. HPS was placed on the National Priorities List (NPL) in 1989 as a Superfund site. In 1991, HPS was designated for closure under the Base Realignment and Closure Act of 1988. In 1994, control of HPS was transferred to EFA WEST.

Currently, many of the buildings and structures at HPS are abandoned and under investigation. However, several dozen tenants continue to operate small industrial and commercial businesses at HPS. A Navy-operated Fire Department at HPS provides fire protection and first aid services. EFA WEST is working on an Emergency Response Plan for HPS. In the meantime, the SFPD and San Francisco Fire Department provide additional emergency services (EFA WEST 1996).

Because HPS is a closing base, EFA WEST is performing investigation and remediation activities at HPS to facilitate transfer of the base to the City of San Francisco. Until the facility is transferred, EFA WEST is also implementing interim leases and licenses for HPS facilities to increase the economic potential of the Bayview Hunters Point community and San Francisco.

2.2 ENVIRONMENTAL INVESTIGATIONS

Because past shipyard operations released hazardous substances, HPS was placed on the NPL in 1989. As a result, the Navy is required to perform a facility-wide hazardous substance remediation in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. Investigation and remediation of contaminated areas at HPS, as well as identification of uncontaminated property, is the start of a multistage process required before HPS can transfer property to the community.

CERCLA and the SARA established a series of programs to respond to releases of hazardous substances nationwide. One of the programs, the Defense Environmental Restoration Program (DERP), is codified in SARA. The Navy's Installation Restoration Program (IRP) is a component of DERP and is designed

to identify, assess, and remediate contamination from releases of hazardous substances that resulted from Navy activities. Environmental investigation activities at HPS have been conducted under the IRP.

IRP sites at HPS undergo a sequence of investigations beginning with a preliminary assessment (PA), which involves record searches, interviews, and limited field investigation. If the PA results indicate that a site requires more complete characterization, the site is advanced to the site inspection (SI) phase. The SI involves collection and evaluation of additional field data. The SI results are combined with the PA findings to determine whether human health or environmental risks exist at the site. If so, the site is carried through to the RI phase. The RI involves characterizing the nature and extent of and threat posed by hazardous substances. The RI also assesses the potential risks posed by each site to human health and the environment.

The Navy identified and investigated known hazardous waste sites first. In 1992, a new site organization strategy was developed to accelerate property transfer to the City of San Francisco. HPS was divided into five geographical parcels (A through E) to expedite investigation, cleanup, and property transfer (Figure 2-2). Parcel F was created in 1995 and consists of the intertidal and submerged lands under the San Francisco Bay. The HPS parcels were subdivided into investigative areas. The areas are renamed as Installation Restoration (IR) areas when the RI and remediation stages are in progress. The IR site designations for areas associated with Building 606 are used in this SSEBS to identify and describe the RIs associated with these sites.

In 1992, the Navy, the U.S. Environmental Protection Agency (EPA) Region 9, and the California Environmental Protection Agency Department of Toxic Substances Control signed the original federal facility agreement (FFA) for HPS (PRC 1996b). The FFA established a procedural framework and schedule for ensuring that environmental impacts associated with past and present HPS activities are thoroughly investigated and appropriately remediated to protect human health and the environment. The FFA also aids the exchange of information and ensures the adequate assessment of potential injury to natural resources. In 1995, a revised FFA was agreed upon for completion of IRP activities at HPS Parcels A through E.

All HPS parcels have undergone the PA and SI stages and are in the RI phase. To date, SI reports have been prepared and distributed for Parcels A through E. RI reports have been prepared and distributed for Parcels A, B, and D. The draft Parcels C and E RI reports are scheduled for distribution on November 29, 1996 and April 29, 1997, respectively.

Subsequent phases of the response process are the FS, Proposed Plan, Record of Decision (ROD), Remedial Design and Remedial Action, and Operation and Maintenance of the Response Action. A no-action ROD was concluded for Parcel A; therefore, an FS was unnecessary. The Draft Final FS report for Parcel B and Draft FS report for Parcel D have been distributed. Draft FS reports for Parcels C and E are scheduled for distribution on February 27, 1997 and July 28, 1997, respectively. The ROD for Parcel A was signed on November 28, 1995. No other ROD documents have been prepared for the remaining parcels.

2.3 BUILDING 606

Building 606 is located within the boundaries of Parcel D and is adjacent to site IR-08 (Figure 2-3). During construction of the building, an area of polychlorinated biphenyl (PCB) contamination was found in the vicinity of what is now the southeast corner of the building. In 1988, an interim remedial action was conducted by the Navy at this PCB spill area. During this remedial action, approximately 1,255 cubic yards of soil with PCB concentrations exceeding 25 milligrams per kilogram (mg/kg) were excavated and disposed of off-site (PRC 1996a). The excavation was backfilled with crushed rock and compacted, and the area was paved with asphalt concrete. The affected area has been investigated at Parcel D site IR-08. The RI and FS for IR-08 have been completed, and the findings are discussed in Section 4.2.1 of this SSEBS.

Building 606 is located on the site of former Buildings 501, 503, 507, and 508 (Figure 2-4). Building 501 was a barracks and Building 503 was the base laundry facility. These facilities were operated from 1948 to 1974. Buildings 507 and 508 were used until 1969 by the Navy Radiological Defense Laboratory (NRDL) as biological laboratory and office space, respectively. NRDL was licensed by the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), to possess and use various radionuclides in their activities at HPS. As part of NRDL's disestablishment in 1969, NRDL was

required to survey all sites where radioactive materials were stored and used. Buildings 507 and 508 were surveyed by NRDL personnel and documented as radiologically clean. Buildings 507 and 508 were demolished sometime between 1977 and 1979. Although the locations of former Buildings 507 and 508 were cleared for unrestricted use by AEC personnel, further radiation surveys have been recommended for these buildings because the outside areas were not surveyed for residual contamination as part of the license termination process. There is little concern that radioactive contamination exists at the sites of former Buildings 507 and 508. However, to confirm that no radiological concerns exist in the areas surrounding the buildings, these areas will be surveyed for radiation and sampled if necessary. The survey is planned for November and December of 1996 (PRC 1996d).

Building 606 was built in 1989 as a Navy facility to support the homeporting of the U.S.S. Missouri; however, it was never used in that capacity. During Operation Desert Storm, Building 606 was used as a military postal facility. Building 606 was leased in 1994 to Skellington Productions, a movie company. No industrial activities or use or storage of hazardous substances are known to have occurred within Building 606. Building 606 is currently unoccupied.

3.0 SURVEY METHODOLOGY

The approach for developing this SSEBS was to use available reports and data, as well as communications with individuals familiar with Building 606. Most information in this SSEBS was extracted from the 1994 SSEBS and updated 1996 SSEBS for Building 606. Section 3.1 presents a list of the documents reviewed for this SSEBS. A physical visual site inspection (VSI) of Building 606 was conducted on September 27, 1996, to identify evidence of additional contamination or exposure pathways. Section 3.2 presents the results of this and previous VSIs. Section 3.3 presents a list of individuals consulted for this SSEBS.

3.1 PRIMARY DOCUMENTS REVIEWED

The following documents were reviewed for this SSEBS:

- EFA WEST. 1994. "Property-Specific Environmental Baseline Survey, Western Division Naval Facilities Engineering Command, Hunters Point Annex, Building 606." July.

- EFA WEST. 1996. "Property-Specific Environmental Baseline Survey, Western Division Naval Facilities Engineering Command, Hunters Point Annex, Building 606." July.

- Harding Lawson Associates (HLA). 1993. "Preliminary Draft Final Summary Alternative Selection Report, Operable Unit II, Naval Station Treasure Island, Hunters Point Annex." May 3.

- Levine-Fricke (LFI). 1996. "Draft Parcel D Feasibility Study, Hunters Point Shipyard." September 26.

- Mare Island Naval Shipyard (MINS). 1993. "Asbestos Survey of Hunters Point Annex." October.

- PRC. 1994. "Draft Final Parcel D Site Inspection Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California, Volume I." May 2.

- PRC. 1996. "Base Realignment and Closure Cleanup Plan, Revision 2, for Naval Station Treasure Island, Hunters Point Annex." March 15.

- PRC. 1996. "Final Basewide Environmental Baseline Survey, Hunters Point Annex, San Francisco, California." June 3.

- PRC. 1996. "Draft Final Parcel D Remedial Investigation Draft Report, Hunters Point Shipyard, San Francisco, California." October 25.

- PRC. 1996. "Phase III Radiation Investigation Draft Final Field Work Plan, Hunters Point Shipyard, San Francisco, California." October 15.

- Tetra Tech. 1994. "Baseline Environmental Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California." Volume 2a. July.

3.2 VISUAL SITE INSPECTIONS

A VSI involves the nonintrusive inspection of buildings, structures, equipment, pipes, visible pipelines, and other property features. VSIs also include inspection of sewer lines, runoff patterns, evidence of

environmental impact, and indications of actual or potential release of hazardous substances or petroleum products.

VSIs of Building 606 and the adjacent areas have been conducted by the Navy, EPA, PRC, and HLA personnel. On July 21, 1994, Navy and EPA personnel conducted a VSI as part of the original SSEBS for Building 606. This VSI was conducted to confirm and supplement the previous VSI findings of HLA personnel (EFA WEST 1994). PRC performed a VSI in 1995 for the draft Basewide Environmental Baseline Survey. Navy personnel conducted an additional VSI on February 15, 1996 to confirm the interior condition of Building 606 (EFA WEST 1996).

PRC personnel conducted a VSI of Building 606 and the areas adjacent to the building on September 27, 1996 as part of this SSEBS. The purpose of this VSI was to confirm that humans are not exposed to contaminant sources at the proposed Building 606 lease area. PRC observed that the condition of all spaces is excellent, with no signs of use, storage, or spillage of hazardous materials existing in Building 606 or surrounding paved areas. No cracks in pavement or interior floors and walls of the building were observed.

3.3 PERSONNEL CONSULTED

PRC and the Navy contacted the personnel listed below regarding their knowledge of Building 606 and the site (EFA WEST 1996).

- Domenic Zigant, Base Closure Manager for HPS: (415) 244-3083
- Donald Shannon, On-Site Caretaker for HPS: (415) 330-0550
- Jim Sickles, PRC HPS Installation Coordinator: (415) 543-4880
- Scott Wald, PRC HPS Parcel D Project Manager: (415) 543-4880
- David Preston, PRC HPS Radiation Officer: (415) 543-4880

4.0 FINDINGS

The following sections summarize the findings of previous SSEBS documents and present new information from the draft final Parcel D RI report and the draft Parcel D FS report. Section 4.1 describes Building 606. Section 4.2 describes the environmental setting of Building 606.

4.1 DESCRIPTION OF BUILDING 606

Building 606 is 89,600 square feet in size and constructed of steel and concrete. The north end of the building includes an entry lobby and two stories of office and conference room space. The south end of the building is a two-story-high open area with concrete flooring. A paved parking area is located at the north end of the building. A fenced area is located at the south end of the building.

4.2 ENVIRONMENTAL SETTING

The environmental setting of Building 606 is discussed in the following subsections. Section 5.2 of the Basewide EBS (PRC 1996c) discusses the overall environmental setting of HPS.

4.2.1 Installation Restoration Site IR-08

Site IR-08 is in the south-central portion of Parcel D, near Hussey and "H" streets. IR-08 covers approximately 0.5 acre and consists of the areas occupied by former Building 508 and a portion of former Building 503. Building 503 was the base laundry facility and was demolished sometime between 1977 and 1979. The site of former Building 503 is currently occupied by Building 606.

The following sections describe groundwater and soil contamination at IR-08. These findings were extracted from Section 4.2 of the draft final Parcel D RI report, which describes IR-08 environmental investigations (PRC 1996a). Section 4.2 of the draft final Parcel D RI report is included as Appendix B of this SSEBS. Appendix B includes maps from the draft final Parcel D RI report showing sampling locations. Appendix B also includes tables of analytical results and statistical summaries of the

analytical results from the RI report for IR-08. Agency comments pertaining to IR-08 information presented in the draft Parcel D RI report and Navy responses to these comments are also included in Appendix B.

4.2.1.1 IR-08 Groundwater Contamination

Groundwater at IR-08 contained metals, chloroform, benzo(a)pyrene, PCBs, total petroleum hydrocarbons (TPH)-diesel, TPH-motor oil, and total recoverable petroleum hydrocarbons (TRPH) at concentrations exceeding EPA Region 9 preliminary remediation goals (PRG) for tap water (see Appendix B). Groundwater sampling locations are shown on Figure 4-1.

The maximum concentrations for the eight metals detected in groundwater at concentrations exceeding screening criteria were distributed among four monitoring wells. These metals do not appear to be related to each other or to the organic compounds detected at IR-08. Chloroform was detected in groundwater in one one monitoring well located more than 200 feet from Building 606 and appears to be an isolated occurrence. The petroleum hydrocarbons were detected in one monitoring well at the northern edge of IR-08, 200 feet north of hydrocarbons detected in soil at IR-08. TPH-motor oil was also detected in one sample from one monitoring well at the northwestern edge of IR-08 and in one HydroPunch sample collected from a boring drilled in the central part of IR-08.

Human health exposure pathways for groundwater are ingestion, dermal contact, inhalation of volatile organic compounds (VOC), and consumption of aquatic life (LFI 1996). Groundwater and surface water at HPS have not been and are not likely to be used for domestic drinking water, industrial, or irrigation purposes. The City of San Francisco provides HPS with potable water from the Yosemite region through the Hetch Hetchy aqueduct (PRC 1996c). Inhalation of VOCs is not a risk for tenants at Building 606 since VOCs are not present in the groundwater at IR-08 except in one isolated occurrence. In addition, in order for exposure to occur, cracks in building walls and foundations must exist and permit migration from the A-aquifer. Since Building 606 was constructed in 1989, it is unlikely that such structural flaws exist and none were observed during the VSI. Therefore, groundwater contamination at IR-08 should not pose any human health risks to tenants at Building 606 provided that groundwater is not used

by the tenants for any purpose. Seafood obtained from the HPS vicinity should not be ingested. Warning signs forbidding fishing at HPS are posted along the HPS shoreline and piers.

4.2.1.2 IR-08 Soil Contamination

Between 1986 and 1987, the PCB spill area near former Building 503 was investigated. The investigation consisted of source, soil, and groundwater sample collection and analysis to delineate the volume of PCB-affected soil and groundwater at the spill area. Investigation results indicated that PCBs were present mainly in soil at the spill area, with the highest concentrations detected at approximately 4 feet below ground surface (bgs) (PRC 1996a). PCBs were detected at levels below the screening criteria in only one of eight groundwater samples. The likely source for PCBs at the site was determined to be liquid PCBs released from electrical transformers stored at the site. The electrical transformers were removed from the site in 1988. Following removal, an interim remedial action was conducted by the Navy. About 1,255 cubic yards of soil were excavated and disposed of off site. The excavation was backfilled with crushed rock, compacted, and paved with asphalt concrete. A map of the PCB spill area is provided in Appendix B.

Soil samples collected during the RI at IR-08 contained arsenic, beryllium, lead, manganese, hexavalent chromium, carcinogenic polynuclear aromatic hydrocarbons (PAH), pesticides, PCBs, TRPH, and total oil and grease (TOG) at concentrations exceeding the screening criteria (see Appendix B). For the purpose of this discussion, soil samples collected between 0 and 2 feet bgs will be referred to as surface samples; soils collected at depths of 2 feet or more will be referred to as subsurface samples. Soil sampling locations are shown on Figure 4-1.

Arsenic was detected at concentrations exceeding the industrial PRG in two surface and 57 subsurface samples. Beryllium, lead, manganese, and hexavalent chromium were detected in samples at concentrations exceeding the residential PRGs but not the industrial PRGs (see Appendix B). The source of these elevated metals is not identified but may be the result of variations in the background concentrations (PRC 1996a). This sporadic distribution of metals exceeding the screening criteria does not appear to be related to organic contaminants or to each other.

Benzo(a)pyrene was detected at a concentration exceeding the industrial PRG in one surface soil sample. Benzo(a)anthracene and benzo(b)fluoranthene were detected at concentrations exceeding the residential PRGs but not the industrial PRGs (see Appendix B). The suspected source of these carcinogenic PAHs is surface spills and leaks of petroleum hydrocarbons (PRC 1996a).

The PCB Aroclor-1260 was detected at concentrations exceeding the industrial PRG in 16 subsurface soil samples. Aroclor-1260 was also detected at concentrations exceeding the residential PRG but not the industrial PRG. The pesticides 4,4'-DDD and 4,4'-DDE were detected at concentrations exceeding their respective residential PRGs, but not their industrial PRGs, in one subsurface soil sample (see Appendix B). Although the PCB removal action conducted in 1988 greatly reduced the potential for migration of PCB, PCBs are still present in soils above the screening criteria because the removal action only targeted surface soils to 6 feet bgs with concentrations exceeding 25 mg/kg.

TRPH was detected at concentrations exceeding the screening criteria in two surface soil samples. TOG was detected at concentrations exceeding the screening criterion in seven surface and 11 subsurface soil samples. The suspected source is surface spills and leaks of petroleum hydrocarbons; these appear to be isolated surface releases (PRC 1996a).

Potential exposure of industrial workers to soil contaminants is not expected to result in adverse health effects under the current or future industrial-use scenarios (PRC 1996a). No remedial actions are proposed for IR-08 soil under industrial-use scenarios except for an area of about 1800 square feet located about 110 feet southeast of the southeast corner of Building 606 (LFI 1996). Soil in this area may be remediated to a depth of 7 feet bgs due to the presence of PCB and PAH. This area is paved and fenced off from Building 606.

The dominant human health exposure pathways are ingestion of and dermal contact with the contaminated soil. Because the only area proposed for cleanup is paved and well outside the lease boundaries, soil contamination at IR-08 should not pose any human health risks to tenants at Building 606, provided tenants refrain from conducting intrusive activities in the paved and fenced off area.

4.2.2 Utilities

The primary utilities at HPS are the storm drain, sanitary sewer, and steam line systems. These systems are described below.

4.2.2.1 Storm Drain and Sanitary Sewer Systems

The storm drain and sanitary sewer systems, constructed from 1942 through 1958, were originally combined. Discharges to the combined system consisted primarily of storm water and domestic sewage, with lesser amounts of industrial wastes, including detergents, solvents, plating solutions, thinners, acids, resins, waste oils, and paints (PRC 1996a). Separation of the systems began in 1958 and was completed by 1976. The storm drains direct rainwater runoff into San Francisco Bay. The sanitary sewer lines direct wastewater to the San Francisco Southeast Wastewater Pollution Control Plant.

Storm Drain System

Storm water drainage areas discharge to San Francisco Bay in five locations at HPS. Drainage Areas A and H collect storm water runoff from the vicinity of Building 606. Drainage Area A collects runoff from the western side of the building and discharges to the bay at Berth 36. Drainage Area H collects runoff from the eastern side of the building and discharges to the bay at Berth 15 (EFA WEST 1996). Although the storm drain system flows by gravity, low ground surface elevations and tidal fluctuations inhibit efficient drainage. Storm drain lines are generally at or slightly above the static water levels.

A storm drain line at IR-08 traverses the PCB spill area (PRC 1996a). Three catch basins are connected to this line east of Building 606, and each catch basin is connected to a drywell. One of these drywells is located within the PCB spill area. During precipitation events, surface water runoff flows into these drywells and, subsequently, percolates through the soil to the groundwater table. Excess water flows into storm drains, which are connected to the drywells, that empty into the bay.

Sediment samples collected from these storm drains exhibited the presence of pesticides, VOCs, metals, and petroleum (EFA WEST 1996). Samples collected in the storm water drain northwest of Building 606 identified vinyl chloride and Aroclor-1260 at concentrations above levels of concern for human health.

The Navy is currently performing a removal action of the storm drain system. The planned removal action will involve cleaning out and disposing of sediments from the storm drain system. This removal action is planned for late 1996 (LFI 1996).

The dominant human health exposure pathways are ingestion of and dermal contact with contaminated sediments. Therefore, storm drains near Building 606 should not pose any risk to human health provided that tenants do not come in contact with storm drain sediments.

Sanitary Sewer System

The sanitary sewer system is constructed of iron, concrete, brick, and vitrified clay pipe. Sewage collected from the system flows to Pump Station A and is then pumped to the west end of Crisp Avenue, where it leaves HPS and discharges to the San Francisco Southeast Wastewater Pollution Control Plant.

Parcel D receives sewage from Parcels A, B, C, and E; sewage from Parcel D flows north to Spear Avenue then west to Pump Station A (PRC 1996a). The sewer lines generally slope downward toward the north to allow gravity flow toward Pump Station A. Groundwater entering the sewer line or trench backfill is potentially transported off site westward through the northern portion of Parcel D to Pump Station A. The southern portion of the sewer system is above static water levels and therefore potentially provides a groundwater recharge. The northern portion of the sewer system is largely below static water level and therefore potentially acts as a groundwater drain.

Water samples collected from the Parcel D sewer lines indicate the presence of arsenic, lead, and manganese at concentrations above levels of concern to human health (EFA WEST 1996). No remedial action is currently planned for the sanitary sewer system in the vicinity of Building 606 (LFI 1996). The sanitary sewer system may be repaired or replaced during the redevelopment of Parcel D (PRC 1996a).

EFA WEST reports that the sewer was dry in the vicinity of Building 606 during its 1996 VSI; PRC personnel also observed the sewer to be dry during its VSI. Provided that tenants do not come into contact with water from the sanitary sewer system, no apparent human health risks to tenants at Building 606 exist due to the sanitary sewer system.

4.2.2.2 Steam Line System

The underground steam line system at HPS provided heat to buildings throughout the shipyard and warmed oil lines to facilitate oil flow. The steam lines were investigated because Triple A is suspected of having used the steam line system to transport waste oil (PRC 1996a).

A steam line located near former Building 503 reportedly was used by Triple A to transport PCB-containing waste oils. A section of this line was broken in the early 1980s during construction activities near Building 503. The break resulted in release of an unknown quantity of oil that was subsequently cleaned up. The spill was investigated in 1986, and the Navy conducted an interim remedial action in 1988 to remove soil containing PCBs from the site. The steam line was removed in 1989 prior to the construction of Building 606 (PRC 1996a).

Sampling of the steam lines in Parcel D indicated the presence of TPH-gasoline, TOG, and mercury at concentrations above levels of concern to human health. No steam lines are located in or around Building 606; therefore, the steam line system should not pose any human health risks to tenants at Building 606.

4.2.3 Storage Tanks

The Navy identified 13 underground storage tanks (UST) and 20 aboveground storage tanks (AST) in Parcel D. One of the USTs was closed in place and 12 were removed (PRC 1996a). Ten ASTs have been removed. Nine ASTs are not in use; one AST is currently in use (PRC 1996a).

A 21,000-gallon AST, used for fuel oil, was associated with former Building 503 (PRC 1996a); it was removed prior to demolition of Building 503. No other USTs or ASTs are known to be associated with Building 606 or the proposed lease area (PRC 1994; 1996b).

4.2.4 Former Transformer Sites

In 1988, the Navy investigated PCB-containing transformers at HPS and removed 199 transformers (EFA WEST 1996). The former transformer sites have been reinspected for the presence of PCB-containing oil that may have been released prior to the removal of the transformers. Seventeen suspected former transformer sites in Parcel D were visually inspected as part of the Parcel D SI. Of the 17 sites, only the Regunning Pier, Building 306, and Building 525 were determined to require environmental sampling. None of these locations are within the area surrounding Building 606.

4.2.5 Radiological Sites

Radioactive materials have been identified as materials of potential concern at several former NRDL buildings in Parcel D, in particular sites IR-38 and IR-39 southeast of Building 606. Former buildings 507 and 508 were located south of Building 606 and were used by NRDL until 1969 as biological laboratory and office space, respectively (PRC 1996c). NRDL was licensed by the AEC, now the NRC, to possess and use various radionuclides in their activities at HPS. As part of NDRL's disestablishment in 1969, NRDL was required to terminate their licenses to possess and use radioactive materials. As part of the termination of their licenses, NRDL surveyed and decontaminated all sites where radioactive materials were stored and used. Documentation was presented to the AEC that the sites were radiologically clean and the buildings were cleared for unrestricted use by AEC personnel. However, to confirm that no radiological concerns exist in the areas surrounding the buildings, these areas will be surveyed for radiation and sampled if necessary. The survey is planned for November and December 1996 (PRC 1996d).

During a 1993 asbestos survey of former NRDL sites, PRC performed cursory radiological measurements to ensure the health and safety of PRC personnel. No indication of elevated radioactivity was found at any of the building locations. Sites IR-38 and IR-39 have been fenced off and any potential

exposure to radioactivity from these sites is considered minimal. Therefore, radiation exposure is not expected to be a risk for tenants at Building 606.

4.2.6 Asbestos

An asbestos survey at HPS was conducted by MINS personnel and published in 1993 (MINS 1993). The survey consisted of visual identification of suspected asbestos-containing materials (ACM) and sampling of selected ACM. Friable asbestos was not found in Building 606. Because Building 606 was constructed in 1989, it is unlikely that asbestos was used in this building. Exposure to asbestos is not anticipated.

4.2.7 Lead Paint

Current local and federal regulations regarding lead-based paint hazards only address housing and schools. Because there are no housing or schools at the property proposed to be leased, the Navy has not implemented a program for lead-based paint surveying or abatement. Lead-based paint was used regularly prior to 1978. Building 606 was constructed in 1989; therefore, lead-based paint is not expected to be present.

4.2.8 Air Monitoring

Air monitoring was conducted during the Parcel D RI to assess potential risks to human health and the environment. Indoor air monitoring was performed in buildings where VOCs in groundwater had migrated under building foundations (PRC 1996a). Human exposure can occur when VOCs diffuse into soil gas, are transported through pore spaces within subsurface soil, and enter the building through cracks in walls and floors. VOCs are not present in the groundwater at IR-08 except for an isolated low level occurrence of chloroform in a monitoring well more than 200 feet from Building 606. Because there are no VOCs beneath Building 606 and foundation cracks were not observed during the VSI, indoor air monitoring was not performed at Building 606. Indoor air quality is not expected to pose a human health risk to tenants at Building 606.

Ambient air monitoring was conducted to evaluate whether gases are being emitted into the outside air by on-site sources of contamination. During the Phase II air quality investigation conducted in 1994, ambient air samples were collected near the southeast corner of Building 606 (PRC 1996a). The maximum detected contaminant concentrations were compared to the California Air Resources Board (CARB) criteria, which are 4-year average concentrations for ambient air in the vicinity of HPS. Where CARB criteria were not available, ambient air PRGs were used.

Ambient air near the southeast corner of Building 606 contained chromium above the CARB criterion. The presence of chromium is primarily attributable to the serpentinite bedrock and fill at HPS. Ambient air near the southeast corner of Building 606 also contained formaldehyde slightly above the CARB criterion, chloromethane slightly above the PRG, and bis(2-ethylhexyl)phthalate above the PRG. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant. Since the screening criteria were only slightly exceeded, significant risk to human health due to ambient air conditions outside Building 606 is not anticipated.

During the Phase II air quality investigation, a wind erosion potential study was conducted to determine whether contaminated soil was becoming suspended in air as particulates. Twenty locations throughout HPS where soil contaminants exist were surveyed in 1994, including several areas adjacent to and upwind of Building 606. These areas were determined to have low to no wind erosion potential due to the presence of vegetation, stones, and pavement (Brown and Caldwell 1995). In addition, the soil in these areas was observed to have a thick soil crust, which is a hardening of the top layer of soil due to precipitation and accumulation of salt. Provided that the soil surface of contaminated areas is not disturbed, there is no apparent health risk to tenants of Building 606 due to airborne particulates.

Appendix D of the draft final Parcel D RI report describes air quality monitoring activities performed during the RI and is included as Appendix C of this SSEBS.

5.0 ADJACENT PROPERTIES

Adjacent properties, as defined in this SSEBS, are the contiguous properties from which hazardous substances could potentially migrate to Building 606 property. Adjacent areas considered for this SSEBS include the IRP sites near Building 606. These areas were investigated during the Parcel D RI. Draft final Parcel D RI report findings are presented in the following sections for IR-38, IR-44, IR-67, and other adjacent sites. The following sections summarize possible contaminants of concern and the likelihood of contaminant exposure for each IR site.

5.1 IR-38

Site IR-38 is located in the southwest portion of Parcel D, near the intersection of "H" and Manseau Street, with a portion of the IR site extending into Parcel E. IR-38 is east of Building 606 (Figure 5-1). Site IR-08 overlaps IR-38 at the southwest end of Building 606, but this area is considered part of IR-08. IR-38 consists of Building 500 and the site of a removed 750-gallon UST.

During an SI of Building 500, which was formerly a barracks, paint chips were observed in exposed soil surrounding the outside of the building. Several metals were detected at concentrations exceeding screening criteria in a composite surface soil sample collected from four locations around Building 500. The extent of soil containing paint chips peeling from the exterior walls of Building 500 is believed to be limited to the upper 1 foot of soil at IR-38, and no release of metals to subsurface soils or groundwater was indicated (PRC 1996a).

UST S-508 was located east of the southern extension of Building 500. The tank was installed in the mid-1940s and was used to store heating oil for a boiler in Building 500. UST S-508 and its associated product piping were removed on July 25, 1991, during Phase I of the HPS UST program (PRC 1994). Soil and groundwater sampling after the removal of UST S-508 detected petroleum hydrocarbons from the former UST.

Groundwater at IR-38 contained metals, TPH-motor oil, and TPH-diesel at concentrations exceeding screening criteria. Soil at IR-38 contained metals, carcinogenic PAHs, and TOG at concentrations exceeding screening criteria (PRC 1996a).

The area between Building 606 and IR-38 is paved or fenced, limiting access to IR-38 and potential exposure to soil contaminants. No direct human health exposure pathway for IR-38 groundwater contamination exists for Building 606 tenants. With the exception of the area around Building 500, IR-38 is currently suitable for industrial use.

Section 4.16 of the draft final Parcel D RI report, which describes IR-38 environmental investigations, is included as Appendix D of this SSEBS. Appendix D includes maps and statistical summaries of the analytical results.

5.2 IR-44

Site IR-44 is located in the central portion of Parcel D, between Hussey, Manseau, and Cochrane Streets, and northeast of Building 606 (Figure 5-1). The site is entirely paved, and consists of Buildings 408, 409, 410, 438, and a large metal shed located in the eastern portion of the site.

Building 408 was used by the Navy as a furnace shelter and oven drying facility. Buildings 409 and 410 were used to house a welder motor generator and to supply power for welding stations. Building 438, the metal spray shelter, was used to heat and then spray metal parts with a metal coating (HLA 1994a; 1994b). The large metal shed in the eastern portion of the site was apparently used to store sandblast abrasive. In 1994, large piles of sandblast abrasive were observed inside the four buildings (HLA 1994a). However, an SI conducted in February 1996 revealed that the sandblast abrasive piles had been removed. Currently, all five buildings at the site are unoccupied (PRC 1996c).

Groundwater at IR-44 contained metals, TPH-motor oil, and TRPH at concentrations exceeding screening criteria. Soil at IR-44 contained metals, SVOCs, TPH-motor oil, TRPH, and TOG at concentrations exceeding screening criteria (PRC 1996a). Potential contaminant sources identified at IR-44 include paints and metals used in the spray shelters, materials used in sandblasting operations, and

surface releases of petroleum hydrocarbons. Distribution of metals exceeding screening criteria in soil and groundwater at IR-44 were not considered indicative of releases. SVOCs detected in soil samples at IR-44 may have originated from before placement of fill material through dredging activities in IR-44. Petroleum hydrocarbons exceeding screening criteria in soil were detected northeast of Building 408 and west of Buildings 408 and 438.

The area between Building 606 and IR-44 is paved or fenced, limiting access to IR-44 and potential exposure to soil contaminants. No direct human health exposure pathway for IR-44 groundwater contamination exists for Building 606 tenants. IR-44 is currently suitable for industrial use (LFI 1996).

Section 4.18 of the draft final Parcel D RI report, which describes IR-44 environmental investigations, is included as Appendix E of this SSEBS. Appendix E includes maps and statistical summaries of the analytical results.

5.3 IR-67

Site IR-67 is located in the central portion of Parcel D, between "H", Hussey and Manseau Streets, and north of Building 606 (Figure 5-1). The site consists of Building 439 and the immediate area surrounding this building.

Building 439 is a two-story building formerly used as a sheet metal shop. During a 1989 survey, chemicals including chlorinated solvents, PCBs, copper, naphthalene, and waste oil were identified inside Building 439 (HLA 1994a). The building is currently unoccupied.

Two USTs used to store acid and alkaline waste are located outside Building 439. The combined capacity of the 1-foot-thick reinforced concrete and lined cast iron tanks is approximately 13,000 gallons. The two tanks contain liquid that may be attributed to surface water leaking into the tanks through the tank covers or groundwater infiltrating into the tanks (HLA 1994a). Petroleum hydrocarbons were detected in liquid samples collected from the waste tanks.

Groundwater at IR-67 contained metals, SVOCs, TPH-motor oil, and TPH-diesel at concentrations exceeding screening criteria. Soil at IR-67 contained metals at concentrations exceeding screening criteria (PRC 1996a). Potential contaminant sources identified at IR-67 include metals, SVOCs, and petroleum hydrocarbons in the two waste USTs. No point sources for the metals or the SVOC hexachloroethane were identified in IR-67. The petroleum hydrocarbons detected in the groundwater may have been released from the alkaline and acid waste tanks outside Building 439. No other potential sources were identified.

The area between Building 606 and IR-67 is paved, limiting potential exposure to soil contaminants. No direct human health exposure pathway for IR-67 groundwater contamination exists for Building 606 tenants. IR-67 is currently suitable for industrial use (LFI 1996).

Section 4.28 of the draft final Parcel D RI report, which describes IR-67 environmental investigations, is included as Appendix F of this SSEBS. Appendix F includes maps and statistical summaries of the analytical results.

5.4 OTHER ADJACENT PROPERTIES

The following sites are adjacent properties but fairly distant from Building 606. It is unlikely that Building 606 tenants will be affected by contaminants present at these sites.

5.4.1 IR-39

Site IR-39 is located southeast of Building 606 (Figure 5-1). Site IR-39 consists of Building 505 (Navy Exchange), former Building 519, and the large vacant lot southwest of Building 709. Former building 519 was the Chapel and Religious Center and has been demolished.

The main potential contaminant sources identified at IR-39 were release of petroleum hydrocarbons to surface soils and the storm drain catch basin. Building 709 and the surrounding area is the site of a former gas station (PRC 1996c). Seven USTs have been removed from this area.

Although the 1996 EFA WEST Building 606 SSEBS identified IR-39 as a site of potential concern for radioactivity, no radioactive materials were known to have been used or stored in IR-39 buildings. Therefore, exposure to radioactive contaminants is not expected.

The area between Building 606 and IR-39 is paved, limiting potential exposure to soil contaminants. No direct human health exposure pathway for IR-39 groundwater contamination exists for Building 606 tenants. IR-39 is currently suitable for industrial use (LFI 1996).

5.4.2 IR-48

Site IR-48 is located in the south-central portion of Parcel D and northeast of Building 606 (Figure 5-1). IR-48 consists of a suspected subsurface steam line near a metal grate. It was suspected that a steam line used to transport waste oil from the docks and berths was located in this area. A geophysical survey performed in March 1993 identified a buried metallic structure. This structure was traced to a nearby drain on Manseau Street and was subsequently identified during an excavation as perforated piping used to drain water from a former baseball field. Contamination is not known to be present at IR-48.

6.0 SUMMARY AND CONCLUSIONS

This section summarizes the findings, recommendations, and conclusions of the SSEBS. Section 6.1 summarizes the environmental condition of Building 606. Section 6.2 presents the U.S. Department of Defense (DOD) property category for Building 606. Section 6.3 presents the recommended conditions for the lease of Building 606. Building 606 has been determined suitable for lease provided the restrictions identified in this report and the accompanying FOSL document are implemented. The tenants will be limited to the lease areas described earlier in this SSEBS.

6.1 ENVIRONMENTAL CONDITION OF BUILDING 606

No potential interior sources of contamination are present in Building 606. The 1993 asbestos survey performed by MINS personnel found no friable asbestos. Since Building 606 was constructed in 1989, it

is unlikely that asbestos and lead-based paints were used in the building. The condition of Building 606 is apparently sound.

One potential exterior source of contamination in the lease area is the PCB spill area under and outside of the southeast corner of Building 606. The PCB contamination was excavated and the area was paved with asphalt concrete. The area outside the building is fenced off and the asphalt concrete is in good condition. Exposure pathways of ingestion, dermal contact, and inhalation of PCBs in soil and groundwater at IR-08 do not apparently exist. Since the anticipated leased activities in Building 606 will not involve excavation or use of groundwater, PCB exposure is not expected.

Another potential exterior source of contamination is radiological, from NRDL activities in Buildings 507 and 508. NRDL surveyed these sites for radiological contamination upon their disestablishment and decontaminated them if necessary. Documentation was presented to the AEC that the sites were radiologically clean and the buildings were cleared for unrestricted use by AEC personnel. However, to confirm that no radiological concerns exist in the areas surrounding the buildings, these areas will be surveyed for radiation and sampled if necessary. The survey is planned for November and December 1996 (PRC 1996d). These areas are fenced off from the proposed lease area.

6.2 DOD PROPERTY CATEGORY FOR BUILDING 606

The DOD developed seven environmental property categories based on the use and presence of hazardous substances and petroleum hydrocarbons. These categories are called DOD categories for the purposes of this SSEBS. Properties categorized as DOD Category 1 through 5 are considered suitable for transfer. Properties categorized as DOD Category 6 may be considered suitable for lease if potential environmental risks can be mitigated. Building 606 and the proposed lease area are classified as DOD Category 4, areas where storage, release, disposal, and migration have occurred and all remedial actions have been taken (PRC 1996c). Several areas adjacent to Building 606 are classified as DOD Category 6, areas where storage, release, disposal and migration have occurred but required response actions have not been taken. These areas are not included in the proposed lease area. If the lease conditions recommended in this report and the accompanying FOSL are implemented, the potential

environmental risks present in and near these buildings will be sufficiently mitigated. The risks associated with the proposed lease areas will be minimized.

6.3 RECOMMENDED LEASE CONDITIONS

The following lease conditions are recommended for Building 606.

- Prohibited: The Lessee and Sub-Lessee are prohibited from entering buildings and property not included in the lease. This includes, but is not limited to, fenced areas on HPS, particularly the fenced areas for IR-38 and IR-39 near Building 606.
- Prohibited: The Lessee and Sub-Lessee are prohibited from conducting activities that disturb surrounding exposed soils. This includes, but is not limited to, installing wells, conducting subsurface excavation, digging, shoveling, and trenching.
- Prohibited: The Lessee and Sub-Lessee are prohibited from disturbing the surface of the licensed premises. The Lessee and Sub-Lessee will maintain the integrity of all paved areas in the lease area during their entire tenancy. This includes, but is not limited to, the southeast end of Building 606 where a PCB spill was removed during building construction.
- Prohibited: The Lessee and Sub-Lessee are prohibited from disturbing any HPS utilities or landscape.
- Prohibited: The Lessee and Sub-Lessee are prohibited from using HPS groundwater as a source of drinking water or in Building 606 operations.
- Prohibited: The Lessee and Sub-Lessee are prohibited from discharging any material to the storm drain system. The Lessee and Sub-Lessee are prohibited from using the sanitary system or the storm drain system to discharge any hazardous substances including paint, solvent, and any other substances and materials used in their activities. Samples collected from the Parcel D storm drains indicated the presence of contaminants above levels of concern for human health. Contact with storm drain sediments should be avoided.
- Prohibited: The Lessee and Sub-Lessee are prohibited from fishing and consuming seafood from HPS waters.
- Limited: The Lessee and Sub-Lessee should limit access and travel to the leased area and direct routes on and off HPS.
- Limited: The Lessee and Sub-Lessee employees are restricted to parking vehicles along the north, east, and west sides of Building 606 adjacent to the building. Parking in other areas of HPS is prohibited. The Lessee and Sub-Lessee are prohibited from parking vehicles, materials, or equipment outside Building 606 in a manner which prevents ready access to groundwater monitoring wells and other sampling areas. Users of the building should in no way interfere with sampling crews conducting ongoing investigations. Users of the parking area should avoid contact with the following features in or near the parking area:

a. Concrete-capped monitoring wells marked in spray paint with identification numbers (avoid parking over wells during periods in which sampling or monitoring is anticipated)

b. Above-ground manholes

- Notification: The Navy may require unrestricted access to the leased property to conduct investigations or remediation activities; the Lessee and Sub-Lessee's activities may be interrupted during remediation activities. The Lessee and Sub-Lessee should not interfere with ongoing environmental investigation and remediation efforts. HPS is a NPL site. Areas where sampling and cleanup crews are working should be avoided.
- Notification: PCBs have been detected in soils near the property to be leased; the Lessee and Sub-Lessee are restricted from entering portions of site IR-08 not included in the lease area.
- Notification: The Lessee and Sub-Lessee should not come in contact with exposed soil from broken or absent pavement or from remediation activities.
- Notification: Systems to ensure personnel and property safety, such as sprinkler and alarm systems, are the responsibility of the Lessee and Sub-Lessee.
- Notification: The Lessee and Sub-Lessee are required to submit all construction modification plans for approval to the BRAC Environmental Coordinator or designee prior to performing any alterations or intrusive work in the proposed property to be leased.
- Notification: The Lessee and Sub-Lessee will handle and dispose of all hazardous materials and hazardous waste in accordance with all applicable local, state, and federal regulations and laws regarding the use, storage, and disposal of hazardous substances.
- Notification: The Lessee and Sub-Lessee are responsible for obtaining all necessary permits and licenses for their specific operations.
- Notification: The Lessee and Sub-Lessee will receive the building in an "as is" condition, without any cleaning or moving of property by the Navy. The Lessee and Sub-Lessee are permitted to sweep, vacuum, and mop down building floors and walls.
- Notification: The Lessee and Sub-Lessee should adhere to all posted notices, including warning signs.
- Notification: The Lessee and Sub-Lessee should be made aware of this report and the existing environmental conditions described herein.

7.0 CERTIFICATION

I certify that the property conditions stated in this report are based on a thorough review of records, visual inspections, and sampling and analysis data as noted, and are true and correct, to the best of my knowledge and belief.

Michael E. McClelland
Hunters Point Shipyard
BRAC Environmental Coordinator

Date

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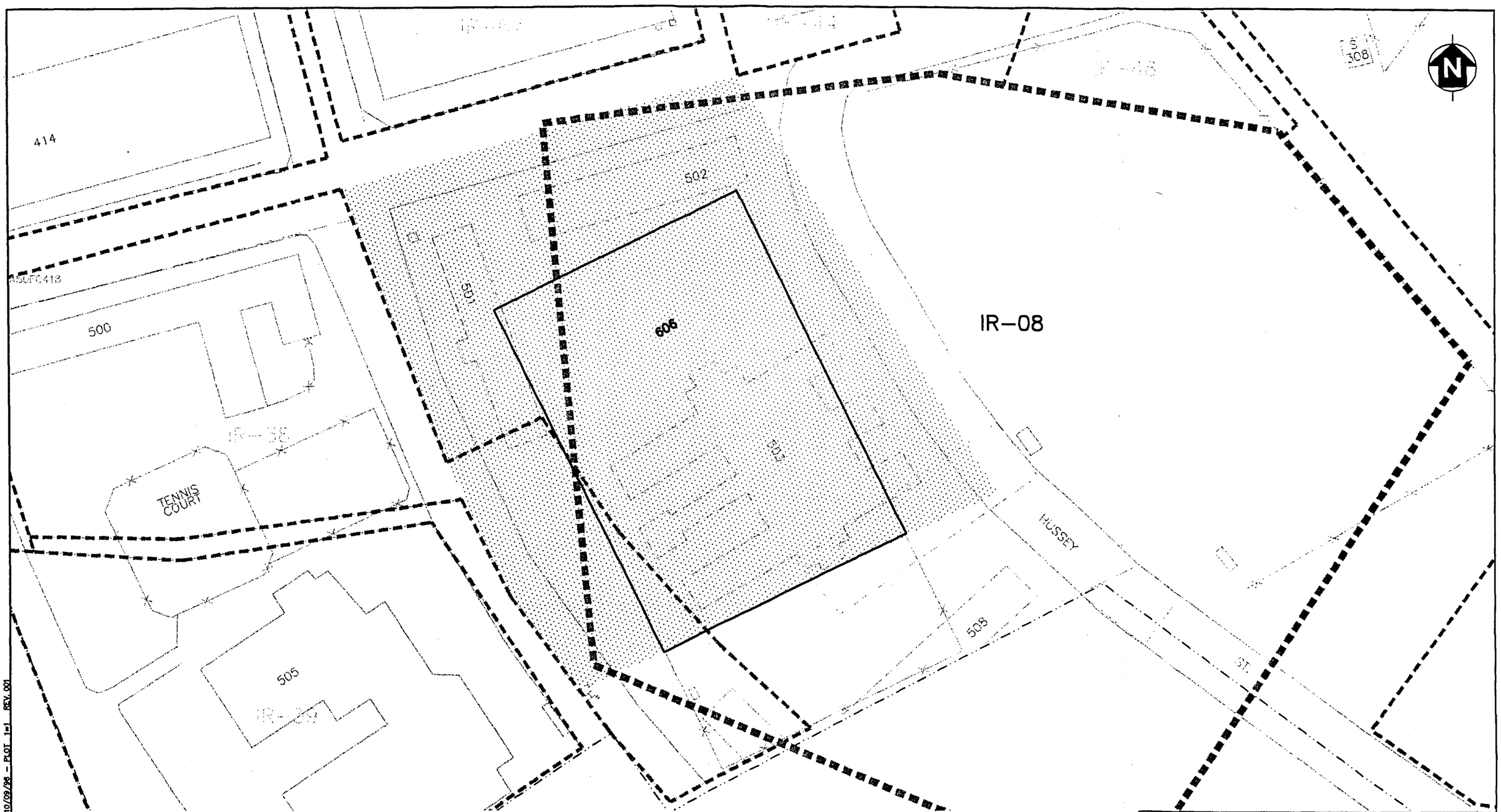
FIGURES



LEGEND:

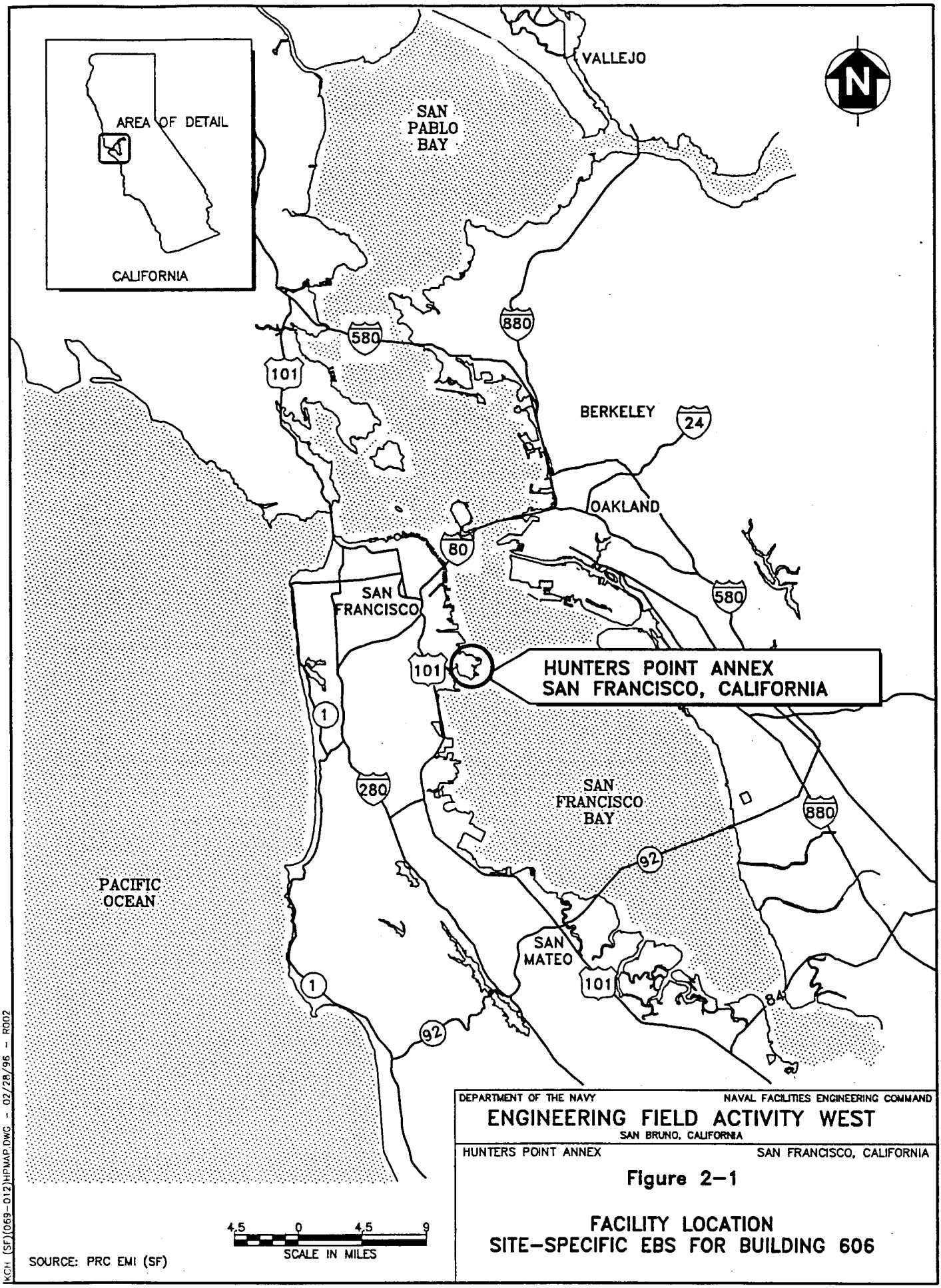
- PROPOSED LEASE BOUNDARY AREA
- IR SITE BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)
- PARCEL BOUNDARY

40' 0 40' 80'
SCALE: 1" = 80'

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT ANNEX — SAN FRANCISCO, CALIFORNIA

Figure ES-1
PROPOSED LEASE BOUNDARY AREA FOR BUILDING 606 SITE SPECIFIC EBS FOR BUILDING 606

KCKSEX 069-012.1 SITEIR08.DWG - 10/09/96 - PLOT 1=1 REV. 001



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT ANNEX — SAN FRANCISCO, CALIFORNIA

Figure 2-1

FACILITY LOCATION
SITE-SPECIFIC EBS FOR BUILDING 606

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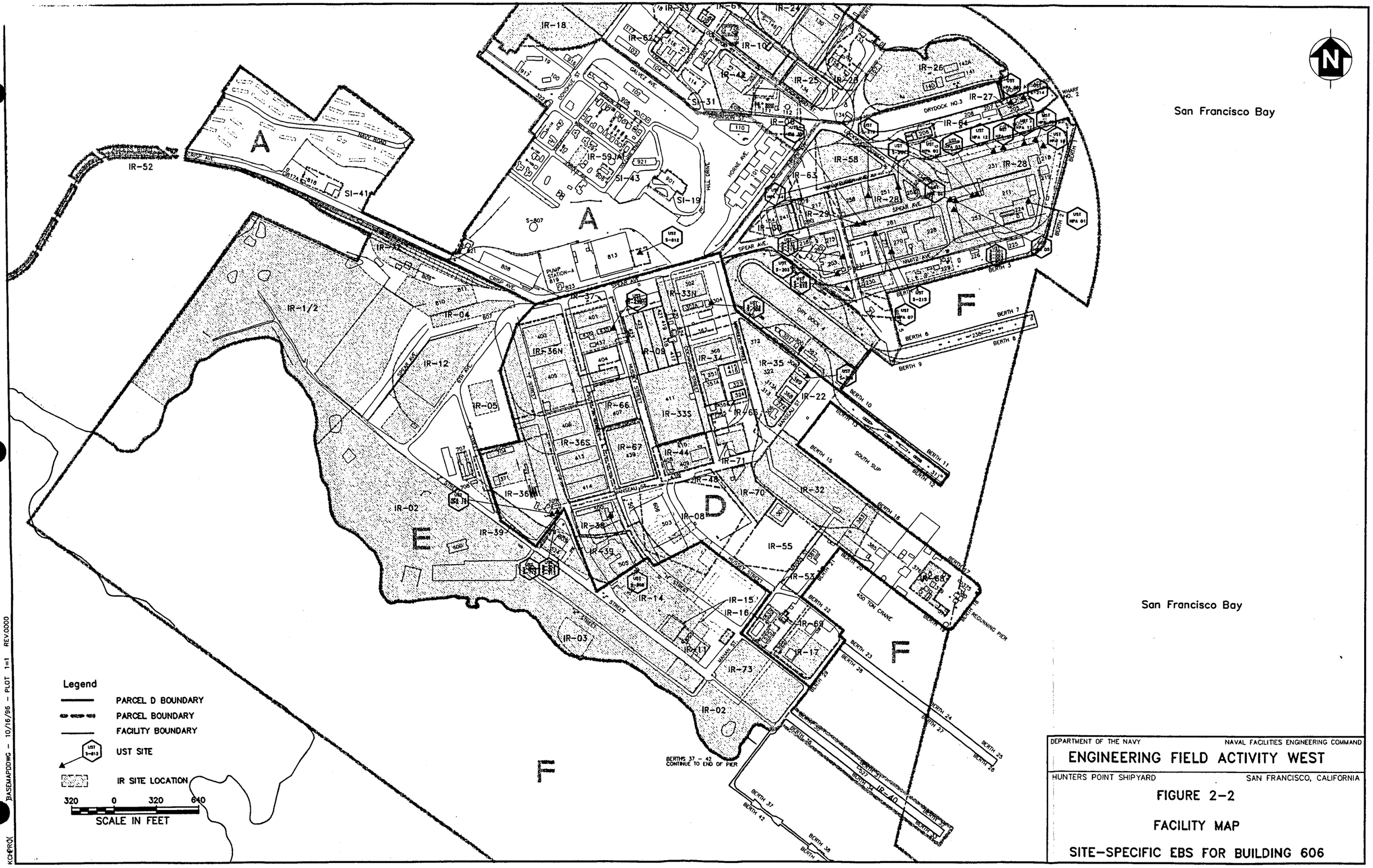


DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 2-2

FACILITY MAP

SITE-SPECIFIC EBS FOR BUILDING 606

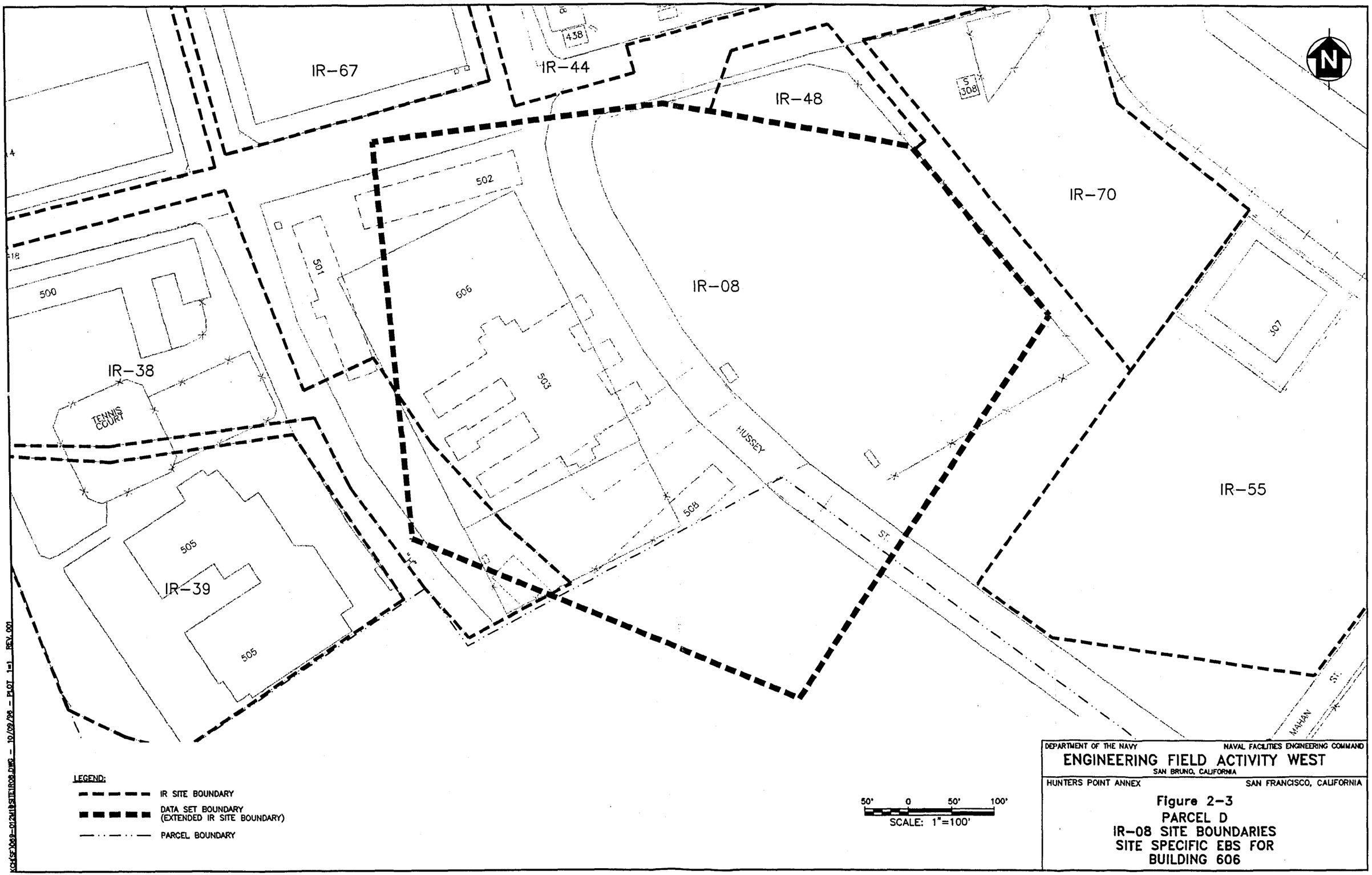
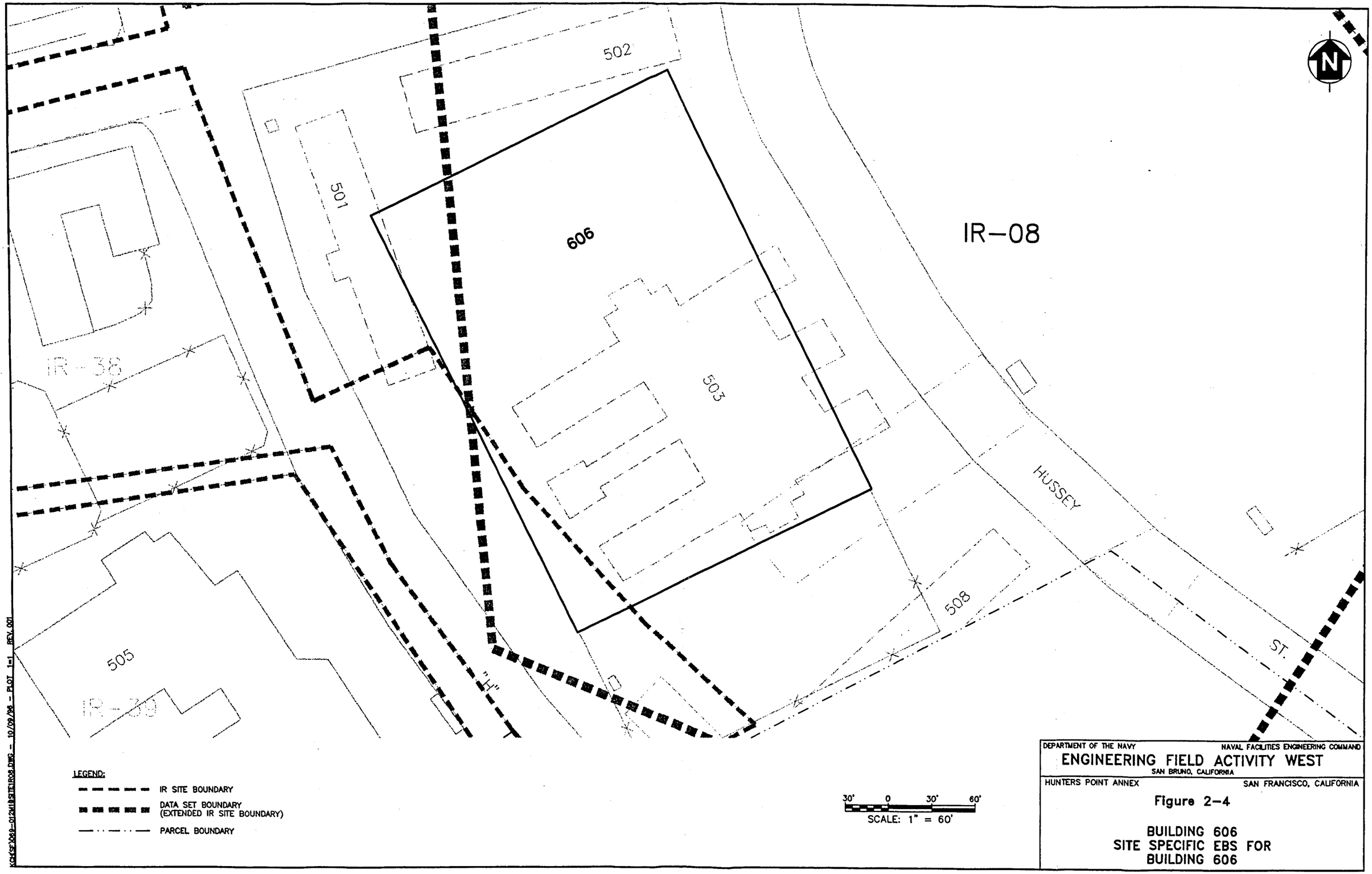


Figure 2-3
PARCEL D
IR-08 SITE BOUNDARIES
SITE SPECIFIC EBS FOR
BUILDING 606



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT ANNEX — SAN FRANCISCO, CALIFORNIA

Figure 2-4

BUILDING 606
SITE SPECIFIC EBS FOR
BUILDING 606

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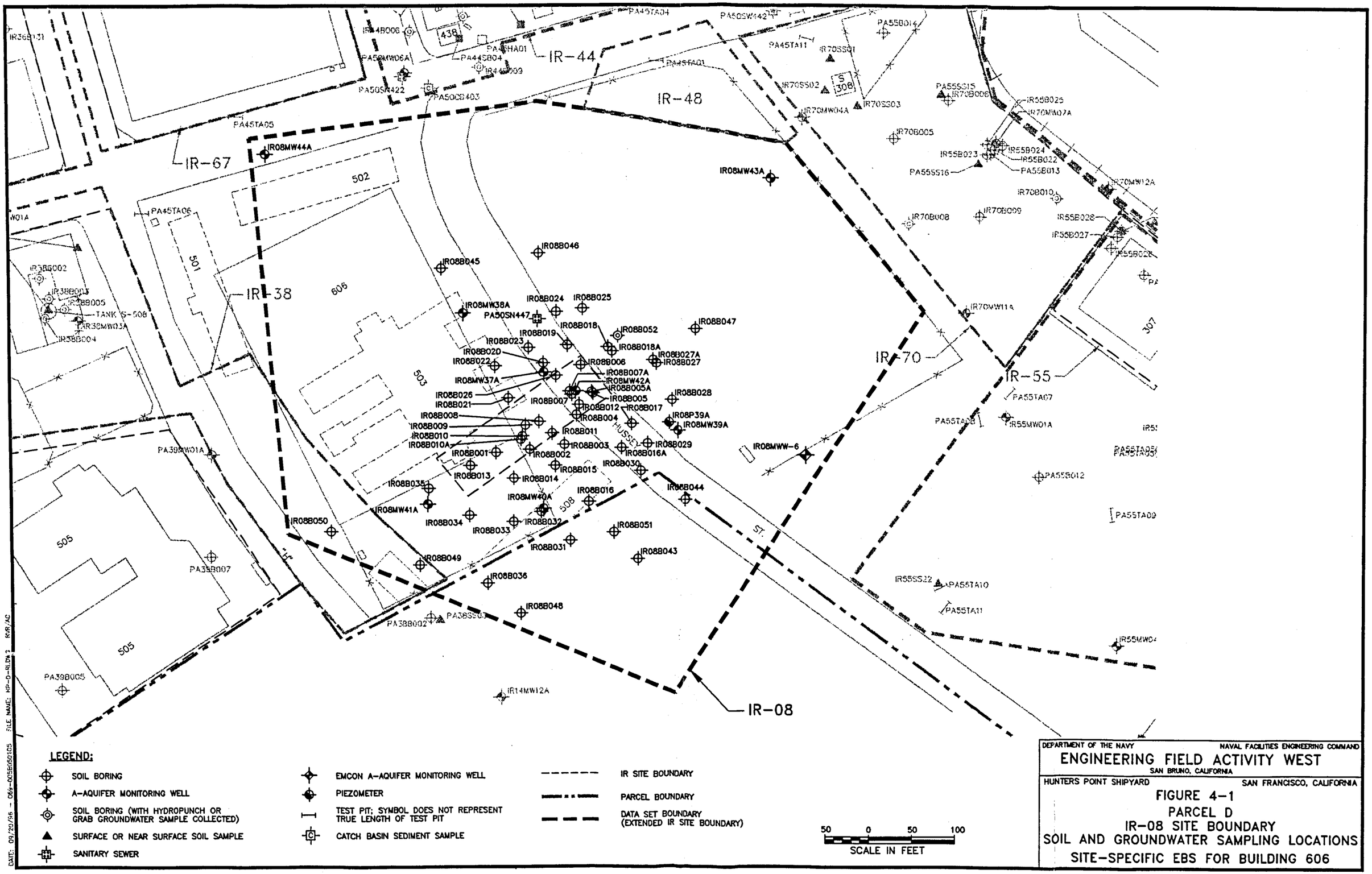


LEGEND:

- SOIL BORING
- A-AQUIFER MONITORING WELL
- SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- SANITARY SEWER
- EMCON A-AQUIFER MONITORING WELL
- PIEZOMETER
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- CATCH BASIN SEDIMENT SAMPLE
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)

50 0 50 100
SCALE IN FEET

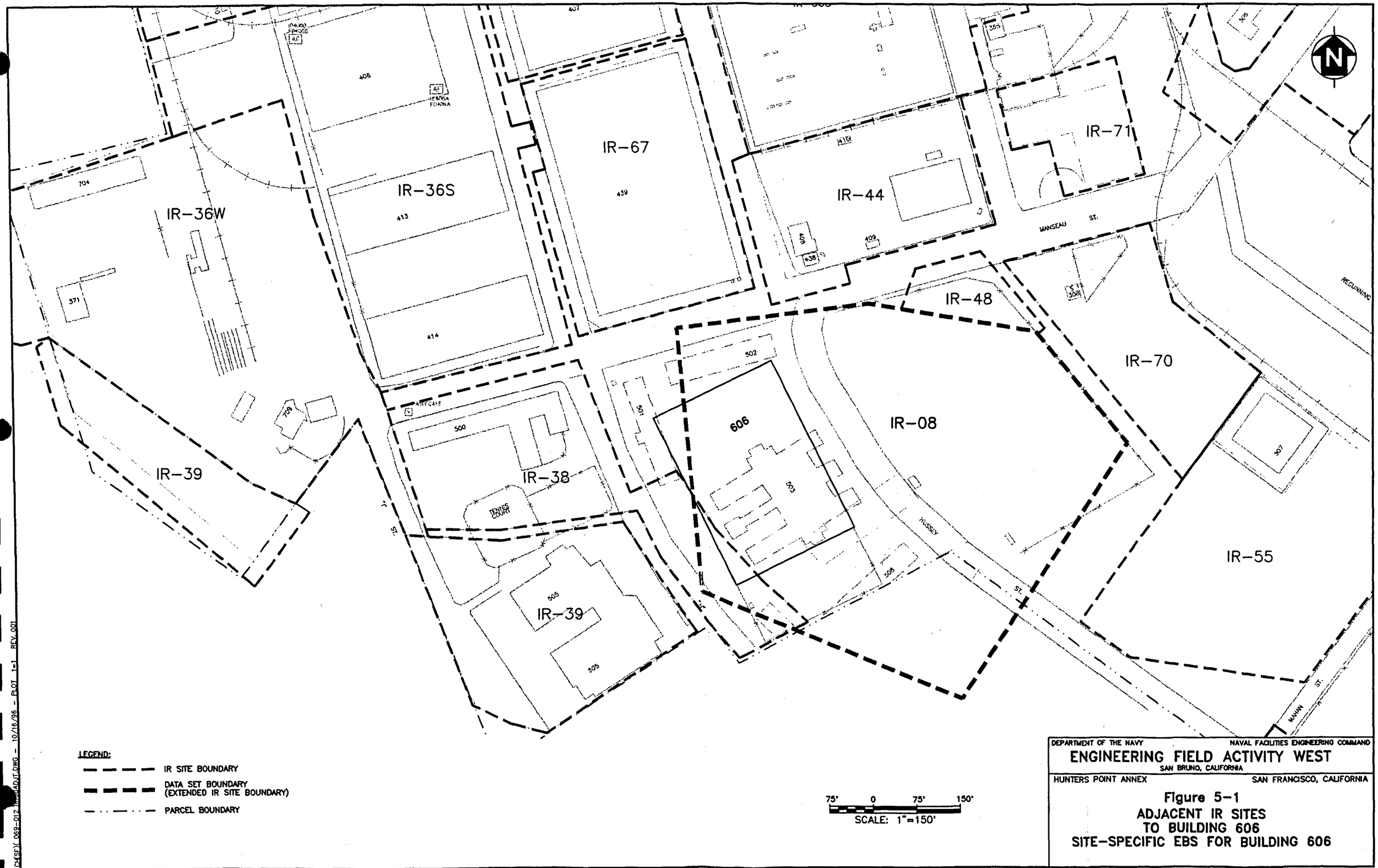
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4-1
PARCEL D
IR-08 SITE BOUNDARY
SOIL AND GROUNDWATER SAMPLING LOCATIONS
SITE-SPECIFIC EBS FOR BUILDING 606

DATE: 09/20/96 - 069-005B050105 FILE NAME: HP-D-RI.DWG KVR/AC



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT ANNEX — SAN FRANCISCO, CALIFORNIA

Figure 5-1
ADJACENT IR SITES
TO BUILDING 606
SITE-SPECIFIC EBS FOR BUILDING 606

KCH(SF)(069-012)\ADJT.DWG - 10/16/96 - PLOT 1=1 REV. 001

APPENDIX A

PREVIOUS SSEBS REPORTS FOR BUILDING 606

PROPERTY-SPECIFIC
ENVIRONMENTAL BASELINE SURVEY

WESTERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
HUNTERS POINT ANNEX

BUILDING 606

July 1994

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C Building 606 Location Map
D HPA Base Closure Plan, Partial Table 3-1

ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
BCP	BRAC Cleanup Plan
BER	Baseline Environmental Report
BLDG	Building
BRAC	Baseline Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of San Francisco
DLA	Defense Logistics Agency
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
FFA	Federal Facility Agreement
FOSL	Finding of Suitability to Lease
HLA	Harding Lawson and Associates
HPA	Hunters Point Annex
MOU	Memorandum of Understanding
NPL	National Priorities List
PA	Preliminary Assessment
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RI/FS	Remedial Investigation/Feasibility Study
SA	Site Assessment
SI	Site Inspection
SFDA	San Francisco District Attorney's Office
TCE	Trichloroethane
TPH	Total Petroleum Hydrocarbons
U.S. EPA	U.S. Environmental Protection Agency
WESTDIV	Western Division Engineering Command

EXECUTIVE SUMMARY

The Western Division Naval Facilities Engineering Command (WESTDIV), Hunters Point Annex (HPA) is currently listed on the National Priorities List (NPL) as a Superfund Site. Before leasing property, the Department of Defense (DOD) policy requires that an Environmental Baseline Survey (EBS) be prepared. According to DOD policy, an EBS is recommended for property which is to be licensed, as well.

This is a Property-Specific EBS conducted as an evaluation of the environmental condition of Building 606 at HPA to determine the suitability of licensing the building for short term use as a set construction and film production studio. Document reviews, interviews and walk-through inspections were conducted to collect relevant information for the EBS. Because the EBS was completed within a short time frame for an immediate license, the EBS analysis does not address the full array of documentation required by DOD guidance, such as: analysis of aerial photos, interviews with employees who may have once worked in Building 606 sampling if appropriate, and so forth.

On the basis of the immediately available information, however, the EBS concludes that there are no known health risks associated with short term use of Building 606.

Further, the EBS concludes that although contaminants may be present immediately outside and nearby Building 606, they are not accessible if proper precautions are followed.

Finally, the EBS concludes that HPA is a highly concentrated industrial complex and hazardous waste site. As such, proper caution should be exercised when on the site, including restriction from fenced areas and areas posted with warnings as well as deference to crews on site who are conducting environmental investigation and remediation.

In the event that more long term use of Building 606 is contemplated prior to the transfer of ownership of Parcel D--the parcel in which Building 606 is located--a more detailed EBS is recommended which adheres more strictly to the DOD EBS and Finding of Suitability to Lease (License) guidance.

1.0 PURPOSE OF THE PROPERTY-SPECIFIC ENVIRONMENTAL BASELINE SURVEY

The purpose of this Property-specific Environmental Baseline Survey (EBS) is to establish the environmental condition of Building 606 at the Western Division Naval Facilities Engineering Command (WESTDIV), Hunters Point Annex, San Francisco, CA (HPA) as it relates to the short term licensing of the building. A more detailed EBS will be conducted prior to any longer term licensing or leasing of the building in the future. An evaluation of the environmental condition of Building 606 provides the basis upon which a Finding of Suitability to License (FOSL) and any recommended use restrictions will be made.

The short term license now being contemplated is for the use of the interior of the building for the construction of a film production set and filming of an animated feature film.

The Property-Specific EBS is organized as follows. Section 2.0 provides a general description and history of the Hunters Point Annex. Section 3.0 briefly describes the methodology used to collect information relevant to this environmental evaluation. Section 4.0 provides a description of Building 606 itself and its environmental condition, to the degree that it is known. Section 5.0 provides conclusions and recommendations.

2.0 INTRODUCTION--HISTORY OF ACTIVITY AT HPA

HPA is in southeast San Francisco on a peninsula extending eastward into San Francisco Bay. The Navy property comprises about 965 acres, about 500 acres of which is on land and the rest of which is in San Francisco Bay. HPA is bounded on the north and east by San Francisco Bay and on the south and west by the Bayview Hunters Point district of San Francisco. (See Appendix A, Map of HPA).

2.1 PROPERTY USE AT HPA

2.1.1 HISTORY OF PAST USE

HPA was operated as a commercial dry dock facility from 1896 until December 29, 1939 at which time the property was purchased by the Navy. The Navy leased the facility to Bethlehem Steel Company until December 18, 1941. On that date, the Navy took possession of the property and began operating the shipyard to provide accelerated production of Liberty ships during World War II. Navy ships and submarines were also modified, maintained and repaired there. In addition, HPA was used for personnel training, limited radiological operations, research and development, ship design, and non industrial services for Navy personnel and their families. In 1974,

the Navy ceased shipyard operations, placed the facility in industrial reserve, and transferred control of the property to its Office of the Supervisor of Shipbuilding Conversion and Repair, San Francisco.

Between 1935 and 1975, fill materials were placed in San Francisco Bay increasing the land area of the facility from less than 100 acres to about 500 acres. Aerial photographs from the 1940s indicate that most of the cutting and filling probably occurred soon after the Navy took possession of the property in late 1941.

From May 1976 to June 1986, Triple A Machine Shop leased most of HPA from the Navy and operated a commercial ship repair facility. Triple A subleased portions of HPA to private warehousing, industrial and commercial firms. Following action by the San Francisco District Attorney's Office (SFDA), Triple A vacated the facility in mid-1987. The SFDA charged Triple A with illegally disposing of hazardous wastes at about 19 locations throughout HPA. In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal.

2.1.2 CURRENT STATUS OF USE

Caretaker responsibility for HPA was transferred to the Western Division Naval Facilities Engineering Command (WESTDIV) on April 1, 1994. Many of the buildings and structures at the shipyard are abandoned and/or under investigation. However, several dozen tenants continue to operate small industrial and commercial businesses at HPA which WESTDIV now manages.

A Navy-operated Fire Department resides on base which provides fire protection and first aid services in the event of emergencies. The Navy has a working relationship with the San Francisco Police Department and Fire Department in case an emergency requires additional services. WESTDIV is now working on an Emergency Response Plan for the base; but, such a plan is not now complete.

As a closing base, WESTDIV is endeavoring to investigate and remediate the facility in an expedited manner so as to transfer the facility to the City of San Francisco as per the Navy's Memorandum of Understanding with the City. In the mean time, WESTDIV is also endeavoring to implement interim leases/licenses for HPA facilities so as to increase the economic potential of the Bayview Hunters Point community and San Francisco, in general.

2.2 ENVIRONMENTAL INVESTIGATION/REMEDIATION AT HPA

2.2.1 HISTORY OF PAST INVESTIGATION/REMEDIATION

On the basis of investigations performed between 1986 and 1988, HPA was placed on the National Priorities List (NPL) in 1989. The Navy is required to perform a Remedial Investigation/Feasibility (RI/FS) Study in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

A Federal Facility Agreement (FFA) has been signed by the Navy, U.S. Environmental Protection Agency (U.S. EPA), and the California Environmental Protection Agency (Cal/EPA)/Department of Toxic Substances Control (DTSC). The agreement identifies the Navy as the lead agency in investigation and cleanup and the U.S. EPA and Cal/EPA as oversight agencies. Prior to 1992, the Navy had undertaken a course of investigation which identified and investigated the worst hazardous waste sites first. In 1992, the site strategy was modified by reorganizing the site into five geographically contiguous parcels (Parcels A through E) for the purposes of expediting parcel investigation, cleanup, and in particular, property transfer. The parties to the FFA are currently negotiating a new schedule by which each parcel will be remediated.

2.2.2 CURRENT STATUS OF INVESTIGATION/REMEDIATION

Building 606 is found within the boundaries of Parcel D. A Site Inspection (SI) of Parcel D investigated the presence of contaminants in and around the area's utilities and numerous building sites within Parcel D by use of environmental sampling techniques. The results of the Site Inspection are documented in the Draft Final Parcel D Site Inspection Report. The area within which Building 606 is located slightly coincides with Installation Restoration (IR) site IR-8 which is the site of a previously remediated Polychlorinated Biphenyl (PCB) spill. (See Appendix B, Map of Parcel D).

3.0 SURVEY METHODOLOGY

3.1 PRIMARY DOCUMENTS CONSULTED

The information in this Property-specific EBS is compiled from the HPA Administrative Record developed to support the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) investigation and remediation of past hazardous waste disposal at HPA and other base investigations and surveys. Specific documents which were reviewed include:

Asbestos Survey of Hunters Point Annex conducted by Mare Island Naval Shipyard, October 1993

Base Realignment and Closure Cleanup Plan (BCP) for Naval Station Treasure Island, (Hunters Point Annex), CA dated March 5, 1994

Draft Final Parcel D Site Inspection Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California, Volume I, dated May 2, 1994

Naval Station Treasure Island, Hunters Point Annex, Baseline Environmental Report, Volume 2a, dated July 1994

Preliminary Draft Final Summary Alternative Selection Report, Operable Unit II, Naval Station Treasure Island, Hunters Point Annex, dated 3 May 1993

3.2 INSPECTION OF PROPERTIES CONDUCTED

On July 21, 1994, U.S. Navy and U.S. Environmental Protection Agency personnel conducted a walk-through inspection as part of the Property-specific EBS for Building 606. The walk-through was conducted to confirm and supplement the findings of HLA personnel. The walk-through team consisted of: the Navy Base Closure Manager, the Navy On-site Caretaker, a Navy Remedial Project Manager, a U.S. EPA Remedial Project Manager, and a U.S. EPA Base Closure Specialist.

3.3 INDIVIDUALS CONSULTED

Domenic Zigant, Base Closure Manager for Hunters Point Annex and Treasure Island and Donald Shannon, On-Site Caretaker, were contacted regarding their knowledge of Building 606.

4.0 FINDINGS--BUILDING 606

4.1 DESCRIPTION OF BUILDING 606

4.1.1 INTERIOR

Building 606 is 89,600 square feet in size and of steel construction. The front part (north end) of the building includes an entry lobby and 2 stories of office and conference room spaces. The rear of the building (south portion) is a 2 story high bay open area with concrete flooring . The condition of all the spaces is excellent with no signs of the use, storage, or spillage of hazardous materials or petroleum products.

4.1.2 EXTERIOR

Building 606 is located in the Hunters Point Installation Restoration Program (IRP) Parcel D. (See Appendices B, Map of Parcel D and C, Building 606 Location Map)

4.2 PROPERTY USE IN BUILDING 606

4.3 ENVIRONMENTAL CONDITION OF BUILDING 606

4.3.1 POTENTIAL INTERIOR SOURCES

There are no potential interior sources. An asbestos survey, completed in 1994 by Mare Island Naval Shipyard personnel, identified possible asbestos containing materials in Building 606, but their detailed inspection of the building found no friable asbestos. Considering the date of construction for building 606, it is unlikely that asbestos was used in this building.

4.3.2 POTENTIAL EXTERIOR SOURCES

During the construction of Building 606, an area of PCB contamination was found in the vicinity of what is now the southeast corner of the building. The PCB contamination was excavated and removed from the site, the excavation was filled with clean and compacted backfill, and the area was paved with asphaltic concrete. This area at the southeast corner of the building is now being investigated as a part of the Hunters Point IRP as IR-8. The results of recent tests on ground water samples from IR-8 have shown non-detect values for PCB's. In light of these tests and since the asphaltic concrete is in good condition and the anticipated licensed activities in Building 606 will not involve any excavation or use of ground water, PCB exposure is not anticipated.

Building 606 is located on the site of former buildings 501, 503, 507 and 508. Buildings 501 (Ship's Barracks) and 503 (Ship's Subsistence and Laundry) did not have uses consistent with the storage or use of hazardous materials. Buildings 507. (Radiochemistry Lab) and 508 (Biological Lab) were used by the Navy Radiological Defense Laboratory (NRDL) until they were disestablished in 1969. NRDL was licensed by the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), to possess and use various radionuclides in their day to day activities and investigations. As a part of the disestablishment of NRDL all sites were surveyed for radiological contamination and decontaminated if necessary. No radiological hazards are expected. Refer to section 4.4.9 Radiological Sites.

4.4 ENVIRONMENTAL SETTING--PARCEL D

4.4.1 STORM DRAIN SYSTEM.

There are five stormwater drainage areas in Parcel D: Areas A, G, H, I, and J. Drainage Areas A and H collect stormwater runoff from the vicinity of Building 606. Drainage Area A collects runoff from the western side of the building and discharges to San Francisco Bay at Berth 36. Drainage Area H collects runoff from the eastern side of the building and discharges to San Francisco Bay at Berth 15. Sediment samples collected from these drains detected the presence of contaminants including: pesticides, volatile organic contaminants, heavy metals and petroleum. Samples collected in the stormwater drain to the northwest of Building 606 identified vinyl chloride and Aroclor-1260 at concentrations above levels of concern for human health.

4.4.2 SANITARY SEWER SYSTEM

The sanitary sewer system in Parcel D consists of six drainage reaches: 5, 6, 7, 8, 9, and 10. Parcel D receives sewage from Parcels A, B, C, and E; sewage from Parcel D flows northward to Spear Avenue then west to Pump Station A. The sewer lines generally slope downward toward the north to allow gravity flow toward Pump Station A. Groundwater entering the sewer line and/or trench backfill is potentially transported offsite westward through the northern portion of Parcel D and to Pump Station A. The southern portion of the sewer system is above static water levels and therefore potentially provides a groundwater recharge. The northern portion of the sewer system is largely below static water level and therefore potentially acts as a groundwater "sink" or drain.

Water samples collected from the Parcel D sewer lines indicate the presence of contaminants. Arsenic, lead, and manganese were detected in Parcel D sewers at concentrations above levels of concern to human health. The sewer was dry in the vicinity of Building 606.

4.4.3 STEAM LINE SYSTEM

During Triple A's tenancy at HPA, it is rumored that the company used the facility's steam line system to transport waste oil from the dry docks to the oil reclamation ponds in the Parcel E. As result, the Navy is now investigating the steam lines for possible waste oil contamination.

Sampling of the steam lines in Parcel D indicated the presence of contaminants. Total Petroleum Hydrocarbons (TPH)-gasoline, total oil and grease, and

mercury were detected in Parcel D steam lines at concentrations above levels of concern to human health. There are no steam lines indicated in or around Building 606.

4.4.4 FORMER TRANSFORMER SITES

In 1988, the Navy undertook an investigation of the Polychlorinated Biphenyl (PCB)-containing transformers at HPA. 199 transformers were removed at that time. These former transformer sites, where known, have been reinspected for the presence of PCB-containing oil which may have been released prior to the removal of the transformers.

Seventeen suspected former transformer sites in Parcel D were visually inspected as part of the Site Inspection for Parcel D. Of them, three were determined to require environmental sampling: the Regunning Pier, Building 306, and Building 525. None of these locations are within the area surrounding Building 606.

4.4.5 UNDERGROUND STORAGE TANKS

According to the Baseline Realignment and Closure (BRAC) Cleanup Plan (BCP) for HPA, 13 underground storage tanks have been identified in Parcel D. One of these tanks was closed in place. All the others have been removed. Further investigation has been proposed for all but that which was closed in place at Building 308.

None of the tanks are associated with Building 606. One, at Building 505, is to the immediate west of Building 606. This was a 750 gallon fuel oil tank installed in the mid-1940s. No sampling data for the removal was reviewed as part of this Property-Specific EBS.

4.4.7 GROUNDWATER CONTAMINATION

Groundwater has been evaluated at specific sites within Parcel D: Installation Restoration (IR) sites and Preliminary Assessment (PA) sites. The Parcel D IR sites are described in the Draft Final Summary Alternative Selection Report for Operable Unit II. They include: Installation Restoration (IR) site IR-6 (the Tank Farm), IR-8 (PCB Spill outside Building 606), IR-9 (Pickling and Plate Yard) and IR-10 (Battery and Electroplating Shop). The Navy has identified volatile organic contaminants, semivolatile organic contaminants, diesel fuel, and oil and grease as contaminants of concern to groundwater at IR-6. The Navy has identified no contaminants of concern to groundwater at IR-8. The Navy has identified hexavalent chromium as the contaminant of concern to groundwater at IR-9. And, the Navy has identified lead, zinc, and volatile organic contaminants as potential contaminants of concern to groundwater at IR-10. The findings at IR-8 are described above in section 4.3.1.2.

The Parcel D Preliminary Assessment (PA) sites are described in the Draft Final Parcel D Site Inspection Report. They include: PA-32 through PA-39, PA-44, PA-53, and PA-55. Heavy metals, volatile organic contaminants, semivolatile organic contaminants, pesticides, PCBs, and petroleum have been detected at various locations in groundwater in Parcel D at these sites. Overall groundwater contamination at Parcel D, however, has not yet been fully evaluated. Additional sampling is proposed as part of the remedial investigation phase of evaluation at the PA sites. (See Appendix D, BCP Table 3-1)

4.4.8 SOIL CONTAMINATION

Soil has been evaluated at specific sites within Parcel D: Installation Restoration (IR) sites and Preliminary Assessment (PA) sites. The Parcel D IR sites are described in the Draft Final Summary Alternative Selection Report for Operable Unit II. They include: Installation Restoration (IR) site IR-6 (the Tank Farm), IR-8 (PCB Spill outside Building 606), IR-9 (Pickling and Plate Yard) and IR-10 (Battery and Electroplating Shop). Diesel fuel, oil and grease, carcinogenic polyaromatic hydrocarbons, PCBs, and lead have been identified in soil at IR-6. Aroclor 1260 has been identified in soil at IR-8 (as described above in section 4.3.1.2). Chromium VI has been identified in soil at IR-9. And, lead has been identified in the soil at IR-10.

The Parcel D Preliminary Assessment (PA) sites are described in the Draft Final Parcel D Site Inspection Report. They include: PA-32 through PA-39, PA-44, PA-53, and PA-55. Heavy metals, volatile organic contaminants, semivolatile organic contaminants, pesticides, PCBs, and petroleum have been detected at various locations in soil in Parcel D at these sites. Additional sampling is proposed as part of the remedial investigation phase of evaluation at these sites. (See Appendix D, BCP Table 3-1)

4.4.9 RADIOLOGICAL SITES

Radioactive materials have been identified as materials of potential concern at several former NRDL buildings in Parcel D, in particular IR-38 and IR-39. Building 606 is located on the site of former buildings 501, 503, 507 and 508. Buildings 507 (Radiochemistry Lab) and 508 (Biological Lab) were used by the Navy Radiological Defense Laboratory (NRDL) until they were disestablished in 1969. NRDL was licensed by the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), to possess and use various radionuclides in their day to day activities and investigations. As a part of their disestablishment, NRDL was required to request termination of all of their licenses to possess and use radioactive materials. As a part of the termination of these licenses, NRDL was required to survey and decontaminate all sites where radioactive materials were stored or used and present documentation to the AEC that the sites were radiologically clean. As a part of the

disestablishment of NRDL all of their licenses were properly terminated by the AEC There is thus very little concern that radioactive materials or contamination are present at the sites of former buildings 507 and 508. A cursory health-based radiological survey performed by a Navy consultant (PRC Environmental Management) at former NRDL sites in 1993 did not indicate elevated radiological activity at any of the demolished building locations. A formal survey will be performed at all former NRDL sites, including IR-38 and IR-39 nearby building 606, as a part of the Phase III Radiological investigation. Exposure to radiological contamination is not anticipated.

4.4.10 ASBESTOS/LEAD PAINT

An asbestos survey, completed in 1994 by Mare Island Naval Shipyard personnel, identified possible asbestos containing materials in Building 606. Their inspection of bldg. 606 found no friable asbestos. Considering the date of construction for Building 606, it is unlikely that either asbestos or lead paint were used in this building and exposure to asbestos or lead paint is not anticipated.

5.0 CONCLUSIONS/RECOMMENDATIONS

The Property-Specific Environmental Baseline Survey for Building 606 concludes that there are no known health risks associated with short term use of Building 606 for set construction and film production which can not be properly controlled by restricted access to those areas where contaminants are located or may be located. On this basis, and because the Navy does not intend to conduct any maintenance activities prior to the licensing of Building 606, the following conclusions and recommendations are given.

1. Future users should identify the appropriate emergency contact numbers prior to any operations on site.

2. Nearby building 606 are the fenced areas for IR-38 and IR-39. Future users should remain outside of any fenced areas on base.

3. At the southeast end of building 606 is IR-8 where a PCB spill was removed during the building construction. The area is paved over with asphaltic concrete thus minimizing possibility of contact with soil in this area. There is no immediate risk associated with these findings. Future users should avoid interference of any on-going investigation and/or cleanup of these soils in the event that sampling/cleanup crews are present.

4. Sediment samples collected from the storm drains in Parcel D detected the presence of contaminants including: pesticides, volatile organic contaminants, heavy metals and petroleum. Samples collected in the stormwater drain to the

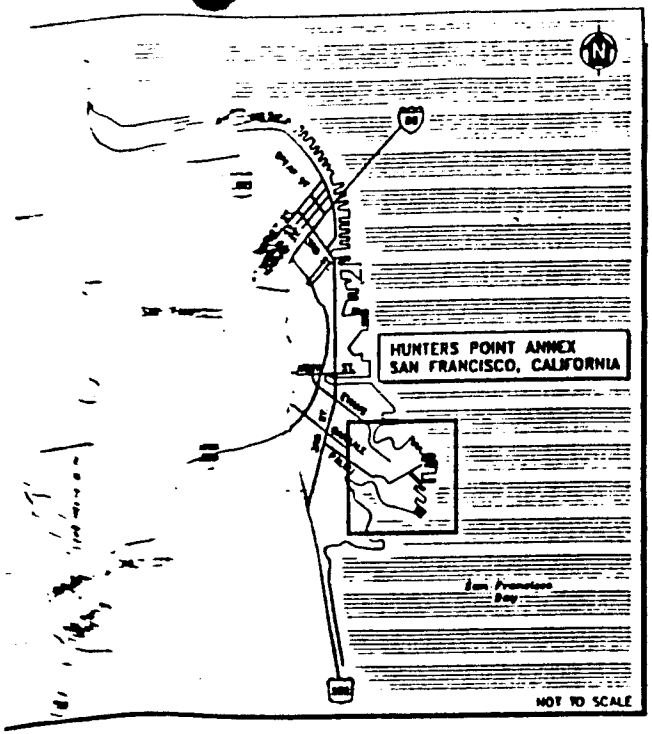
northwest of Building 606 identified vinyl chloride and Aroclor-1260 at concentrations above levels of concern for human health. Contact with storm drain sediments should be avoided. Future users should be forbidden from the discharge of any material to the storm drain system.

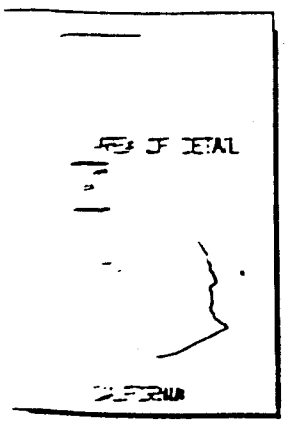
In addition, future users should avoid any interference of on-going remediation of the storm drain system, in the event that environmental/maintenance crews are present conducting sediment removal in this area.

5. HPA is a highly concentrated, industrial site which has been in operation for several decades. The site contains many pieces of dangerous equipment and buildings in poor repair. In addition, HPA is a national priority hazardous waste site which is under on-going environmental investigation. As indicated in Section 4.0 above, concentrations of hazardous substances and petroleum have been found in soil and groundwater throughout the facility which exceed levels of concern to human health. As such, future users should use the same kind of caution at HPA which is appropriate at any industrial site. Further, future users should remain outside of any fenced areas, adhere to all warning signs, disturb none of the facility's utilities or landscape and interfere with none of the on-going sampling and remediation efforts. A license for use of Building 606 should specify use of the building's interior space and the parking areas to the north and south of the building only.

APPENDIX A

MAP OF HUNTERS POINT ANNEX





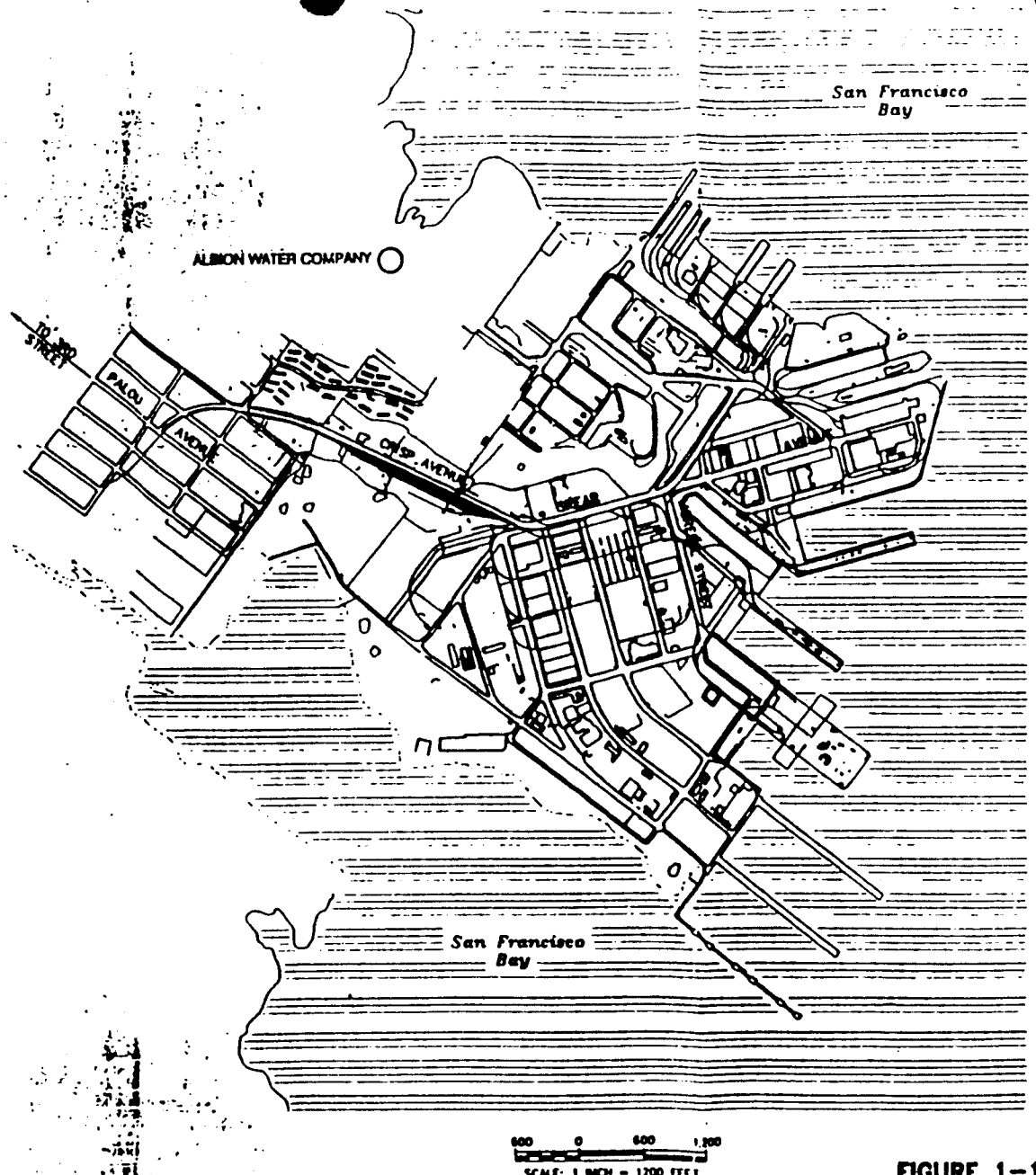
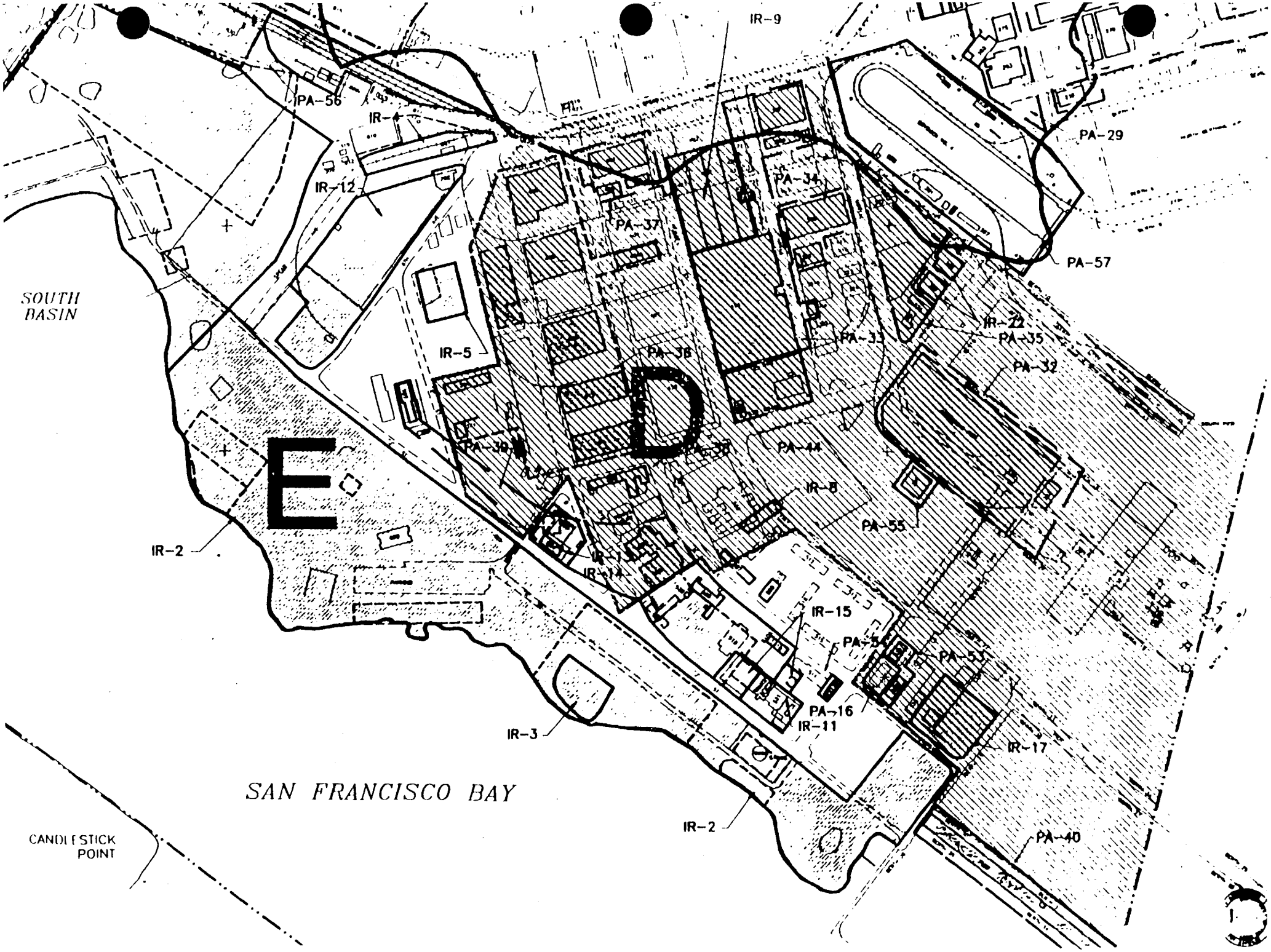


FIGURE 1-1
SITE LOCATION MAP
HUNTERS POINT ANNEX
SAN FRANCISCO, CALIFORNIA

APPENDIX B

MAP OF PARCEL D


IR-9
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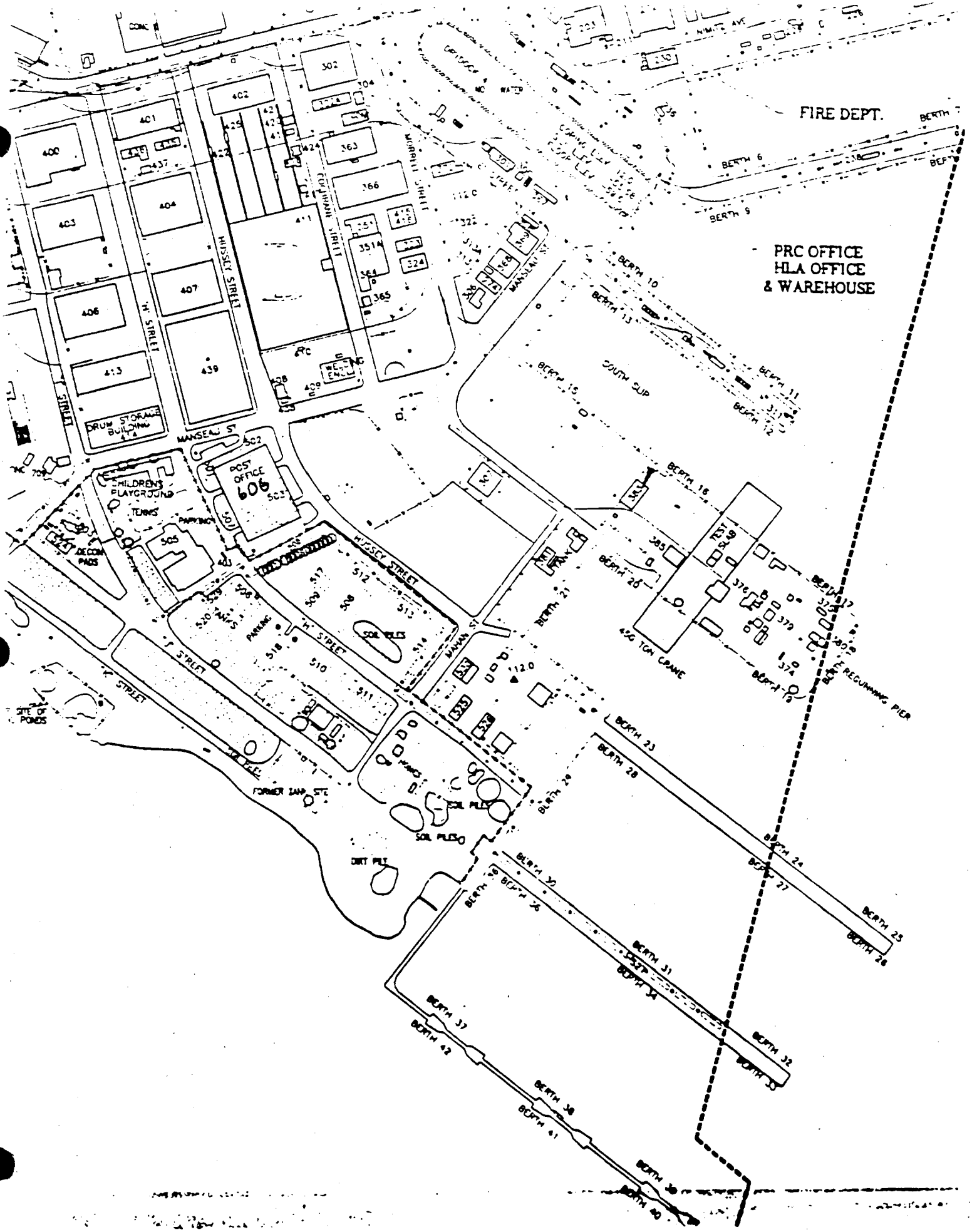
IR-
IR-12
PA-29
PA-34
PA-37
PA-57
SOUTH BASIN
IR-22
PA-35
PA-33
IR-5
PA-36
PA-32
D
E
PA-39
PA-38
PA-44
IR-8
PA-55
IR-2
IR-13
IR-14
IR-15
PA-54
PA-53
PA-16
IR-11
IR-3
IR-17
SAN FRANCISCO BAY
IR-2
PA-40
CANDLESTICK POINT

APPENDIX C

BUILDING 606 LOCATION MAP


FIRE DEPT.
PRC OFFICE
HLA OFFICE
& WAREHOUSE
HUSSEY STREET
MORRELL STREET
COCHRANE STREET
MANSEAU ST
MAHAN ST
'H' STREET
'J' STREET
'K' STREET
DRUM STORAGE BUILDING
POST OFFICE
606
CHILDRENS PLAYGROUND
TENNIS
PARKING
DECON PADS
SOIL PILES
FORMER TANK SITE
DIRT PILE
SITE OF PONDS
SOUTH SLIP
TEST SLAB
450 TON CRANE
BERTH 6
BERTH 9
BERTH 10
BERTH 11
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526
112.0
NO WATER

APPENDIX D

HPA BASE CLOSURE PLAN, PARTIAL TABLE 3-1

TABLE 3-1 [a] (continued)

SITE SUMMARY TABLE

Parcel	IAS Site No.	Triple A Site No.	IR Site No.	Description	Suspected Material Used and/or Disposed of at Site	Risk to Human Health or Environment [b]	Findings [b]	Final Determination [b]
C	-	-	IR-30	Building 241	Oil, asbestos		Stained and discolored soils; oozing oil and asbestos; potentially contaminated unlined utility trench	Excavation and further investigation/RI work recommended
C	-	-	IR-57	Dry Dock 4 Area	Oil, PCBs, sandblast waste		Sandblast materials; oil staining from transformers; storm drain contamination	Investigation and excavation of contaminated soils; sediment removal from storm drains; RI work recommended; radiological investigation recommended
C	-	-	IR-58	Scrap Yard (near Building 258)	Oil, miscellaneous debris		Oil stains on soil; miscellaneous debris may contain oils, leaking lead acid batteries, and other leaking materials	Further sampling and RI work recommended
D	-	9	PA-16	Container Storage Area	PCBs, unknown chemicals		Low levels of hydrocarbon and metal identified; miscellaneous chemicals identified	RI work for sample quality verification recommended
D	-	-	PA-48	Suspected Steam Lines at former Building 503	Waste oil, PCBs	None	Potential PCBs and waste oil in steam lines; steam lines may have broken or leaked near building	No further action ROD recommended

TABLE 3-1 [a] (continued)

SITE SUMMARY TABLE

Parcel	IAS Site No.	Triple A Site No.	IR Site No.	Description	Suspected Material Used and/or Disposed of at Site	Risk to Human Health or Environment [b]	Findings [b]	Final Determination [b]
D	-	-	-	Building 313A	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
D	-	-	-	Building 313	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
D	-	-	-	Building 351A	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
D	-	-	-	Building 365	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
D	-	-	-	Building 364	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
D	-	-	IR-08	Building 503, PCB Spill Area	PCBs		On-site transformers likely sources; PCBs found in groundwater	No further action recommended
D	59-8	-	IR-09	Pickling and Plate Yard	Acids		Containment vault, storm drains, and pickling tanks; potential sanitary sewer contamination	Interim remediation recommended; additional sampling to fill data gaps
D	-	10 & 11	IR-17	Drum Storage and Disposal Site	Industrial debris		Minor staining and debris	Quarterly monitoring for VOCs recommended; no interim action

TABLE 3-1 [a] (continued)

SITE SUMMARY TABLE

Parcel	IAS Site No.	Triple A Site No.	IR Site No.	Description	Suspected Material Used and/or Disposed of at Site	Risk to Human Health or Environment [b]	Findings [b]	Final Determination [b]
D	-	-	IR-22	Buildings 368, 369	Fuel, oils, sandblast waste, asbestos		SOC, TPH, asbestos, sandblast materials, and metals identified	RI work recommended
D	-	-	IR-32	Building 383 and Regunning Pier	Radioactive material		No significant findings	No further action ROD recommended
D	-	-	IR-33	Buildings 302, 302A, 304, 364, 411, 418 UST 23	Fuels, oils, paint solvents, unknown chemicals, acids, sandblast waste, radioactive material		Potential oil and metal contamination; storm drain and subsurface contamination; potential UST; potential RAD issue	Exploratory excavation and RI work recommended; RAD watch
D	-	-	IR-34	Buildings 351, 366	Acids, oils, unknown chemicals		Leaking batteries, oil stains on soil and asphalt, leading to storm drain	RI work recommended
D	-	-	IR-35	Buildings 274, 306	Unknown chemicals, PCBs, sandblast waste, radioactive material		Oil staining, PCB leaks, sandblast materials; potential storm drain and floor drain contamination; Potential RAD issue	RI work recommended; RAD watch
D	-	-	IR-36	Buildings 371, 400, 404A, 405, 407, 406, 413, 414, 704, area west of Building 405, Plate Storage Area	Oils, PCBs, solvents, unknown chemicals, miscellaneous debris		Miscellaneous debris, scrap metal, PCBs, and leaking equipment; staining and poor housekeeping	Exploratory excavation and RI work recommended

TABLE 3-1 [a] (continued)

SITE SUMMARY TABLE

Parcel	IAS Site No.	Triple A Site No.	IR Site No.	Description	Suspected Material Used and/or Disposed of at Site	Risk to Human Health or Environment [b]	Findings [b]	Final Determination [b]
D	-	-	IR-37	Buildings 401, 423, 435, 436, 437 UST 25	Paint, solvents, unknown chemical(s)		Possible sources are storage drum, pickling/plate yard, paints and solvents	Exploratory excavation and RI work recommended
D	-	-	IR-44	Area near Buildings 408, 409, 410, 438	Sandblast waste		Sandblast materials and debris potentially in storm drains and buildings	RI work recommended
D	-	-	IR-53	Buildings 525, 530	Oil, fuel, adhesives, paint, unknown chemicals		Oil and/or possible chemical staining	Exploratory excavation and RI work recommended
D	-	-	IR-55	Building 307	Oil, unknown hazardous material		Oil leaks and soaking; underground vaults	Exploratory excavation and RI work recommended
E	-	-	PA-40	Building 527 and Pier 2	PCBs		No significant findings	No further action ROD recommended
E	-	-	PA-47	Fuel Distribution Lines, Tank S-505	Diesel fuel, oil		Oil identified in lines	Remove oil and lines
E	-	-	PA-54	Building 511A	Miscellaneous debris		No significant findings	No further action ROD recommended
E	-	-	-	Building 508	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch
E	-	-	-	Building 517	Radioactive material		Potential RAD issue	Site visit and radiological survey recommended; RAD watch

PROPERTY-SPECIFIC
ENVIRONMENTAL BASELINE SURVEY

ENGINEERING FIELD ACTIVITY WEST
HUNTERS POINT ANNEX

BUILDING 606

February 1996

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
BCP	BRAC Cleanup Plan
BER	Baseline Environmental Report
BLDG	Building
BRAC	Baseline Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of San Francisco
DLA	Defense Logistics Agency
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
FFA	Federal Facility Agreement
FOSL	Finding of Suitability to Lease
HLA	Harding Lawson and Associates
HPA	Hunters Point Annex
MOU	Memorandum of Understanding
NPL	National Priorities List
PA	Preliminary Assessment
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RI/FS	Remedial Investigation/Feasibility Study
SA	Site Assessment
SI	Site Inspection
SFDA	San Francisco District Attorney's Office
TCE	Trichloroethane
TPH	Total Petroleum Hydrocarbons
U.S. EPA	U.S. Environmental Protection Agency
WESTDIV	Western Division Engineering Command

EXECUTIVE SUMMARY

The Engineering Field Activity West (EFA WEST), Hunters Point Annex (HPA) is currently listed on the National Priorities List (NPL) as a Superfund Site. Before leasing property, the Department of Defense (DOD) policy requires that an Environmental Baseline Survey (EBS) be prepared. According to DOD policy, an EBS is recommended for property which is to be leased.

This is a Property-Specific EBS conducted as an evaluation of the environmental condition of Building 606 at HPA to determine the suitability of leasing the building to the San Francisco Redevelopment Agency (SFRA) for the City and County of San Francisco, who in turn will sublease the building to the San Francisco Police Department, to be used for office administration and staging. Document reviews, Basewide EBS review, interviews and walk-through inspections were conducted to collect relevant information for the property-specific EBS.

On the basis of the immediately available information, the property-specific EBS concludes that there are no known health risks associated with use of Building 606.

Further, the EBS concludes that although contaminants may be present immediately outside and nearby Building 606, they are not accessible if proper precautions are followed.

Finally, the EBS concludes that HPA is a highly concentrated industrial complex and hazardous waste site. As such, proper caution should be exercised when on the site, including restriction from fenced areas and areas posted with warnings as well as deference to crews on site who are conducting environmental investigation and remediation.

1.0 PURPOSE OF THE PROPERTY-SPECIFIC ENVIRONMENTAL BASELINE SURVEY

The purpose of this Property-specific Environmental Baseline Survey (EBS) is to establish the environmental condition of Building 606 at the Engineering Field Activity West, Naval Facilities Engineering Command (EFA WEST), Hunters Point Annex, San Francisco, CA (HPA) as it relates to the leasing of building 606. An evaluation of the environmental condition of Building 606 provides the basis upon which a Finding of Suitability to Lease (FOSL) and any recommended use restrictions to be made.

The lease now being contemplated is to lease building 606 to the San Francisco Redevelopment Agency (SFRA) who in turn will sub lease the building the use of the interior of the building to the San Francisco Police Department for office administration and staging. The purpose for this site-specific Environmental Baseline Survey (EBS) is to collect available information to establish the current physical and environmental conditions of building 606, and to assist the Navy in complying with its obligations under the Comprehensive Environmental Reponse, Compensation, and Liability Act (CERCLA), as amended (42 U.S.C. 9620[h]).

The Property-Specific EBS is organized as follows. Section 2.0 provides a general description and history of the Hunters Point Annex. Section 3.0 briefly describes the methodology used to collect information relevant to this environmental evaluation. Section 4.0 provides a description of Building 606 itself and its environmental condition, to the degree that it is known. Section 5.0 provides conclusions and recommendations.

2.0 INTRODUCTION--HISTORY OF ACTIVITY AT HPA

HPA is in southeast San Francisco on a peninsula extending eastward into San Francisco Bay. The Navy property comprises about 936 acres, about 493 acres of which is on land and the rest of which is in San Francisco Bay. HPA is bounded on the north and east by San Francisco Bay and on the south and west by the Bayview Hunters Point district of San Francisco. (See Appendix A, Map of HPA).

2.1 PROPERTY USE AT HPA

2.1.1 HISTORY OF PAST USE

HPA was operated as a commercial dry dock facility from 1896 until December 29, 1939 at which time the property was purchased by the Navy. The Navy leased the facility to Bethlehem Steel Company until December 18, 1941. On that date, the Navy took possession of the property and began operating the shipyard to provide

accelerated production of Liberty ships during World War II. Navy ships and submarines were also modified, maintained and repaired there. In addition, HPA was used for personnel training, limited radiological operations, research and development, ship design, and non industrial services for Navy personnel and their families. In 1974, the Navy ceased shipyard operations, placed the facility in industrial reserve, and transferred control of the property to its Office of the Supervisor of Shipbuilding Conversion and Repair, San Francisco.

Between 1935 and 1975, fill materials were placed in San Francisco Bay increasing the land area of the facility from less than 100 acres to about 500 acres. Aerial photographs from the 1940s indicate that most of the cutting and filling probably occurred soon after the Navy took possession of the property in late 1941.

From May 1976 to June 1986, Triple A Machine Shop leased most of HPA from the Navy and operated a commercial ship repair facility. Triple A subleased portions of HPA to private warehousing, industrial and commercial firms. Following action by the San Francisco District Attorney's Office (SFDA), Triple A vacated the facility in mid-1987. The SFDA charged Triple A with illegally disposing of hazardous wastes at about 19 locations throughout HPA. In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal.

2.1.2 CURRENT STATUS OF USE

Caretaker responsibility for HPA was transferred to the Engineering Field Activity West, Naval Facilities Engineering Command (EFA WEST) on April 1, 1994. Many of the buildings and structures at the shipyard are abandoned and/or under investigation. However, several dozen tenants continue to operate small industrial and commercial businesses at HPA which EFA WEST now manages.

A Navy-operated Fire Department resides on base which provides fire protection and first aid services in the event of emergencies. The Navy has a working relationship with the San Francisco Police Department and Fire Department in case an emergency requires additional services. EFA WEST is now working on an Emergency Response Plan for the base; but, such a plan is not now complete.

As a closing base, EFA WEST is endeavoring to investigate and remediate the facility in an expedited manner so as to transfer the facility to the San Francisco Redevelopment Agency. In the mean time, EFA WEST is endeavoring to implement interim leases for HPA facilities so as to increase the economic potential of the Bayview Hunters Point community and San Francisco, in general.

2.2 ENVIRONMENTAL INVESTIGATION/REMEDIATION AT HPA

2.2.1 HISTORY OF PAST INVESTIGATION/REMEDIATION

On the basis of investigations performed between 1986 and 1988, HPA was placed on the National Priorities List (NPL) in 1989. The Navy is required to perform a Remedial Investigation/Feasibility (RI/FS) Study in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

A Federal Facility Agreement (FFA) has been signed by the Navy, U.S. Environmental Protection Agency (U.S. EPA), and the California Environmental Protection Agency (Cal/EPA)/Department of Toxic Substances Control (DTSC). The agreement identifies the Navy as the lead agency in investigation and cleanup and the U.S. EPA and Cal/EPA as oversight agencies. Prior to 1992, the Navy had undertaken a course of investigation which identified and investigated the worst hazardous waste sites first. In 1992, the site strategy was modified by reorganizing the site into five geographically contiguous parcels (Parcels A through E) for the purposes of expediting parcel investigation, cleanup, and in particular, property transfer. In 1995 the offshore portion of HPA was designated Parcel F and the FFA schedule was renegotiated.

2.2.2 CURRENT STATUS OF INVESTIGATION/REMEDIATION

Building 606 is within the boundaries of Parcel D. A Site Inspection (SI) of Parcel D investigated the presence of contaminants in and around the area's utilities and numerous building sites within Parcel D by use of environmental sampling techniques. The results of the Site Inspection are documented in the Draft Final Parcel D Site Inspection Report. The area within which Building 606 is located slightly coincides with Installation Restoration (IR) site IR-8 which is the site of a previously remediated Polychlorinated Biphenyl (PCB) spill. (See Appendix B, Map of Parcel D). A Remedial Investigation (RI) of Parcel D is presently being done with the draft submittal expected in June 1996.

3.0 SURVEY METHODOLOGY

3.1 PRIMARY DOCUMENTS CONSULTED

The information in this Property-specific EBS is compiled from the HPA Administrative Record developed to support the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) investigation and remediation of past hazardous waste disposal at HPA and other base investigations and surveys. Specific documents which were reviewed include:

Asbestos Survey of Hunters Point Annex conducted by Mare Island Naval Shipyard, October 1993

Base Realignment and Closure Cleanup Plan (BCP) for Naval Station Treasure Island, (Hunters Point Annex), CA dated March 5, 1994

Draft Final Parcel D Site Inspection Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California, Volume I, dated May 2, 1994

Naval Station Treasure Island, Hunters Point Annex, Baseline Environmental Report, Volume 2a, dated July 1994

Preliminary Draft Final Summary Alternative Selection Report, Operable Unit II, Naval Station Treasure Island, Hunters Point Annex, dated 3 May 1993

Draft Basewide Environmental Baseline Survey, Hunters Point Annex, San Francisco, dated 15 Jan 1996, Volume 1 of 2.

3.2 INSPECTION OF PROPERTIES CONDUCTED

On July 21, 1994, U.S. Navy and U.S. Environmental Protection Agency personnel conducted a walk-through inspection as part of the Property-specific EBS for Building 606. The walk-through was conducted to confirm and supplement the findings of HLA personnel. The walk-through team consisted of: the Navy Base Closure Manager, the Navy On-site Caretaker, a Navy Remedial Project Manager, a U.S. EPA Remedial Project Manager, and a U.S. EPA Base Closure Specialist.

A more recent visual inspection was conducted by PRC in preparing the draft Basewide Environmental Baseline Survey. They have placed building 606 in catagory 4, since remedial actions are complete, and the building was recently leased by the movie industry.

An additional walk through inspection was conducted on February 15, 1996 by U.S. Navy personnel to confirm the interior conditions of Building 606.

3.3 INDIVIDUALS CONSULTED

Domenic Zigant, Base Closure Manager for Hunters Point Annex and Treasure Island and Donald Shannon, On-Site Caretaker, were contacted regarding their knowledge of Building 606. Jim Sickles and Scott Wald, both of PRC, were contacted regarding findings of the in progress RI of parcel D.

4.0 FINDINGS--BUILDING 606

4.1 DESCRIPTION OF BUILDING 606

4.1.1 INTERIOR

Building 606 is 89,600 square feet in size and of steel construction. The front part (north end) of the building includes an entry lobby and 2 stories of office and conference room spaces. The rear of the building (south portion) is a 2 story high bay open area with concrete flooring . The condition of all the spaces is excellent with no signs of the use, storage, or spillage of hazardous materials or petroleum products.

4.1.2 EXTERIOR

Building 606 is located in the Hunters Point Installation Restoration Program (IRP) Parcel D. (See Appendices B, Map of Parcel D and C, Building 606 Location Map)

4.2 PROPERTY USE IN BUILDING 606

4.3 ENVIRONMENTAL CONDITION OF BUILDING 606

4.3.1 POTENTIAL INTERIOR SOURCES

There are no potential interior sources. An asbestos survey, completed in 1994 by Mare Island Naval Shipyard personnel, identified possible asbestos containing materials in Building 606, but their detailed inspection of the building found no friable asbestos. Considering the date of construction (1989) for building 606, it is unlikely that asbestos was used in this building.

4.3.2 POTENTIAL EXTERIOR SOURCES

During the construction of Building 606, an area of PCB contamination was found in the vicinity of what is now the southeast corner of the building. The PCB contamination was excavated and removed from the site, the excavation was filled with clean and compacted backfill, and the area was paved with asphaltic concrete. This area at the southeast corner of the building is now being investigated as a part of the Hunters Point IRP as IR-8. The results of recent tests on ground water samples from IR-8 have shown non-detect values for PCB's. In light of these tests and since the asphaltic concrete is in good condition and the anticipated leased activities in Building 606 will not involve any excavation or use of ground water, PCB exposure is not anticipated. Preliminary results of the in progress IR-8 R.I. are consistent with this conclusion.

Building 606 is located on the site of former buildings 501, 503, 507 and 508. Buildings 501 (Ship's Barracks) and 503 (Ship's Subsistence and Laundry) did not have uses consistent with the storage or use of hazardous materials. Buildings 507 (Radiochemistry Lab) and 508 (Biological Lab) were used by the Navy Radiological Defense Laboratory (NRDL) until they were disestablished in 1969. NRDL was licensed by the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), to possess and use various radionuclides in their day to day activities and investigations. As a part of the disestablishment of NRDL all sites were surveyed for radiological contamination and decontaminated if necessary. No radiological hazards are expected. Refer to section 4.4.9 Radiological Sites.

4.4 ENVIRONMENTAL SETTING--PARCEL D

4.4.1 STORM DRAIN SYSTEM.

There are five stormwater drainage areas in Parcel D: Areas A, G, H, I, and J. Drainage Areas A and H collect stormwater runoff from the vicinity of Building 606. Drainage Area A collects runoff from the western side of the building and discharges to San Francisco Bay at Berth 36. Drainage Area H collects runoff from the eastern side of the building and discharges to San Francisco Bay at Berth 15. Sediment samples collected from these drains detected the presence of contaminants including: pesticides, volatile organic contaminants, heavy metals and petroleum. Samples collected in the stormwater drain to the northwest of Building 606 identified vinyl chloride and Aroclor-1260 at concentrations above levels of concern for human health.

4.4.2 SANITARY SEWER SYSTEM

The sanitary sewer system in Parcel D consists of six drainage reaches: 5, 6, 7, 8, 9, and 10. Parcel D receives sewage from Parcels A, B, C, and E; sewage from Parcel D flows northward to Spear Avenue then west to Pump Station A. The sewer lines generally slope downward toward the north to allow gravity flow toward Pump Station A. Groundwater entering the sewer line and/or trench backfill is potentially transported offsite westward through the northern portion of Parcel D and to Pump Station A. The southern portion of the sewer system is above static water levels and therefore potentially provides a groundwater recharge. The northern portion of the sewer system is largely below static water level and therefore potentially acts as a groundwater "sink" or drain.

Water samples collected from the Parcel D sewer lines indicate the presence of contaminants. Arsenic, lead, and manganese were detected in Parcel D sewers at concentrations above levels of concern to human health. The sewer was dry in the vicinity of Building 606.

4.4.3 STEAM LINE SYSTEM

During Triple A's tenancy at HPA, it is rumored that the company used the facility's steam line system to transport waste oil from the dry docks to the oil reclamation ponds in the Parcel E. As result, the Navy is now investigating the steam lines for possible waste oil contamination.

Sampling of the steam lines in Parcel D indicated the presence of contaminants. Total Petroleum Hydrocarbons (TPH)-gasoline, total oil and grease, and mercury were detected in Parcel D steam lines at concentrations above levels of concern to human health. There are no steam lines indicated in or around Building 606.

4.4.4 FORMER TRANSFORMER SITES

In 1988, the Navy undertook an investigation of the Polychlorinated Biphenyl (PCB)-containing transformers at HPA. 199 transformers were removed at that time. These former transformer sites, where known, have been reinspected for the presence of PCB-containing oil which may have been released prior to the removal of the transformers.

Seventeen suspected former transformer sites in Parcel D were visually inspected as part of the Site Inspection for Parcel D. Of them, three were determined to require environmental sampling: the Regunning Pier, Building 306, and Building 525. None of these locations are within the area surrounding Building 606.

4.4.5 UNDERGROUND STORAGE TANKS

According to the Baseline Realignment and Closure (BRAC) Cleanup Plan (BCP) for HPA, 13 underground storage tanks have been identified in Parcel D. One of these tanks was closed in place. All the others have been removed. Further investigation has been proposed for all but that which was closed in place at Building 308.

None of the tanks are associated with Building 606. One, at Building 505, is to the immediate west of Building 606. This was a 750 gallon fuel oil tank installed in the mid-1940s. No sampling data for the removal was reviewed as part of this Property-Specific EBS.

4.4.7 GROUNDWATER CONTAMINATION

Groundwater has been evaluated at specific sites within Parcel D: Installation Restoration (IR) sites and Preliminary Assessment (PA) sites. The Parcel D IR sites are described in the Draft Final Summary Alternative Selection Report for Operable Unit II. They include: Installation Restoration (IR) site IR-6 (the Tank Farm), IR-8 (PCB Spill outside Building 606), IR-9 (Pickling and Plate Yard) and IR-10 (Battery and Electroplating Shop). The Navy has identified volatile organic contaminants, semivolatile organic contaminants, diesel fuel, and oil and grease as contaminants of concern to groundwater at IR-6. The Navy has identified no contaminants of concern to groundwater at IR-8. The Navy has identified hexavalent chromium as the contaminant

of concern to groundwater at IR-9. And, the Navy has identified lead, zinc, and volatile organic contaminants as potential contaminants of concern to groundwater at IR-10. The findings at IR-8 are described above in section 4.3.1.2.

The Parcel D Preliminary Assessment (PA) sites are described in the Draft Final Parcel D Site Inspection Report. They include: PA-32 through PA-39, PA-44, PA-53, and PA-55. Heavy metals, volatile organic contaminants, semivolatile organic contaminants, pesticides, PCBs, and petroleum have been detected at various locations in groundwater in Parcel D at these sites. Overall groundwater contamination at Parcel D, however, has not yet been fully evaluated. Additional sampling is being accomplished as part of the RI of parcel D. (See Appendix D, BCP Table 3-1)

4.4.8 SOIL CONTAMINATION

Soil has been evaluated at specific sites within Parcel D: Installation Restoration (IR) sites and Preliminary Assessment (PA) sites. The Parcel D IR sites are described in the Draft Final Summary Alternative Selection Report for Operable Unit II. They include: Installation Restoration (IR) site IR-6 (the Tank Farm), IR-8 (PCB Spill outside Building 606), IR-9 (Pickling and Plate Yard) and IR-10 (Battery and Electroplating Shop). Diesel fuel, oil and grease, carcinogenic polyaromatic hydrocarbons, PCBs, and lead have been identified in soil at IR-6. Aroclor 1260 has been identified in soil at IR-8 (as described above in section 4.3.1.2). Chromium VI has been identified in soil at IR-9. And, lead has been identified in the soil at IR-10.

The Parcel D Preliminary Assessment (PA) sites are described in the Draft Final Parcel D Site Inspection Report. They include: PA-32 through PA-39, PA-44, PA-53, and PA-55. Heavy metals, volatile organic contaminants, semivolatile organic contaminants, pesticides, PCBs, and petroleum have been detected at various locations in soil in Parcel D at these sites. Additional sampling is being accomplished as part of the RI of parcel D. (See Appendix D, BCP Table 3-1)

4.4.9 RADIOLOGICAL SITES

Radioactive materials have been identified as materials of potential concern at several former NRDL buildings in Parcel D, in particular IR-38 and IR-39. Building 606 is located on the site of former buildings 501, 503, 507 and 508. Buildings 507 (Radiochemistry Lab) and 508 (Biological Lab) were used by the Navy Radiological Defense Laboratory (NRDL) until they were disestablished in 1969. NRDL was licensed by the Atomic Energy Commission (AEC), now the Nuclear Regulatory Commission (NRC), to possess and use various radionuclides in their day to day activities and investigations. As a part of their disestablishment, NRDL was required to request termination of all of their licenses to possess and use radioactive materials. As a part of the termination of these licenses, NRDL was required to survey and

decontaminate all sites where radioactive materials were stored or used and present documentation to the AEC that the sites were radiologically clean. As a part of the disestablishment of NRDL all of their licenses were properly terminated by the AEC There is thus very little concern that radioactive materials or contamination are present at the sites of former buildings 507 and 508. A cursory health-based radiological survey performed by a Navy consultant (PRC Environmental Management) at former NRDL sites in 1993 did not indicate elevated radiological activity at any of the demolished building locations. A formal survey will be performed at all former NRDL sites, including IR-38 and IR-39 nearby building 606, as a part of the Phase III Radiological investigation. Exposure to radiological contamination is not anticipated.

4.4.10 ASBESTOS/LEAD PAINT

An asbestos survey, completed in 1994 by Mare Island Naval Shipyard personnel, identified possible asbestos containing materials in Building 606. Their inspection of bldg. 606 found no friable asbestos. Considering the date of construction for Building 606, it is unlikely that either asbestos or lead paint were used in this building and exposure to asbestos or lead paint is not anticipated.

5.0 CONCLUSIONS/RECOMMENDATIONS

The Property-Specific Environmental Baseline Survey for Building 606 concludes that there are no known health risks associated with the use of Building 606 for office administration and staging by the San Francisco Police Department. The following conclusions and recommendations are given.

1. Nearby building 606 are the fenced areas for IR-38 and IR-39. The SFRA and the Police Department should remain outside of any fenced areas on base.

2. At the southeast end of building 606 is IR-8 where a PCB spill was removed during the building construction. The area is paved over with asphaltic concrete thus minimizing possibility of contact with soil in this area. There is no immediate risk associated with these findings. SFRA and the Police Department should avoid interference of any on-going investigation and/or cleanup of these soils in the event that sampling/cleanup crews are present.

3. Sediment samples collected from the storm drains in Parcel D detected the presence of contaminants including: pesticides, volatile organic contaminants, heavy metals and petroleum. Samples collected in the stormwater drain to the northwest of Building 606 identified vinyl chloride and Aroclor-1260 at concentrations above levels of concern for human health. Contact with storm drain sediments should be avoided. SFRA and the Police Department should be forbidden from the discharge of any material to the storm drain system.

In addition, the SFRA and the Police Department should avoid any interference of on-going remediation of the storm drain system, in the event that environmental/maintenance crews are present conducting sediment removal in this area.

4. HPA is a highly concentrated, industrial site which has been in operation for several decades. The site contains many pieces of dangerous equipment and buildings in poor repair. In addition, HPA is a national priority hazardous waste site which is under on-going environmental investigation. As indicated in Section 4.0 above, concentrations of hazardous substances and petroleum have been found in soil and groundwater throughout the facility which exceed levels of concern to human health. As such, the SFRA and the Police Department should use the same kind of caution at HPA which is appropriate at any industrial site. Further, they should remain outside of any fenced areas, adhere to all warning signs, disturb none of the facility's utilities or landscape and interfere with none of the on-going sampling and remediation efforts. A lease for use of Building 606 should specify use of the building's interior space and the parking areas to the north and south of the building only.

6.0 CERTIFICATION

I certify that the property conditions stated in this report are based on a thorough review of available records, visual inspections, sampling, and analysis as noted and are true and correct, to the best of my knowledge and belief.

_____

Michael McClelland, P.E. Date
BRAC Environmental Coordinator
Engineering Field Activity, West
Naval Facilities Engineering Command

APPENDIX B

IR-08 SITE FINDINGS
EXCERPTED FROM DRAFT FINAL PARCEL D RI REPORT

4.2 IR-08: PCB SPILL AREA — FORMER BUILDING 503, BASE LAUNDRY (NOW BUILDING 606, MILITARY POSTAL SERVICE) AND FORMER BUILDING 508, LOCKER CLUB

Site IR-08 was initially identified by the Navy in 1986, as a PCB spill site, during repair of an underground steam line near former Building 503. This PCB spill was investigated in 1986, and the Navy conducted an interim remedial action in 1988, to remove PCB-contaminated soil from the site. In 1988, the site was designated IR-08 and included in the Group II (OU II) RI (HLA 1992e).

Site IR-08 is located in the southeastern portion of Parcel D, near Hussey and "H" Streets. The site covers approximately 0.5 acre and consists of the areas occupied by former Building 508 and a portion of former Building 503 (Figure 4.2-1). Building 503 was the base laundry facility and Building 508 was a recreational facility (locker club). These facilities were operated from (at least) 1948 to 1974. Buildings 503 and 508 were demolished sometime between 1977 and 1979. The site of former Building 503 is currently occupied by Building 606, which was built in 1989 as the HPS military postal facility. Building 606 is currently unoccupied (PRC 1995).

Site features at IR-08 include a storm drain line that traverses the PCB spill area (Figure 4.2-1A and 4.2-1B). Three catch basins are connected to this line, east of Building 606, and each catch basin is connected to a drywell. One of these drywells is located within the PCB spill area. During precipitation events, surface water runoff flows into these drywells and, subsequently, percolates through the soil to the groundwater table. Excess water flows into storm drains (connected to the dry wells) that empty into San Francisco Bay.

A steam line was initially thought to be located near former Building 503 and was reportedly was used by Triple A to transport waste oils with PCBs. A section of this line was broken in the early 1980s, during construction activities near Building 503. The break resulted in a spill of an unknown quantity of oil that was subsequently cleaned up. The steam line was also repaired. The steam line was removed in 1989 prior to the construction of Building 606 (HPA 1994b).

An unknown number of electrical transformers which contained PCB oil were reportedly stored on a transformer pad within the PCB spill area at IR-08 (Figure 4.2-1). This pad was located on the south side of the former Building 503. Two transformers containing PCB oil were also located on power poles, north and south of the site (Figure 4.2-1). The transformers were removed from service by American Environmental Management Corporation (AEMC) and the Navy Public Works Department (NPWD) in 1988 (HLA 1992e).

Two oily grease traps, related to the former Building 503 laundry facility, reportedly were located south and west of former Building 503 (Figure 4.2-1). A 21,000 gallon aboveground storage tank, used for fuel oil, was also associated with the former laundry facility. This tank was removed prior to demolition of Building 503. In addition, the grease traps and floor drains were most likely removed as part of the construction activities for Building 606. An abandoned pump house, used to pump salt water to charge the fire-hydrant system, is located immediately northeast of the PCB spill area. The date when this pump house was abandoned is unknown (HLA 1992e).

Potential contaminant sources identified prior to the investigation at IR-08 include:

- PCB-oil from ruptured steam lines and surface spills
- Dielectric fluids containing PCBs, from electrical transformers formerly located at the site
- Acidic solutions possibly containing metals, solvents, or other hazardous chemicals discharged into floor drains in former Building 503
- Fuel oil possibly leaked or spilled from the former aboveground storage tank near Building 503
- Pesticides discharged into floor drains in former Buildings 503 and 508
- Waste oil from maintenance in the former pump house

RI field investigations, geology and hydrogeology, analytical results, the nature and extent of contaminants, contaminant fate and transport, the site-specific risk assessment, and conclusions and recommendations for IR-08 are discussed in the following sections.

4.2.1 RI Field Investigations

Between 1986 and 1987, ERM-West conducted an investigation of the PCB spill area, near former Building 503 (Figure 4.2-1). The investigation, which was conducted in four phases, consisted of source, soil, and groundwater sample collection and analysis to determine the source of contamination and to delineate the volume of PCB-affected soil and groundwater at the spill area. During the investigation, 72 soil borings were drilled, with seven of the borings converted to monitoring wells. A total of 157 soil, eight groundwater, and two source samples were collected. Soil and source samples were analyzed for PCBs and SVOCs; two of the soil samples were also analyzed for VOCs. Groundwater samples were analyzed only for PCBs. During the investigation, the reportedly ruptured steam line was not located. The suspected steam line is now thought not to exist beneath IR-08. Results of these investigations are presented in reports prepared by ERM-West for the Navy (ERM-West 1986a, 1986b, and 1987).

Investigation results indicated that PCBs were present predominantly in soil at the spill area around the transformer pad and downgradient from the pad, with the highest concentrations (up to 910 mg/kg) detected at approximately 4 feet bgs. PCBs were detected in only one of eight groundwater samples at a concentration of 0.004 mg/L. Investigation results also suggested that the likely source for PCBs in soil at the site were the electrical transformers stored on the pad at the site (ERM-West 1986a, 1986b, and 1987). No measurable contamination was detected in samples collected near the sumps or separators (ERM-West 1986a).

The results of the investigations showed that liquid PCBs had leaked from transformers on the transformer pad and migrated eastward, along a drainage swale, toward a catch basin and associated dry well located on the west side of Hussey Street (Figure 4.2-1). No PCBs were detected in the area of the two transformers on power poles. In 1988, an interim remedial action was conducted by the Navy at the PCB spill area associated with the transformer pad. During this remedial action, approximately 1,255 cubic yards of soil with PCB concentrations exceeding 25 mg/kg were removed and disposed of off-site. The depth of this excavation varied from 10 to 3 feet bgs. This action was overseen by the California Department of Health and Safety (CDHS). Confirmation sampling conducted after excavation verified that PCB-contaminated soil had been removed to a level less than 25 mg/kg. With the approval of the CDHS, the resultant excavation was backfilled with crushed rock and compacted. The electrical transformers were also removed from the site in 1988 (ERM-West 1989).

Additional field activities were conducted at IR-08 between February 1988 and May 1996. These activities consisted of soil and groundwater sampling to evaluate potential contaminants at the site, and slug and pump testing to evaluate hydrogeologic parameters, and tidal influence studies. These activities are summarized in the table below.

RI Field Activities Summary					
Task	Number of Borings, Wells, or Samples	Characterization			
		Source	Soil	Groundwater	Aquifer
Soil Borings	51		X		
HydroPunch Borings	1		X	X	
Soil Samples[a]	384		X		
Groundwater Monitoring Wells[b]	9			X	
Groundwater Samples[c]	59			X	
Piezometers	1				X
Additional Activities					
Aquifer Testing (Pump and Slug Testing)					
Tidal Influence Study					

Notes:

a Includes samples collected from soil, HydroPunch, and monitoring well borings; 380 samples for chemical analyses and four samples for physical analyses.

b Includes one monitoring well (IR08MWW-6) installed during PCB spill investigation.

c Includes 58 samples from monitoring wells and one sample from HydroPunch boring.

Figure 4.2-1 shows the sampling locations within and near the boundaries of IR-08. A discussion of the RI field activities and sampling procedures is presented in Appendix I. Boring logs showing the lithology and well construction details are presented in Appendix J. Results of the aquifer testing are and tidal influence study presented in Appendix C. RI soil, groundwater, and aquifer characterization activities are discussed below.

Source Characterization

Source characterization was not conducted at IR-08.

Soil Characterization

In February 1988, one boring (IR08B036) was drilled to 82 feet bgs to obtain soil samples for physical analysis, to evaluate subsurface stratigraphy, and to develop well design parameters for IR-08. Four soil samples were collected from this boring between approximately 2 and 82 feet bgs, and analyzed for physical parameters only.

Between October 1989 and July 1990, 41 soil borings (IR08B001 through IR08B035, IR08B005A, IR08B007A, IR08B010A, IR08B016A, IR08B018A, and IR08B027A) were drilled throughout IR-08, to depths ranging between approximately 10 and 30 feet bgs (Figure 4.2-1). Borings IR08B005A and IR08B010A were drilled to refusal; soil samples were not collected from these two borings. A total of 306 soil samples were collected between approximately 1 and 30 feet bgs, from the remainder of these borings, and analyzed for the chemical constituents listed in Table 4.2-1. Approximately 70 to 75 percent of the samples were analyzed for pesticides and PCBs only.

Between September and November 1991, nine soil borings (IR08B043 through IR08B051) were drilled, throughout IR-08, to depths ranging from 7 to 10 feet bgs (Figure 4.2-1). A total of 25 soil samples were collected between approximately 0.3 and 9 feet bgs from these borings, and analyzed for the chemical constituents listed in Table 4.2-1.

Between April 1990 and September 1991, six monitoring wells (IR08MW37A through IR08MW42A) were drilled to depths up to approximately 26 feet bgs at IR-08 (Figure 4.2-1). All six wells were screened at depths ranging between approximately 7 and 25 feet bgs, in the A-aquifer. A total of 43 soil samples were collected between approximately 2 and 24 feet bgs, from these well borings, and analyzed for the chemical constituents listed in Table 4.2-1. Soil samples were not collected from boring IR08MW40A. Groundwater samples were also collected from the completed monitoring wells, as discussed in the following section (Groundwater Characterization).

In October 1995, one HydroPunch boring (IR08B052) was drilled to a depth of approximately 27 feet bgs, northwest of former Building 503 (Figure 4.2-1). Six soil samples were collected between approximately 1 and 26 feet bgs, and analyzed for the chemical constituents listed in Table 4.2-1. One HydroPunch groundwater sample was also collected from this boring, as discussed in the following section (Groundwater Characterization).

Groundwater Characterization

Between September 1995 and October 1995, two monitoring wells (IR08MW43A and IR08MW44A) were drilled to depths up to approximately 22 feet bgs, northeast and northwest of IR-08, respectively (Figure 4.2-1). Both wells were screened between approximately 6 and 21 feet bgs in the A-aquifer. No soil samples were collected from these two well borings during drilling.

In October 1995, one HydroPunch boring (IR08B052) was drilled to a depth of approximately 27 feet bgs, northwest of former Building 503 (Figure 4.2-1). One HydroPunch groundwater sample was collected from this boring between 7.5 and 10 feet bgs, and analyzed for the chemical constituents listed in Table 4.2-7. A table listing HydroPunch and grab groundwater sample information is included in Appendix C.

Between July 1990 and March 1996, a total of 58 groundwater samples, including duplicates, were collected from the eight monitoring wells (IR08MW37A through IR08MW44A) installed at IR-08 during the RI, and from well IR08MWW-6, which was installed during the ERM-West investigation of the PCB spill area. Groundwater samples were analyzed for the chemical constituents listed in Table 4.2-4.

Aquifer Characterization

In March 1992, one piezometer (IR08P39A) was installed at IR-08 to monitor groundwater elevations at the site (Figure 4.2-1). This piezometer was screened from approximately 6 to 36 feet bgs in the A-aquifer. No soil samples were collected from the piezometer boring during installation, and no groundwater samples were collected from the completed piezometer.

In 1992, two phases of aquifer testing were conducted at IR-08. The first phase consisted of slug testing at four monitoring wells (IR08MW37A, IR08MW38A, IR08MW40A, IR08MW41A). The second phase consisted of step-drawdown and constant-rate pumping tests at monitoring well IR08MW37A. The results from the aquifer tests performed at IR-08 are presented in Appendix C and discussed in Section 4.2.2 (Hydrogeology).

Between October 1991 and March 1992, a tidal influence study, using monitoring wells IR08MW37A, IR08MW40A, and IR08BMW41A, was conducted at IR-08. The results of this study are presented in Appendix C.

4.2.2 Geology and Hydrogeology

This section discusses the surface conditions, geology, and hydrogeology at IR-08. An additional discussion of the surface soils at IR-08, at Parcel D, and at HPS is presented in Appendix H, and additional discussions of the geology and hydrogeology at Parcel D and at HPS are presented in Sections 3.7 and 3.8, respectively.

Surface Conditions

The surface soils at IR-08 consist of Urban Land and Orthents, reclaimed complex, with slopes between 0 and 2 percent (PRC 1994). The ground surface at IR-08 is predominantly asphalt or concrete pavement, with about 20 percent of the site covered by the former Building 503 (now Building 606) PCB Spill Area. No other buildings or structures are located at IR-08 (see Figure 4.2-1). A base-wide soil distribution map of HPS is shown on Figure 3.6-1.

Geology

The regional geology of the San Francisco Bay area is discussed in Section 3.7.1. Discussions of HPS and Parcel D geology are presented in Sections 3.7.2 and 3.7.3, respectively. A topographic and geologic map of HPS is shown on Figure 3.4-1. A geologic cross-section depicting an interpretation of lithology at IR-08 is shown on Figure 3.7-11. Additional Parcel D cross-sections are shown on Figures 3.7-10 and 3.7-12 through 3.7-15. Locations of geologic cross-sections within Parcel D are shown on Figure 3.7-8.

Every borelog for IR-08 was considered during interpretation of lithology; all borelogs for this site are presented in Appendix J. Specific borelogs used to construct the cross-section for IR-08 include IR08B001, IR08B009, IR08B014, IR08B021, IR08B022, IR08B033, IR08B036, and IR08MW38A. No geotechnical borelogs were used during interpretation of lithology at IR-08.

From the surface downward, the geologic units at IR-08 consist of Artificial Fill (Qaf), Undifferentiated Upper Sand Deposits (Quus), Bay Mud Deposits (Qbm), Undifferentiated Sedimentary Deposits (Qu), and Franciscan Complex (KJf) bedrock. The Artificial Fill consists predominantly of clayey gravel, sand and gravel, and gravelly clay, and ranges from 8 to 31 feet thick. Bedrock-derived cobble and boulder fill predominates in the southeast portion of IR-08. The Undifferentiated Upper Sand Deposits, consisting of poorly-graded sands with a trace of shell fragments, range from 0 to 18 feet thick. The depth to Bay Mud Deposits ranges from 20 to at least 36 feet bgs. Bay Mud Deposits consist of clay with some silt, and up to 40 percent shell fragments, and range from 6 to at least 59 feet thick. The Undifferentiated Sedimentary Deposits range in thickness from 10 to 20 feet and consist of poorly graded sand and silty sand with clay. The deepest soil boring drilled at IR-08 (81.5 feet bgs) did not penetrate the total thickness of the Bay Mud Deposits. Therefore, the depth to serpentinite bedrock and the total thickness of the bedrock at IR-08 is unknown.

The bedrock surface beneath this site consists of a low or saddle between two bedrock highs. This saddle trends west-northwest to east-southeast and may be greater than 50 feet deep (Figure 3.7-1). The Bay Mud Deposits surface forms a swale that trends to the east-northeast (Figure 3.7-2). Undifferentiated Upper Sand Deposits locally overlie Bay Mud and underlie Artificial Fill.

Hydrogeology

A conceptual groundwater flow model of HPS is shown on Figure 3.8-2. Groundwater elevation contouring of the A-aquifer for May and November 1995, and April 1996, is shown on Figures 3.8-4 through 3.8-6, respectively. Groundwater elevation contouring for February 1994 (wet season) is shown on Figure 3.8-3, and is included for comparison with April 1996. The hydrogeologic units, groundwater occurrence, magnitude and direction of groundwater flow, aquifer hydraulic properties, groundwater flow rates, and TDS in groundwater at IR-08 are discussed in the following sections.

Hydrogeologic Units

From the surface downward, the hydrogeologic units at IR-08 consist of the A-aquifer, the Bay Mud Aquitard, the B-aquifer, and the bedrock water-bearing zone. The A-aquifer at IR-08 consists of Artificial Fill and Undifferentiated Upper Sand Deposits. Based on groundwater elevation data, the saturated thickness of the A-aquifer is about 9 to 15 feet. The Bay Mud Aquitard appears to be laterally continuous beneath the site (Figure 3.7-7). The B-aquifer at IR-08 consists of Undifferentiated Sedimentary Deposits. Because no monitoring wells installed in the B-aquifer, the saturated thickness of this unit at IR-08 is unknown. Because bedrock was not encountered during the field investigation, the depth to the bedrock water-bearing zone at IR-08 is unknown.

Groundwater Occurrence

Groundwater elevations were measured during the wet and dry seasons and during the transition periods. Based on historical rainfall data for San Francisco, these periods were determined to be December to April (wet season), August to November (dry season), and May (transition period). Groundwater in the A-aquifer at IR-08 occurs at about 5 to 9 feet bgs during the wet season, at about 5 to 8 feet bgs during the dry season, and at about 5 to 9 feet bgs during the transition period. The A-aquifer is under unconfined water table conditions. Data are not available for the B-aquifer and bedrock water-bearing zone at IR-08 because no monitoring wells were installed in these hydrogeologic units. Tidal influence monitoring conducted between October 1991 and March 1993, at monitoring wells IR08MW37A, IR08MW40A, and IR08MW41A, indicates that groundwater elevations and flow direction in the A-aquifer at IR-08 are not affected by tidal activity in San Francisco Bay. The results of the tidal influence study are presented in Appendix C. Groundwater elevation measurement data for Parcel D are shown in Tables 3.8-3 through 3.8-6 (see Section 3).

Magnitude and Direction of Groundwater Flow

Hydraulic gradients for IR-08 were estimated from groundwater elevation contour maps for May and November 1995, and April 1996, as well as groundwater elevation data collected at the site. Groundwater in the A-aquifer at IR-08 generally flows southeast and southwest during the wet season with an hydraulic gradient of 0.002 to 0.003; generally flows south and southeast during the dry season with an hydraulic

gradient of 0.003; and generally flows south and southeast during the transition period with an hydraulic gradient of 0.002.

Aquifer Hydraulic Properties

The hydraulic properties of the A-aquifer at IR-08 were estimated from data obtained during four slug tests and from step-drawdown and constant-rate pumping tests, conducted at monitoring wells screened in the A-aquifer. Hydraulic properties were evaluated using the Bouwer and Rice analysis method, as discussed in Appendix C. The hydraulic conductivity, from slug tests, ranges from 2.4 to 46 feet per day (see Table 3.8-7). The average hydraulic conductivity is typical for silty to clean sand (Heath 1987). The hydraulic conductivity, from the pumping test, ranges from 2.7 to 19 feet per day (see Table 3.8-8). The aquifer transmissivity, from slug tests, ranges from 51 to 840 square feet per day (see Table 3.8-7). The aquifer storativity, based on pumping test data, ranges from 0.00062 to 0.0056, which is low for typical unconfined aquifers (Heath 1987).

One 24-hour constant-rate pumping test was conducted at IR-08. The pumping rate was 8.9 gpm. The maximum drawdown from the pumping well is unavailable . A summary of constant rate pumping test results for IR-08 is shown in Table 3.8-8 (see Section 3).

The hydraulic properties of the B-aquifer and the bedrock water-bearing zone at IR-08 are unknown because monitoring wells were not installed in these hydrogeologic units.

Groundwater Flow Rates

The average linear velocity represents an estimated rate at which contaminants, in groundwater, may move horizontally through the pore spaces in an aquifer. The average linear velocity of groundwater in the A-aquifer at IR-08 was calculated using the equation for groundwater flow presented in Section 3.8. A summary of average linear velocity calculations (May and November 1995, and April 1996) for the A-aquifer at Parcel D is presented in Table 3.8-9. A summary of average linear velocity calculations for February 1994 is included, in Table 3.8-10, for comparison with April 1996.

Using the hydraulic conductivities and the gradients given above, and porosities of 28 and 40 percent (the low and high values in the range of laboratory-tested porosities), the calculated average linear velocity ranges from 0.12 to 0.49 feet per day toward the southeast and southwest during the wet season; from 0.02 to 0.49 feet per day toward the south and southeast during the dry season; and from 0.01 to 0.33 feet per day toward the south and southeast during the transition period. The range in velocities reflects the heterogenous hydrogeologic conditions of the Artificial Fill at IR-08.

Other predominant transport or attenuation mechanisms, such as retardation, dispersion, and partitioning characteristics should be taken into account during the estimation of transport for solute and nonaqueous phase liquids (NAPLs) in groundwater.

Total Dissolved Solids in Groundwater

Groundwater in the A-aquifer at IR-08 exhibits salinity concentrations ranging from 470 to 1,600 mg/L and TDS concentrations ranging from 7,500 to 26,000 mg/L (see Table 3.8-11). The secondary drinking water MCL for TDS is 500 mg/L. The RWQCB criteria for a drinking water source in California is 3,000 mg/L, and the U.S. EPA criteria for a drinking water source is 10,000 mg/L.

4.2.3 RI Analytical Results

This section presents the results of soil and groundwater sampling conducted during the RI investigation of IR-08. The data presented in this section were evaluated using the screening criteria presented in Section 4.0. Figures 4.2-2 and 4.2-3 present analytical results for analytes detected at concentrations exceeding screening criteria at each sampling location in soil and groundwater, respectively.

Nondetected analytes, discussed in this section, do not appear in statistical summary tables, and sampling locations where all analytes were "nondetect" do not appear in analytical results tables. All analytical results, including "nondetects", for the IR-08 RI are presented in Appendix M. Analytical results for only filtered (dissolved) metals are discussed under the "Metals" heading(s) in this section.

4.2.3.1 Soil Analytical Results

This section presents soil analytical results for analytes detected at concentrations exceeding screening criteria at IR-08. The screening criteria used for evaluation of soil analytical results were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for soil samples are summarized in Table 4.2-1 (Summary of Soil Analytical Tests). A statistical summary of soil analytical results for detected metals and organic constituents is presented in Table 4.2-2. Analytes detected in soil samples are listed in Table 4.2-3. All analytical results for the IR-08 RI are presented in Appendix M.

Metals

Metals detected in soil samples, at concentrations exceeding screening criteria, were antimony, arsenic, barium, beryllium, chromium, hexavalent chromium, copper, lead, manganese, mercury, molybdenum, nickel, vanadium, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Antimony	17/89	11.3	30.7	0	9.05	4
Arsenic	82/90	12.9	0.32	82	11.10	2
Barium	90/90	540	5,340	0	314.36	5
Beryllium	45/90	0.74	0.14	44	0.71	1
Chromium	90/90	1,340	211	32	a	0
Hexavalent Chromium	9/93	0.68	0.20	3	NA[b]	--
Copper	89/90	151	2,850	0	124.31	4
Lead	84/90	156	130	1	8.99	36
Manganese	90/90	2,540	382	84	1,431.18	7
Mercury	38/90	4.0	23.0	0	2.28	1
Molybdenum	2/45	2.7	383	0	2.68	1

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Nickel	90/90	2,310	150	53	a	0
Vanadium	90/90	189	537	0	117.17	13
Zinc	90/90	275	23,000	0	109.86	13

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples.
b Because hexavalent chromium is not considered to be naturally-occurring at HPS, no HPAL has been established for this metal.

Volatile Organic Compounds

VOCs were not detected in soil samples at concentrations exceeding screening criteria.

Semivolatile Organic Compounds

SVOCs detected in soil samples, at concentrations exceeding screening criteria, were benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/kg)	PRG Value (μg/kg)	Number of Samples Exceeding PRG
Benzo(a)anthracene	12/94	730	610	1
Benzo(a)pyrene	9/94	990	61	5
Benzo(b)fluoranthene	13/94	1,600	610	1

Note:

μg/kg Micrograms per kilogram

Pesticides and PCBs

Pesticides and PCBs detected in soil samples, at concentrations exceeding screening criteria, were 4,4'-DDD, 4,4'-DDE, and Aroclor-1260 as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentrations (μg/kg)	PRG Value (μg/kg)	Number of Samples Exceeding PRG
4,4'-DDD	18/307	3,000	1,900	1
4,4'-DDE	18/307	2,400	1,300	1
Aroclor-1260	41/360	7,200	66	35

Note:

μg/kg Micrograms per kilogram

Petroleum Hydrocarbons

TRPH was detected in soil samples at concentrations exceeding screening criteria. This compound exceeded the criterion (1,000 mg/kg) in two out of 27 samples, with a maximum concentration of 4,400 mg/kg. TOG was detected in soil samples at concentrations exceeding screening criteria. This compound exceeded the criterion (1,000 mg/kg) in 18 out of 120 samples, with a maximum concentration of 7,400 mg/kg.

4.2.3.3 Groundwater Analytical Results

This section presents groundwater analytical results for analytes detected at concentrations exceeding screening criteria at IR-08. The screening criteria used for evaluation of groundwater analytical results were tap water PRGs for metals and organics, drinking water MCLs, NAWQC for saltwater aquatic life, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for monitoring well and HydroPunch groundwater samples are summarized in Tables 4.2-4 and 4.2-7, respectively (Summary of Monitoring Well Groundwater Analytical Tests and Summary of HydroPunch Groundwater Analytical Tests). Statistical summaries of groundwater analytical results for detected metals and organic constituents in monitoring well and HydroPunch groundwater samples are presented in Table 4.2-5 and 4.2-8,

respectively. Analytes detected in monitoring well and HydroPunch groundwater samples are listed in Tables 4.2-6 and 4.2-9, respectively. All analytical results for the IR-08 RI are presented in Appendix M.

Metals

Metals detected in monitoring well groundwater samples, at concentrations exceeding screening criteria, were antimony, arsenic, beryllium, copper, manganese, mercury, nickel, and thallium as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Antimony	10/28	37.7	15.0	4	6.0	6	500	0
Arsenic	16/28	4.7	0.04	16	50.0	0	36.0	0
Beryllium	5/28	0.54	0.02	5	4.0	0	NA	–
Copper	11/28	54.2	1,400	0	NA	–	2.4	9
Manganese	28/28	12,900	180	26	NA	–	NA	–
Mercury	4/49	0.47	11.0	0	2.0	0	0.03	4
Nickel	6/28	41.4	730	0	100	0	8.2	4
Thallium	2/28	11.8	NA	–	2.0	1	NA	–

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRG for tap water

Metals were not analyzed for in the single HydroPunch groundwater sample.

Volatile Organic Compounds

Chloroform was the only VOC detected in a monitoring well groundwater sample at a concentration exceeding its screening criteria. This compound exceeded the PRG (0.2 μg/L) in two out of 28 with a maximum concentration of 3 μg/L.

VOCs were not analyzed for in the single HydroPunch groundwater sample.

Semivolatile Organic Compounds

Benzo(a)pyrene was detected at a concentration exceeding its screening criteria. This compound exceeded the PRG (0.002 μg/L) in one out of 49 monitoring well groundwater samples, with a concentration of 0.1 μg/L. Bis(2-ethylhexyl)phthalate was detected at a concentration exceeding its screening criteria. This compound exceeded the PRG (5 μg/L) and the MCL (4 μg/L) in one out of 32 monitoring well groundwater samples, with a concentration of 10 μg/L.

SVOCs were not analyzed for in the single HydroPunch groundwater sample.

Pesticides and PCBs

Pesticides were not detected in monitoring well groundwater samples and, as a result, do not appear in the corresponding statistical summary in Table 4.2-5.

Aroclor-1260 was the only PCB detected at concentrations exceeding screening criteria. This compound exceeded the PRG (0.009 μg/L) in two out of 54 monitoring well groundwater samples, with a maximum concentration of 3 μg/L.

Pesticides and PCBs were not detected in the single HydroPunch groundwater sample and, as a result, do not appear in the HydroPunch groundwater statistical summary Table 4.2-8.

Petroleum Hydrocarbons

Petroleum hydrocarbons detected in monitoring well groundwater samples, at concentrations exceeding screening criteria, were TPH-d, TPH-mo, and TRPH as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	Petroleum Hydrocarbon Screening Criteria (μg/L)	Number of Samples Exceeding Screening Criteria
TPH-d	2/23	120	100	1
TPH-mo	6/6	950	100	5
TRPH	1/6	750	100	1

Notes:

μg/L Micrograms per liter

TPH-mo was the only petroleum hydrocarbon detected in the single HydroPunch groundwater sample at concentrations exceeding screening criteria. This analyte exceeded the criterion (100 μg/L), with a concentration of 2,100 μg/L.

4.2.4 Nature and Extent of Contaminants

The following section describes the nature and extent of the constituents discussed in Section 4.2.3 that exceeded the screening criteria for soil and groundwater.

4.2.4.1 Nature and Extent of Contaminants in Soil

Analytical results indicate the following constituents are present in soil at IR-08, at concentrations exceeding their screening criteria:

- Metals
- SVOCs
- Pesticides and PCBs
- Petroleum Hydrocarbons

The distribution of these constituents is shown on Figure 4.2-2 and discussed below. For the purpose of this discussion, soil samples collected between 0 and 2 feet bgs will be referred to as surface samples and those collected at depths of 2 feet or more will be referred to as subsurface samples.

Metals

As discussed in Section 4.2.3, the metals antimony, arsenic, barium, beryllium, chromium, hexavalent chromium, copper, lead, manganese, mercury, molybdenum, nickel, vanadium, and zinc are present in soil at IR-08 at concentrations exceeding the screening criteria. The nature and extent of these metals are summarized in the following paragraphs.

Antimony was detected at concentrations exceeding the HPAL (9.05 mg/kg), but not the PRG (30.7 mg/kg) in four subsurface samples. Depths for these samples ranged from 2.75 to 6.25 feet bgs, and sample concentrations exceeding screening criteria ranged from 9.1 to 11.3 mg/kg. The maximum antimony concentration was detected in subsurface soil collected at a depth of 2.75 feet bgs from boring IR08B029.

Arsenic was detected at concentrations exceeding the PRG (0.32 mg/kg) in 25 surface and 57 subsurface soil samples. Concentrations for arsenic also exceeded the HPAL (11.10 mg/kg) in two subsurface soil samples. Depths for all samples ranged from 0.75 to 6.25 feet bgs, and sample concentrations exceeding the screening criteria ranged from 0.54 to 12.6 mg/kg. The maximum arsenic concentration was detected in subsurface soil collected at a depth of 3.25 feet bgs from boring IR08B021.

Barium was detected at concentrations exceeding the HPAL (314.36 mg/kg), but not the PRG (5,340 mg/kg), in two surface and three subsurface soil samples. Depths for these samples ranged from 1.25 to 6.25 feet bgs, and sample concentrations exceeding the screening criteria ranged from 318 to 540 mg/kg. The maximum barium concentration was detected in surface soil collected at a depth of 1.25 feet in boring IR08B028.

Beryllium was detected at concentrations exceeding the PRG (0.14 mg/kg) on 12 surface and 32 subsurface soil samples. Beryllium was also detected at concentrations exceeding the HPAL (0.71 mg/kg) in one surface soil sample. Depths to all samples ranged from 0.75 to 6.75 feet bgs, and sample concentrations exceeding screening criteria ranged from 0.26 to 0.74 mg/kg. The maximum beryllium concentration was detected in surface soil collected from 0.75 feet bgs in boring IR08B016A.

Chromium was detected at concentrations exceeding the PRG (211 mg/kg), but not the HPAL (which varies by sample), in six surface and 26 subsurface soil samples. Depths for these samples ranged from 0.75 to 6.25 feet bgs, and sample concentrations exceeding the screening criteria ranged from 212 to 1,340 mg/kg. The maximum chromium concentration was detected in a subsurface soil sample collected at a depth of 6.25 feet bgs in IR08B020.

Hexavalent chromium was detected at concentrations exceeding the PRG (0.20 mg/kg) in one surface and two subsurface soil samples. There is no HPAL for hexavalent chromium. Depths for these samples ranged from 0.75 to 5.75 feet bgs, and concentrations exceeding the screening criteria ranged from 0.28 to 0.68 mg/kg. The maximum hexavalent chromium concentration was detected in a subsurface soil sample collected at a depth of 5.75 feet bgs from boring IR08B022.

Copper was detected at concentrations exceeding the HPAL (124.31 mg/kg), but not the PRG (2,850 mg/kg), in two surface and two subsurface soil samples. Depths for these samples ranged from 1.25 to 3.25 feet bgs, and concentrations exceeding the screening criteria ranged from 127 to 151 mg/kg. The maximum copper concentration was detected in a surface soil sample collected from a depth of 1.25 feet bgs in boring IR08B031.

Lead was detected at concentrations exceeding the HPAL (8.99 mg/kg) in 17 surface and 19 subsurface soil samples. The lead concentration also exceeded the PRG (130 mg/kg) in one subsurface soil sample. Depths for all samples ranged from 0.75 to 6.25 mg/kg, and sample concentrations exceeding the screening criteria ranged from 9.2 to 156 mg/kg. The maximum lead concentration was detected in subsurface soil at a depth of 3.25 feet bgs in boring IR08B023.

Manganese was detected at concentrations exceeding the PRG (382 mg/kg) in 24 surface and 60 subsurface soil samples. Concentrations for manganese also exceeded the HPAL (1,431.18 mg/kg) in one surface and six subsurface soil samples. Depths for all samples ranged from 0.75 to 6.75 feet bgs, and sample concentrations exceeding the screening criteria ranged from 525 to 2,540 mg/kg. The maximum manganese concentration was detected in a sample collected from a depth of 5.75 feet bgs in boring IR08B014.

Mercury was detected at a concentration exceeding the HPAL (2.28 mg/kg), but not the PRG (23 mg/kg), in one surface soil sample. The concentration for this sample, which was collected at a depth of 1.75 feet bgs from boring IR08B033, was 4.0 mg/kg.

Molybdenum was detected at a concentration exceeding the HPAL (2.68 mg/kg), but not the PRG (383 mg/kg), in one subsurface soil sample. The concentration for this sample, which was collected at a depth of 6.25 feet bgs from boring IR08B011, was 2.7 mg/kg.

Nickel was detected at concentrations exceeding the PRG (150 mg/kg), but not the HPAL (which varies by sample), in 16 surface and 37 subsurface soil samples. Depths for samples ranged from 0.75 to 6.25 feet bgs, and sample concentrations exceeding the screening criteria ranged from 151 to 2,310 mg/kg. The maximum nickel concentration was detected in subsurface soil collected at a depth of 5.75 feet bgs from boring IR08B024.

Vanadium was detected at concentrations exceeding the HPAL (117.17 mg/kg), but not the PRG (537 mg/kg) in one surface and 12 subsurface soil samples. Depths for these samples ranged from 1.75 to 6.75 feet bgs, and concentrations exceeding the screening criteria ranged from 118 to 189 mg/kg. The maximum vanadium concentration was detected in subsurface soil collected at a depth of 5.25 feet bgs from boring IR08B031.

Zinc was detected at concentrations exceeding the HPAL (109.86 mg/kg), but not the PRG (23,000 mg/kg), in six surface and seven subsurface soil samples. Depths for these samples ranged from 1.25 to 5.75 feet bgs, and sample concentrations exceeding the screening criteria ranged from 112 to 275 mg/kg. The maximum zinc concentration was detected in subsurface soil collected at a depth of 3.25 feet bgs from boring IR08B022.

Semivolatile Organic Compounds

As discussed in Section 4.2.3, the SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene are present in soil at IR-08 at concentrations exceeding the screening criteria.

Benzo(a)anthracene was detected at a concentration exceeding the PRG (610 μg/kg) in one surface soil sample. The concentration for this sample, which was collected at a depth of 0.75 feet bgs from boring IR08B016, was 730 μg/kg.

Benzo(a)pyrene was detected at concentrations exceeding the PRG (61 μg/kg) in five surface soil samples. Depths for these samples ranged from 0.75 to 1.75 feet bgs, and sample concentrations above screening criteria ranged from 83 to 990 μg/kg. The maximum benzo(a)pyrene concentration was detected in surface soil collected at a depth of 0.75 feet bgs from boring IR08B016.

Benzo(b)fluoranthene was detected at a concentration exceeding the PRG (610 μg/kg) in one surface soil sample. The concentration for this sample, which was collected at a depth of 0.75 feet bgs from boring IR08B016, was 1,600 μg/kg.

Pesticides and Polychlorinated Biphenyls

As discussed in Section 4.2.3, the pesticides 4,4'-DDD and 4,4'-DDE, and the PCB Aroclor-1260 are present in soil at IR-08 at concentrations exceeding the screening criteria.

The pesticide 4,4'-DDD was detected at a concentration exceeding the PRG (1,900 μg/kg) in one subsurface soil sample. The concentration for this sample, which was collected at a depth of 3.25 feet from boring IR08B035, was 3,000 μg/kg (Figure 4.2-4).

The pesticide 4,4'-DDE was detected at a concentration exceeding the PRG (1,300 μg/kg) in one subsurface soil sample. The concentration for this sample, which was collected at a depth of 3.25 feet from boring IR08B035, was 2,400 μg/kg (Figure 4.2-5).

The PCB Aroclor-1260 was detected at concentrations exceeding the PRG (66 μg/kg) in 10 surface and 25 subsurface soil samples. The depths for these samples ranged from 0.75 to 29.75 feet bgs, and sample concentrations exceeding the screening criteria ranged from 68 to 7,200 μg/kg. The maximum Aroclor-1260 concentration was detected in a subsurface soil sample collected at a depth of 16.25 feet bgs from boring IR08MW42A.

Petroleum Hydrocarbons

As discussed in Section 4.2.3, petroleum hydrocarbons measured as TRPH and TOG are present in soil at IR-08 at concentrations exceeding screening criteria.

TRPH was detected at concentrations exceeding the screening criterion (1,000 mg/kg) in two surface soil samples. TRPH was detected at a concentration of 2,600 mg/kg in a sample collected from a depth of 0.75 feet bgs in boring IR08B052 and at a concentration of 4,400 mg/kg in a sample collected from a depth of 2.25 feet bgs in boring IR08B045.

TOG was detected at concentrations exceeding the screening criterion 1,000 mg/kg in 7 surface and 11 subsurface soil samples. Depths for all samples ranged from 1.25 to 5.25 feet bgs, and concentrations exceeding screening criteria ranged from 1,100 to 7,400 mg/kg. The maximum TOG concentration was detected in a subsurface soil sample collected from a depth of 2.25 feet bgs in IR08B045.

Summary of Soil Chemistry

Analysis of the metals results indicates a sporadic distribution of metals exceeding the screening criteria. Antimony, barium, copper, molybdenum, vanadium, and zinc exceeded their HPALs but not their PRGs. Arsenic, beryllium, lead, and manganese exceeded both their HPALs and PRGs, and may represent a metals release to the environment. However, they were detected at isolated locations that are not consistent with other potential metal or organic contamination.

The maximum detected concentrations of 13 metals and hexavalent chromium were distributed among 10 borings and at depths ranging from 075 to 6.25 feet bgs. With the exception of lead, the distribution of these metals do not appear to be related to organic contaminants or to each other.

Lead was detected at concentrations exceeding the HPAL in samples collected at depths up to 6 feet bgs in borings IR08B013, IR08B022, IR08B033, and IR08B035. Soil samples from these borings also contained TRPH or TOG at concentrations exceeding their screening criteria.

The SVOC benzo(a)pyrene was detected at concentrations exceeding the PRG in five surface soil samples scattered across IR-08. Benzo(a)anthracene and benzo(b)fluoranthene were detected in a surface soil sample collected from boring IR08B016.

The pesticides 4,4'-DDD and 4,4'-DDE were detected in one soil sample collected at a depth of 3.5 feet bgs in boring IR08B035. No source for the pesticides contamination was identified.

The PCB Aroclor-1260 was detected at concentrations exceeding the PRG in shallow soil samples collected from borings IR08B013, IR08B014, IR08B016, IR08B018A, IR08B021, IR08B022, IR08B032, IR08B035, and IR08B052. These borings were drilled around the perimeter of IR-08.

Aroclor-1260 was also detected at concentrations exceeding the PRG in deeper soils (2 to 6 feet bgs) in several of the perimeter borings and in borings drilled in the central part of IR-08 (IR08B004, IR08B005A, IR08B007, IR08B007A, IR08B012).

In addition, Aroclor-1260 was detected at concentrations exceeding the PRG in soil samples collected at 9.25 feet bgs in boring IR08B007, at 16.25 feet bgs in boring IR08MW42A and at 18.75 feet bgs in boring IR08MW42A.

Petroleum hydrocarbons were detected at concentrations exceeding the screening criteria in several surface soil samples and soils collected from less than 6 feet bgs. These detections appear to be isolated surface releases.

4.2.4.2 Nature and Extent of Contaminants in Groundwater

Analytical results indicate the following constituents are present in groundwater at IR-08, at concentrations exceeding their screening criteria:

- Metals
- VOCs
- SVOCs
- PCBs
- Petroleum Hydrocarbons

The distribution of these constituents is shown on Figure 4.2-3 and is discussed below. Because contaminant concentrations in groundwater may vary throughout the year due to seasonal variations, the figure has been prepared using the highest concentration detected in the four most recent sampling events, where available, representing all seasons for each monitoring well. The figure shows the maximum extent of groundwater contamination regardless of the season in which the maximum contamination occurs.

Metals

As discussed in Section 4.2.3.2, the metals antimony, arsenic, beryllium, copper, manganese, mercury, nickel, and thallium were detected in monitoring well groundwater samples at concentrations exceeding their screening criteria.

Antimony was detected at concentrations exceeding the MCL (6 μg/L) in six samples from five wells and the PRG (15 μg/L) in four samples from three wells. No sample concentrations exceeded the NAWQC (500 μg/L). Concentrations for these samples exceeding screening criteria ranged from 1.8 to 37.7 μg/L. The maximum antimony concentration was detected in a sample collected from monitoring well IR08MW40A.

Arsenic was detected at concentrations exceeding the PRG (0.04 μg/L), but not the MCL (50 μg/L) or the NAWQC (36 μg/L), in 15 samples from 6 wells. Concentrations for these samples exceeding screening criteria ranged from 1.5 to 4.7 μg/L. The maximum arsenic concentration was detected in a sample collected from monitoring well IR08MW40A.

Beryllium was detected at concentrations exceeding the PRG (0.02 μg/L), but not the MCL (4.0 μg/L) in five samples from five wells (IR08MW37A, IR08MW38A, IR08MW39A, IR08MW40A, and I08MW41A). The concentration for all samples was 0.54 μg/L.

Copper was detected at concentrations exceeding the NAWQC (2.4 μg/L), but not the PRG (1,400 μg/L) in nine samples from six wells. Concentrations for these samples exceeding screening criteria ranged from 6.0 to 54.2 μg/L. The maximum copper concentration was detected in a sample collected from monitoring well IR08MW38A.

Manganese was detected at concentrations exceeding the PRG (180 μg/L) in 26 samples from 8 wells. Concentrations for these samples exceeding the screening criteria ranged from 336 to 12,900 μg/L. The maximum manganese concentration was detected in a sample collected from monitoring well IR08MW44A.

Mercury was detected at concentrations exceeding the NAWQC (0.03 μg/L), but not the MCL (2.0 μg/L) or PRG (11 μg/L) in four samples from three wells. Concentrations for these samples exceeding the screening criteria ranged from 0.16 to 0.47 μg/L. The maximum mercury concentration was detected in a sample collected from monitoring well IR08MW37A.

Nickel was detected at concentrations exceeding the NAWQC (8.2 μg/L), but not the MCL (100 μg/L) or NAWQC (730 μg/L), in four samples from four wells. Concentrations for these samples exceeding the screening criteria ranged from 19.8 to 41.4 μg/L. The maximum nickel concentration was detected in a sample collected from monitoring well IR08MW41A.

Thallium was detected at a concentration of 11.8 μg/L in one sample collected from monitoring well IR08MW44A. This concentration exceeded the MCL (2.0 μg/L).

Volatile Organic Compounds

Chloroform was detected at a maximum concentration of 3 μg/L in two samples collected from monitoring well IR08MW43A. This concentration exceeded the PRG (0.2 μg/L), but not the MCL (100 μg/L).

Semivolatile Organic Compounds

Benzo(a)pyrene was detected at a concentration of 0.1 μg/L in one sample collected from monitoring well IR08MW42A. This concentration exceeded the PRG (0.002 μg/L), but not the MCL (0.2 μg/L).

Bis(2-ethylhexyl)phthalate was detected at a concentration of 10 μg/L in one sample from monitoring well IR08MW40A. This concentration exceeded the PRG (5 μg/L) and the MCL (4 μg/L).

Polychlorinated Biphenyls

Aroclor-1260 was detected in two samples from monitoring well IR08MW42A. It was detected at a concentration of 3 μg/L and at a concentration of 1.0 μg/L in subsequent samples collected in October and December of 1991. This concentration exceeded the PRG (0.009 μg/L).

Petroleum Hydrocarbons

TPH-d was detected at a concentration of 120 μg/L in one sample from monitoring well IR08MW43A. This concentration exceeded the screening criterion (100 μg/L).

TPH-mo was detected at concentrations exceeding the screening criterion (100 μg/L) in five samples from two monitoring wells (IR08MW43A and IR08MW44A). Concentrations for these samples exceeding the screening criteria ranged from 180 to 950 μg/L. TPH-mo was also detected at a concentration of 2,100 μg/L in one HydroPunch water sample collected from boring IR08B052.

TRPH was detected at a concentration of 750 μg/L in one sample collected from monitoring well IR08MW43A. This concentration exceeded the screening criterion (100 μg/L).

Summary of Groundwater Chemistry

The maximum concentrations for the eight metals detected in groundwater at concentrations exceeding screening criteria were distributed among four monitoring wells. These metals do not appear to be related to each other or to the organic contamination at IR-08. The VOC contamination detected in groundwater at IR-08 appear to be an isolated occurrence.

The petroleum hydrocarbons TPH-d, TPH-mo, and TRPH were detected at concentrations exceeding screening criteria in samples collected from monitoring well IR08MW43A at the northern edge of IR-08, 200 feet north of the petroleum hydrocarbon contamination in the soil at IR-08. TPH-mo was also detected in a sample collected from monitoring well IR08MW44A at the northwest edge of IR-08 and a HydroPunch sample collected from boring IR08B052 drilled in the central part of IR-08.

4.2.5 Contaminant Fate and Transport

This section discusses contaminant fate and transport at IR-08 in relation to the geology and hydrogeology of IR-08 and the nature and extent of contaminants at IR-08. Potential migration routes, persistence in the environment, and a migration evaluation are discussed below.

The purpose of this section is to identify in what media, and at what location, VOCs, SVOCs, pesticides, PCBs, and petroleum hydrocarbons which exceeded their respective screening criteria may occur in the future. This evaluation is divided into discussions on potential migration routes, persistence in the environment, and a migration evaluation for the chemicals above screening levels at the site. Detailed descriptions of the physical, chemical, and biological processes influencing the fate and transport of the metals and organic compounds at IR-08 are presented in Section 3.0 of Appendix O. Section 4.0 of Appendix O summarizes the physical and chemical characteristics of the metals and organic compounds which exceeded the screening criteria in soil or groundwater at IR-08. Finally, Table O-4 contains a summary of the fate and transport of these chemicals. This table can be used as a quick reference to the fate and transport of metals, SVOCs, pesticides, PCBs, and petroleum hydrocarbons at IR-08.

4.2.5.1 Potential Migration Routes

Figure 4.2-6 shows a conceptual model for contaminant migration at IR-08. In addition, migration routes are summarized on Table 4.2-10.

PCB is the primary contaminant of concern at IR-08. This section focuses on the routes and mechanisms of PCB migration at IR-08. An understanding of the mechanisms of PCB migration is important during future risk assessment and remedial design activities. Although the PCB removal action conducted in 1988 has greatly reduced the potential for PCB contaminants to migrate on and off site, PCB concentrations still exceed the screening criteria because the interim removal action only targeted surface soils at depths of less than 6 feet bgs and containing PCB concentrations exceeding 24 mg/kg. On- and off-site migration of PCBs is discussed below.

Field sampling results reveal that Aroclor-1260 contaminants have migrated to approximately 16 to 20 feet bgs, 10 to 15 feet below the water table, in a relatively narrow area. This distribution may indicate a preferential pathway of downward PCB migration to that depth.

The storm drain catch basin (SDCB) captures surface water runoff in a topographically low area and generally consists of a drywell associated with storm drain pipes. The drywell is usually located several feet below the water table and filled with gravel and sand. Storm drain pipes are connected to the drywell a few feet above or at the threshold of the water table. During precipitation events, surface water captured by the SDCB will initially recharge groundwater in the aquifer through the drywell. However, if the rate of surface water flow into the dry well is greater than the recharge rate into the aquifer, the water level in the drywell will rise to the point where it flows into the storm drain pipes. The overflow water is directed to a sanitary sewer. The purpose of the SDCB design is to maintain the water table at a constant level during heavy storm events and to protect water resources during dry seasons. At HPS, the storm drain pipes of the SDCB are commonly located at 2 to 4 feet bgs or 2 to 4 feet above the water table, and overflow water is discharged either to San Francisco Bay or the sanitary sewer. Information on the diameter and depth of the dry well is unavailable.

The major migration route for contaminants at IR-08 has been the overland flow of liquid Aroclor-1260, or sediments with Aroclor-1260 sorbed to them, to low areas within IR-08. Associated SVOCs and pesticides have also collected in these low areas. In one of these low areas, a dry well has acted as a conduit to allow additional downward migration of Aroclor-1260. Liquid PCBs, such as Aroclor-1260, are extremely immobile in the environment once sorbed to soil. Therefore, any additional migration of Aroclor-1260 at IR-08 is expected to be as a result of surface sediment transport with adsorbed PCBs.

The dominant migration route for metals detected in soil at IR-08 will be slow leaching by precipitation from shallow soil to deeper soil and groundwater. Metals in groundwater will equilibrate with the soil matrix through which the groundwater is moving. Metal solubility depends on a complex series of reactions between groundwater and soil, influenced by several factors including the pH and oxidation potential. The potential for metal migration in groundwater is expected to be low.

4.2.5.2 Persistence in the Environment

Metals do not degrade in soil and groundwater and so persist indefinitely.

The organic contaminants present in soil at IR-08 are the SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, the pesticides 4,4'-DDE and 4,4'-DDD, the PCB Aroclor-1260, and petroleum hydrocarbons detected as TRPH and TOG. Persistence of the organic contaminants at IR-08 is summarized in Table 4.2-10 and described in detail in Appendix O.

4.2.5.3 Migration Evaluation

This section evaluates the migration potential for metals, VOCs, SVOCs, pesticides, PCBs, and petroleum hydrocarbons, detected above screening levels in soil and groundwater at IR-08. This evaluation considers the mobility of a compound, its chemical characteristics, and its persistence in the environment, in order to estimate its potential for migrating away from IR-08.

Migration in Soil

The following sections evaluate the migration of metals, the SVOCs benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, the pesticides 4,4'-DDE and 4,4'-DDD, the PCB Aroclor-1260, and petroleum hydrocarbons in soil at IR-08.

Metals

Antimony, arsenic, barium, beryllium, chromium, chromium VI, copper, lead, manganese, mercury, molybdenum, nickel, vanadium, and zinc were detected above screening levels in soil at IR-08. As discussed in Section 4.2.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the soil matrix and the subsurface conditions. In general, with the exception of antimony, barium, chromium VI, manganese, and vanadium, the migration of these metals is limited because of their sorption onto soil under the environmental conditions present at IR-08 (Table O-4). Chromium VI, however, is considerably more soluble than the other metal species and may be easily leached to deeper soil and potentially to groundwater. Migration of chromium VI will be stopped when it comes in contact with reducing conditions, such as those created by the biodegradation of petroleum hydrocarbons. Therefore, the potential for these metals to be leached from soil to groundwater is low. The other metals that are leachable will slowly be transported to the groundwater by infiltrating precipitation.

SVOCs

The SVOCs are all PAHs with very low solubilities in water, low vapor pressures, and high organic carbon partition coefficients (Table O-3). In addition, they are resistant to degradation. It is, therefore, assumed that the PAH SVOCs will remain in their present location and not be degraded.

Pesticides

The pesticides 4,4'-DDE and 4,4'-DDD have low solubilities, low vapor pressures, and high organic carbon partitioning coefficients. They are also resistant to degradation. It is therefore expected that 4,4'-DDE and 4,4'-DDD will remain in the soil where detected, but will not be degraded.

PCBs

The PCB Aroclor-1260 has a very low solubility, low vapor pressure, and a high organic carbon partitioning coefficient (Table O-3). It is, therefore, assumed that Aroclor-1260 detected in groundwater samples is actually present as a result of sorption to very fine soil particles, colloids, or bacteria and is not actually dissolved in groundwater. Contaminants migrating with groundwater in this fashion may move at the same rate as the groundwater but will more likely be retarded to varying degrees by sorption to the surrounding soil matrix. Groundwater analytical results indicate that though the release of PCBs is more than 10 years old, PCBs are present in groundwater only in the immediate area of the dry well and are not present in groundwater 150 feet downgradient from their only detection in groundwater.

Petroleum Hydrocarbons

Petroleum hydrocarbons measured as TOG were detected at concentrations exceeding the screening criteria for soil. These petroleum hydrocarbons are expected to sorb to clay particles and to degrade at various rates depending on the size of the hydrocarbon molecule and site-specific conditions. Once the source of petroleum hydrocarbons is removed, further migration is not expected. The petroleum hydrocarbons are therefore expected to remain at their present locations, where they may degrade.

Migration in Groundwater

The following sections evaluate the migration of metals, VOCs, SVOCs, PCBs, and petroleum in groundwater at IR-08.

Metals

Antimony, arsenic, beryllium, copper, manganese, mercury, nickel, and thallium were detected above screening levels in groundwater at IR-08. As discussed in Section 4.2.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the groundwater it is dissolved in, the soil matrix saturated by the groundwater, and subsurface conditions such as the pH and oxidation potential. In general, these metals form compounds that are relatively insoluble in groundwater under the environmental conditions present at IR-08. In addition, the migration of these metals is further limited because of their sorption onto soil under the environmental conditions present at IR-08. Therefore, there is a low potential for these metals to be transported in groundwater away from IR-08 (Table O-4).

SVOCs

The SVOC benzo(a)pyrene is a PAH with very low solubility in water, low vapor pressure, and high organic carbon partition coefficient (Table O-3). In addition, it is resistant to degradation. It is, therefore, assumed that benzo(a)pyrene will sorb to soil matrix from groundwater and therefore not migrate from its present location but not be degraded. The SVOC bis(2-ethylhexyl)phthalate is also expected to sorb to soil from groundwater and slowly degrade.

PCBs

The PCB Aroclor-1260 has a very low solubility in water, and a high organic carbon partitioning coefficient (Table 0-3). It is, therefore, assumed that Aroclor-1260 detected in groundwater samples is actually present as a result of sorption to very fine soil particles, colloids, or bacteria and is not actually dissolved in the groundwater. Contaminants migrating with gorundwater in this fashion may move at the same rate as the groundwater but will more likely be retarded to varying degrees by sorption to the surrounding soil matrix. Groundwater analytical results indicate that though the release of PCBs is more than 10 years old, PCBs are present in gorundwater only in the immediate area of the dry well and are not present in gorundwater 150 feet downgradient from their only detection in gorundwater.

4.2.6 Risk Assessment

The following sections present the HHRA and a summary of the environmental and ecological risks.

4.2.6.1 Human Health Risk Assessment

This section summarizes the HHRA presented in Appendix N of this RI report conducted under the current industrial, future residential, and future industrial land-use scenarios at IR-08 in accordance with the methodology summarized in Section 4.0.

Current Industrial Land Use Risk and Hazard Characterization

Twenty-four 0.5-acre exposure areas are within or contact IR-08 (Table 4.0-2 and Figure 4.0-4). Currently, IR-08 is used for industrial purposes. Soil samples were collected from 0 to 2 feet bgs in unpaved areas at only exposure area BC27 (Table 4.0-2); therefore, an HHRA was conducted for soil. A-aquifer groundwater samples containing VOCs were collected at five exposure areas; therefore, an HHRA was conducted for A-aquifer groundwater. The B-aquifer and the bedrock water-bearing zone are not currently used as sources of potable drinking water or for industrial purposes; therefore, an HHRA was not conducted for either the B-aquifer groundwater or the bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and for A-aquifer groundwater under the RME and average exposure cases are summarized below.

In addition, an evaluation of the potential for current workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME and Average Cases - Soil

A total ELCR was not calculated for the 1 exposure area (BC27) with available soil data because no carcinogenic compounds were identified in this exposure area. In addition, the total segregated HI is less than 1 in exposure area BC217 (Table 4-126 and Figure 4.1-84).

The U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPC for lead in exposure area BC27 is less than 1,000 mg/kg (Table 4.1-26); therefore, potential exposure of industrial workers to lead in soil at IR-08 is not expected to result in adverse health effects under the current industrial scenario.

RME and Average Exposure Cases - A-Aquifer Groundwater

For all 5 industrial exposure areas with VOCs in the A-aquifer groundwater, modeled indoor air concentrations are less than the U.S. EPA Region IX ambient air PRGs (see Attachment N-E) of Appendix N). Therefore, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-08 is expected to be insignificant.

Future Residential Land Use Risk and Hazard Characterization

One hundred seventy-eight 2,500 ft^2 exposure areas are within or contact IR-08 (Table 4.0-3 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the residential land-use scenario, soil data are available for 31 exposure areas (Table 4.0-3). In addition, groundwater data for A-aquifer groundwater are available for six exposure areas (Table 4.0-3). Groundwater data are not available for either the B-aquifer or the bedrock water-bearing zone; therefore, a HHRA was not prepared for either B-aquifer or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and groundwater for the A-aquifer under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future residents to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 24 exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 4×10^{-9} in exposure area 091082 to 9×10^{-4} in exposure area 096086. Of the 31 exposure areas with available soil data, 22 exposure areas have total ELCRs that equal or exceed 1×10^{-6} and 9 exposure areas

have ELCRs less than 1×10^{-6}. To facilitate the presentation and discussion of ELCRs, each range was assigned a group number. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$> 1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	8
4	1×10^{-5} to $< 1 \times 10^{-4}$	12
5	1×10^{-6} to $< 1 \times 10^{-5}$	2
6	$< 1 \times 10^{-6}$	9[a]

Note:

[a] Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-27 and are shown graphically in Figure 4.1-85. The distribution of total ELCRs and the COPCs contributing to them are summarized below.

- In Group 3 (a total of 8 exposure areas), the total ELCRs are largely the result of potential exposure to one or more of the following COPCS: Aroclor-1260, pesticides, PAHs, and VOCs.
- In Groups 4 and 5 (a total of 14 exposure areas), the total ELCRs are largely the result of potential exposure to one or more of the following COPCs: Aroclor-1260, PAHs, arsenic, beryllium, and pesticides.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, in exposure areas in which PCBs, PAHs, and pesticides contribute most significantly to the total ELCRs, ingestion of homegrown produce is the dominant exposure pathway. For exposure areas in which metals contribute significantly to the total ELCRs, ingestion of soil and ingestion of homegrown produce are the dominant exposure pathways.

Of the 31 exposure areas for which soil data are available, total segregated HIs equal or exceed 1 in 11 exposure areas under the child residential scenario and 1 exposure area under the adult residential scenario. To facilitate the presentation and discussion of HIs, the HIs that equal or exceed 1 were assigned a group number. The following breakdown of total segregated HIs that equal or exceed 1 under the child residential scenario was observed:

Group Number	Highest Total Segregated HI Range	Number of Exposure Areas
1	HI ≥ 7	0
2	3 ≤ HI < 7	2
3	1≤ HI< 3	9

The specific exposure areas in the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child residential scenario in Figure 4.1-86.

In Group 2, the highest total segregated HIs in exposure areas 094087 and 097091 are largely the result of potential exposure to manganese and antimony.

The highest total segregated HIs in Group 3 are largely the result of exposure to one or more of the following COPCs: manganese; aluminum; antimony; mercury; and 4,4'-DDT. Vanadium contributes frequently at low, chemical-specific HIs to the highest total segregated HI in combination with manganese, aluminum, or antimony. Collectively, ingestion of homegrown produce is the dominant exposure pathway.

Lastly, using the U.S. EPA's Integrated Exposure Uptake Biokinetic Model for lead (U.S. EPA 1994), a lead concentration of 221 mg/kg was determined to be a level of concern for children exposed to lead in soil. The EPCs for lead are less than 221 mg/kg in all 31 exposure areas with available soil data (Table 4.1-35); therefore, potential exposure to lead in soil is not expected to result in adverse health effects.

Average Exposure Case - Soil

Total ELCRs range from 7×10^{-10} in exposure area 091082 to 5×10^{-5} in exposure areas 092085 and 096086. Of the 31 exposure areas with available soil data, 20 exposure areas have total ELCRs that exceed 1×10^{-6} and 11 exposure areas have total ELCRs of less than 1×10^{-6} (Table 4.1-27). The exposure areas with total ELCRs that exceed 1×10^{-6} are shown in Figure 4.1-85. Relative contributions of COPCs and pathways contributing to the total ELCRs are similar to those under the RME case.

Of the 31 exposure areas with available soil data, total segregated HIs are equal or exceed 1 in 7 exposure areas under the child residential scenario and are all less than 1 under the adult residential scenario (Table 4.1-28 and Figure 4.1-86).

As discussed under the RME case, the EPCs for lead are less than 221 mg/kg (the level of concern for resident children potentially exposed to lead in soil) in all 31 exposure areas with available soil data; therefore, potential exposure to lead in soil is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

VOCs were detected in A-aquifer groundwater in 6 exposure areas at IR-08. Under both the RME and average exposure cases, modeled indoor air concentrations of volatile COPCs are less than their respective U.S. EPA Region IX ambient air PRGS (U.S. EPA 1995). Therefore, the potential for adverse effects resulting from potential exposure of residents to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-08 is expected to be insignificant.

Future Industrial Land Use Risk and Hazard Characterization

Twenty-four 0.5-acre exposure areas are within or contact IR-08 (Table 4.0-2 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the industrial land-use scenario, soil data are available for 14 exposure areas (Table 4.0-2). Groundwater data are not available for either the B-aquifer or the bedrock water-bearing zone; therefore, an HHRA was not conducted for either the B-aquifer or the bedrock water-bearing zone groundwater. In addition, groundwater data for VOCs in A-aquifer groundwater are available for five exposure areas

(Table 4.0-2). The risk and hazard characterizations for soil and groundwater from the A-aquifer under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 10 exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 1×10^{-10} in exposure area AZ28 to 1×10^{-5} in exposure area BB30. Of the 14 exposure areas with available soil data, 8 exposure areas have total ELCRs that equal or exceed 1×10^{-6} and 6 exposure areas have total ELCRs of less than 1×10^{-6}. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$> 1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	0
4	1×10^{-5} to $< 1 \times 10^{-4}$	1
5	1×10^{-6} to $< 1 \times 10^{-5}$	7
6	$< 1 \times 10^{-6}$	6[a]

Note:

[a] Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-33 and are shown graphically in Figure 4.1-91. The distribution of total ELCRs and the COPCs contributing to them are summarized below.

- In Group 4, the total ELCR in exposure area BB30 is largely the result of potential exposure to PAHs.

- In Group 5, the total ELCRs in seven exposure areas are largely the result of potential exposure to one or more of the following COPCs: Aroclor-1260, arsenic, beryllium, and PAHs.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, ingestion of and dermal contact with soil are the dominant exposure pathways.

Of the 14 exposure areas with available soil data, total segregated HIs are all less than 1 (Table 4.1-33).

Lastly, the U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPCs for lead in all 14 exposure areas with available soil data are less than 1,000 mg/kg; therefore, potential exposure of industrial workers to lead is not expected to result in adverse health effects.

Average Exposure Case - Soil

Among the 10 exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 1×10^{-11} in exposure area AZ28 to 6×10^{-7} in exposure area BA30. Of the 14 exposure areas with available soil data, all 14 exposure areas have total ELCRs less than 1×10^{-6} (Table 4.1-33).

Of the 14 exposure areas with available soil data, total segregated HIs for all exposure areas are less than 1 (Table 4.1-33).

As discussed under the RME case, the EPCs for lead are less than 1,000 mg/kg (the level of concern for industrial workers potentially exposed to lead in soil) in all 14 exposure areas with available soil data; therefore, potential exposure of industrial workers is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

As discussed under the current industrial scenario, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs in A-aquifer groundwater in future industrial buildings at IR-08 is expected to be insignificant.

4.2.6.2 Environmental/Ecological Risk

Fifty percent of IR-08 is covered by pavement, and the remaining 50 percent consists of ruderal habitat. No wetlands are located at IR-08. Few ecological receptors are expected to use the site because of the limited area and poor quality of available habitat. Potential terrestrial exposure pathways for IR-08 include dermal contact with and ingestion of contaminated soils and in the unpaved areas. These pathways, although complete, do not pose a significant risk because of the lack of ecological receptors at the site.

Metals in groundwater potentially migrating to the Bay may be an ecological concern at IR-08. Concentrations of copper, mercury, and nickel exceed the NAWQC for saltwater aquatic life (Table 4.2-8). Using the NAWQC for screening criteria at IR-08 is a conservative screening approach because the NAWQC are designed to protect ecological receptors in surface waters and are used to evaluate direct discharges to surface water. Groundwater at IR-08 does not discharge directly into the Bay but rather filters indirectly through soils and sediments before reaching the Bay. When comparing groundwater concentrations of chemicals at IR-08 to the NAWQC, factors influencing the fate and transport of chemicals in groundwater such as dilution and attenuation were not considered. Affected groundwater at this site is about 1,000 feet inland from the Bay. These factors influence the concentrations of contaminants in groundwater reaching the Bay and will be evaluated when determining remedial options for groundwater in the Parcel D FS. Potential ecological risk from these chemicals to aquatic receptors will be addressed during the Phase 1B ERA.

4.2.7 Conclusions and Recommendations

Based on the results of the RI and HHRA, conclusions and recommendations are summarized below.

4.2.7.1 Conclusions

Site characteristics and potential sources, the nature and extent of contamination, and the HHRA are summarized below.

Site Characteristics and Potential Sources

IR-08 consists of an unpaved catch basin area and the former Buildings 508 and 503.

Artificial fill in the area is approximately 8 to 31 feet thick. Groundwater occurs at about 4 to 7 feet bgs and flows with a hydraulic gradient of about 0.003 to the south or southeast.

Potential contaminant sources identified prior to the investigation at IR-08 include:

- PCB-oil from ruptured steam lines and surface spills
- Dielectric fluids containing PCBs, from electrical transformers formerly located at the site
- Acidic solutions possibly containing metals, solvents, or other hazardous chemicals discharged into floor drains in former Building 503
- Fuel oil possibly leaked or spilled from the former aboveground storage tank near Building 503
- Pesticides discharged into floor drains in former Buildings 503 and 508
- Waste oil from maintenance in the former pump house

However, following the RI, it appears that only the leaking transformers on the transformer pad south of former Building 503 have contributed to contamination at the site.

Nature and Extent of Contamination

Lead was detected at concentrations exceeding the HPAL in samples collected at depths up to 6 feet bgs in borings IR08B013, IR08B022, IR08B033, and IR08B035.

SVOCs were detected in five surface soil samples scattered across IR-08. The pesticides 4,4'-DDD and 4,4'-DDE were detected at a concentration exceeding the screening criteria in one subsurface soil sample collected from boring IR08B035.

The PCB Aroclor-1260 was detected at concentrations exceeding the screening criteria in surface soil around the central part of IR-08. It was also detected at concentrations exceeding screening criteria in deeper soil (2 to 6 feet bgs) in several of the same borings drilled in the central part of IR-08. In addition, Aroclor-1260 was detected at concentrations exceeding the screening criteria in several deeper soil samples collected at depths of 9.25 to 18.75 feet bgs in borings IR08B007 and IR08MW42A drilled in the central part of IR-08.

TRPH was detected at concentrations exceeding screening criteria in surface soil collected from borings IR08B045 and IR08B052.

TOG was detected at concentrations exceeding the screening criteria in 7 surface and 11 subsurface soil samples collected above 6 feet bgs from 15 borings around the center of IR-08.

The maximum concentrations for the eight metals detected in groundwater at concentrations exceeding screening criteria were distributed among four monitoring wells. The concentrations of these metals in groundwater do not appear to be related to the organic contamination at IR-08.

The petroleum hydrocarbons TPH-d, TPH-mo, and TRPH were detected at concentrations exceeding screening criteria in samples collected from monitoring wells located on the northern and northwestern edges of IR-08 upgradient of the central PCB contamination in soil.

Human Health Risk Assessment

HHRA findings under the current industrial, future residential, and future industrial land use scenarios at IR-08 are summarized below.

Current Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- The total ELCR was not calculated because no carcinogenic COPCs were identified in exposure area BC27, the only exposure area with available soil data (Figure 4.1-84 and Table 4.1-26).
- The total segregated HI is less than 1 in exposure area BC27, the only exposure area with available soil data (Table 4.1-26).
- The EPC for lead is less than 1,000 mg/kg in exposure area BC27, the only exposure area with available soil data.

Average Exposure Case: Soil

- The total ELCR was not calculated because no carcinogenic COPCs were identified in exposure area BC27, the only exposure area with available soil data (Table 4.1-26).
- The total segregated HI is less than 1 in exposure area BC27, the only exposure area with available soil data (Table 4.1-26).
- The EPC for lead is less than 1,000 mg/kg in exposure area BC27, the only exposure area with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- B-aquifer and bedrock water-bearing zone are currently not used as a source of potable drinking water or for industrial purposes, and data are not available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from A-aquifer groundwater are not expected to result in adverse health effects at IR-08.

Future Residential Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 22 of the 31 exposure areas with available soil data. Total ELCRs for 8 of these 22 exposure areas are equal to or exceed 1×10^{-4}, but are less than 1×10^{-3} (Figure 4.1-85 and Table 4.1-27).

- Total segregated HIs equal or exceed 1 in 11 exposure areas for children and in 1 exposure area for adults in the 31 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).

- EPCs for lead are less than 221 mg/kg in all 31 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 20 of the 31 exposure areas with available soil data. Total ELCRs in these 20 exposure areas are less than 1×10^{-4} (Figure 4.1-85 and Table 4.1-27).

- Total segregated HIs are equal to or exceed 1 in 7 of the 31 exposure areas with available soil data for children and adults, respectively (Figure 4.1-86 for children only and Table 4.1-28.).

- EPCs for lead are less than 221 mg/kg in all 31 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from A-aquifer groundwater are not expected to result in adverse health effects at IR-08.

Future Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 8 of the 14 exposure areas with available soil data. Total ELCRs for these 8 exposure areas are less than 1×10^{-4} (Figure 4.1-91 and Table 4.1-33).
- Total segregated HIs for workers are less than 1 in all 14 exposure areas with available soil data (Table 4.1-33).
- EPCs for lead are less than 1,000 mg/kg in all 14 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs are less than 1×10^{-6} in all 14 exposure areas with available soil data (Table 4.1-33).
- Total segregated HIs for workers are less than 1 in all 14 exposure areas with available soil data (Table 4.1-33).
- EPCs for lead are less than 1,000 mg/kg in all 14 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- As discussed under the current industrial scenario, the potential for adverse health effects associated with potential exposures to VOCs through inhalation in future industrial buildings is expected to be insignificant at IR-08.

4.2.7.2 Recommendations

IR-08 is recommended for evaluation in the Parcel D FS report for remedial action because results of the HHRA indicate that under the future residential scenario, RME case, a potential risk to human health in one or more exposure areas exists at IR-23 based on: (1) ELCRs exceeding 1×10^{-6}, and (2) total HIs exceeding 1. In addition, possible risks posed to ecological receptors from analytes detected at IR-08 based on exceedances of the NAWQC are recommended for further evaluation during the Parcel D FS. TPH detected in soil and groundwater at concentrations exceeding the screening criteria are recommended for further evaluation during the petroleum corrective action plan.

TABLE 4.2-1

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B001	8940E066			✓				✓			✓					✓			✓	✓		✓
IR08B001	8940E067			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B001	8940E068										✓											
IR08B001	8940E069										✓											
IR08B001	8940E070										✓											
IR08B001	8940E071										✓											
IR08B001	8940E072										✓											
IR08B001	8940E073										✓											
IR08B002	8940E074			✓				✓			✓					✓			✓	✓		✓
IR08B002	8940E075			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B002	8940E076										✓											
IR08B002	8940E077										✓											
IR08B002	8940E078										✓											
IR08B002	8940E079										✓											
IR08B002	8940E080										✓											
IR08B002	8940E081										✓											
IR08B002	8940E082										✓											
IR08B002	8940E083										✓											
IR08B003	8940E084			✓				✓											✓	✓		
IR08B003	8940E085			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B003	8940E086										✓											
IR08B003	8940E087										✓											
IR08B003	8940E088										✓											
IR08B003	8940E089										✓											
IR08B003	8940E090										✓											
IR08B003	8940E091										✓											
IR08B003	8940E092										✓											
IR08B004	8941G065			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B004	8941G066										✓											
IR08B004	8941G067										✓											
IR08B004	8941G068										✓											
IR08B005	8940G038			✓				✓			✓					✓			✓	✓		✓
IR08B005	8940G039			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B005	8940G040										✓											
IR08B005	8940G041										✓											
IR08B005	8940G042										✓											
IR08B005	8940G043										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B005	8940G044										✓											
IR08B005	8940G045										✓											
IR08B006	8940G046			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B006	8940G047			✓			✓	✓			✓					✓			✓	✓		✓
IR08B006	8940G048										✓											
IR08B006	8940G049										✓											
IR08B006	8940G050										✓											
IR08B006	8940G051										✓											
IR08B006	8940G052										✓											
IR08B007	8940G025										✓											
IR08B007	8940G026										✓											
IR08B007	8940G027										✓											
IR08B007A	8941G062										✓											
IR08B007A	8941G063										✓											
IR08B008	8940G006			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B008	8940G007			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B008	8940G008										✓											
IR08B008	8940G009										✓											
IR08B008	8940G010										✓											
IR08B008	8940G011										✓											
IR08B008	8940G012										✓											
IR08B008	8940G013										✓											
IR08B009	8941G053			✓			✓	✓			✓					✓			✓	✓		✓
IR08B009	8941G054			✓			✓	✓			✓					✓			✓	✓		✓
IR08B009	8941G055										✓											
IR08B009	8941G056										✓											
IR08B009	8941G057										✓											
IR08B009	8941G058										✓											
IR08B009	8941G059										✓											
IR08B009	8941G060										✓											
IR08B009	8941G061										✓											
IR08B010	8940G017			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B010	8940G018			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B010	8940G019										✓											
IR08B010	8940G020										✓											
IR08B010	8940G021										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B010	8940G022										✓											
IR08B010	8940G023										✓											
IR08B010	8940G024										✓											
IR08B011	8940E093			✓				✓											✓	✓		
IR08B011	8940E094			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B011	8940E095										✓											
IR08B011	8940E096										✓											
IR08B011	8940E097										✓											
IR08B011	8940E098										✓											
IR08B011	8940E099										✓											
IR08B011	8940E100										✓											
IR08B012	8940G028			✓			✓	✓											✓	✓		✓
IR08B012	8940G029			✓				✓			✓					✓			✓	✓		✓
IR08B012	8940G030										✓											
IR08B012	8940G031										✓											
IR08B012	8940G032										✓											
IR08B012	8940G033										✓											
IR08B012	8940G034										✓											
IR08B012	8940G035										✓											
IR08B013	9016H134			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B013	9016H135			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B013	9016H136			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B013	9016H137										✓											
IR08B013	9016H138										✓											
IR08B013	9016H139										✓											
IR08B013	9016H140										✓											
IR08B013	9016H141										✓											
IR08B013	9016H142										✓											
IR08B013	9016H143										✓											
IR08B014	9016H152A			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B014	9016H153			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B014	9016H154			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B014	9016H155										✓											
IR08B014	9016H156										✓											
IR08B014	9016H157										✓											
IR08B014	9016H158										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B014	9016H159										✓											
IR08B014	9016H160										✓											
IR08B015	9015H096			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B015	9015H097			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B015	9015H098			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B015	9015H099										✓											
IR08B015	9015H100										✓											
IR08B015	9015H101										✓											
IR08B015	9015H102										✓											
IR08B015	9015H103										✓											
IR08B015	9015H104										✓											
IR08B015	9015H105										✓											
IR08B016	9027E125			✓			✓	✓			✓					✓			✓	✓		✓
IR08B016	9027E126			✓			✓	✓			✓					✓			✓	✓		✓
IR08B016	9027E127			✓			✓	✓			✓					✓			✓	✓		✓
IR08B016	9027H270										✓											
IR08B016	9027H271										✓											
IR08B016	9027H272										✓											
IR08B016A	9017H202			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B016A	9017H203			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B016A	9017H204			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B017	9027F053			✓			✓	✓			✓					✓			✓	✓		✓
IR08B017	9027F054			✓			✓	✓			✓					✓			✓	✓		✓
IR08B017	9028F055										✓											
IR08B017	9028F056										✓											
IR08B018	9026L001						✓	✓			✓					✓			✓	✓		✓
IR08B018	9026L002						✓	✓			✓					✓			✓	✓		✓
IR08B018	9026L003						✓	✓			✓					✓			✓	✓		✓
IR08B018	9026L004										✓											
IR08B018	9026L005										✓											
IR08B018	9026L006										✓											
IR08B018	9026L007										✓											
IR08B018	9026L008										✓											
IR08B018	9026L009										✓											
IR08B018A	9017F032			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B018A	9017F033			✓			✓	✓		✓	✓					✓			✓	✓		✓

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B018A	9017F034			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B018A	9017F035										✓											
IR08B019	9016H144			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B019	9016H145			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B019	9016H146										✓											
IR08B019	9016H147										✓											
IR08B019	9016H148										✓											
IR08B019	9016H149										✓											
IR08B019	9016H150										✓											
IR08B019	9016H151										✓											
IR08B019	9016H152B										✓											
IR08B020	9016G223			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B020	9016G224			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B020	9016G225			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B020	9016G226										✓											
IR08B020	9016G227										✓											
IR08B020	9016G228										✓											
IR08B020	9016G229										✓											
IR08B020	9016G230										✓											
IR08B020	9016G231										✓											
IR08B020	9016G232										✓											
IR08B020	9016G233										✓											
IR08B021	9020G255			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B021	9020G256			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B021	9020G257			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B021	9020G258										✓											
IR08B021	9020G259										✓											
IR08B021	9020G260										✓											
IR08B021	9020G261										✓											
IR08B021	9020G262										✓											
IR08B021	9020G263										✓											
IR08B021	9020G264										✓											
IR08B022	9016G212			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B022	9016G213			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B022	9016G214			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B022	9016G215										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B022	9016G216										✓											
IR08B022	9016G217										✓											
IR08B022	9016G218										✓											
IR08B022	9016G219										✓											
IR08B022	9016G220										✓											
IR08B022	9016G221										✓											
IR08B022	9016G222										✓											
IR08B023	9015H124			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B023	9015H125			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B023	9015H126										✓											
IR08B023	9015H127										✓											
IR08B023	9015H128										✓											
IR08B023	9015H129										✓											
IR08B023	9015H130										✓											
IR08B023	9015H131										✓											
IR08B023	9015H132										✓											
IR08B023	9015H133										✓											
IR08B024	9017H179			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B024	9017H180			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B024	9017H181			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B024	9017H182										✓											
IR08B024	9017H183										✓											
IR08B024	9017H184										✓											
IR08B024	9017H185										✓											
IR08B024	9017H186										✓											
IR08B024	9017H187										✓											
IR08B024	9017H188										✓											
IR08B024	9017H189										✓											
IR08B024	9017H190										✓											
IR08B025	9017H191			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B025	9017H192			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B025	9017H193			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B025	9017H194										✓											
IR08B025	9017H195										✓											
IR08B025	9017H196										✓											
IR08B025	9017H198										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B025	9017H199										✓											
IR08B025	9017H200										✓											
IR08B025	9017H201										✓											
IR08B026	9016G195										✓											
IR08B026	9016G196										✓											
IR08B026	9016G197										✓											
IR08B026	9016G198										✓											
IR08B026	9016G199										✓											
IR08B026	9016G200										✓											
IR08B026	9016G201										✓											
IR08B026	9016G202										✓											
IR08B026	9016G203										✓											
IR08B026	9016G204										✓											
IR08B026	9016G205										✓											
IR08B026	9016G206										✓											
IR08B026	9016G207										✓											
IR08B026	9016G208										✓											
IR08B026	9016G209										✓											
IR08B026	9016G210										✓											
IR08B026	9016G211										✓											
IR08B027	9026G289						✓	✓			✓					✓			✓	✓		✓
IR08B027	9026G290			✓			✓	✓			✓					✓			✓	✓		✓
IR08B027	9026G292										✓											
IR08B027	9026G293										✓											
IR08B027	9026G294										✓											
IR08B027	9026G295										✓											
IR08B027A	9017F038A			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B028	9016H163			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B028	9016H164										✓											
IR08B028	9016H165										✓											
IR08B028	9016H166										✓											
IR08B028	9016H167										✓											
IR08B028	9016H168										✓											
IR08B029	9017F026			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B029	9017F027			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B029	9017F028										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR088029	9017F029										✓											
IR088029	9017F030										✓											
IR088029	9017F031										✓											
IR088030	9026K001			✓			✓	✓			✓					✓			✓	✓		✓
IR088030	9026K002			✓			✓	✓			✓					✓			✓	✓		✓
IR088030	9026K003			✓			✓	✓			✓					✓			✓	✓		✓
IR088030	9026K004										✓											
IR088030	9026K005										✓											
IR088030	9026K008										✓											
IR088031	9027F049			✓			✓	✓			✓					✓			✓	✓		✓
IR088031	9027F050			✓			✓	✓			✓					✓			✓	✓		✓
IR088031	9027F051										✓											
IR088031	9027F052										✓											
IR088032	9019G241			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088032	9019G242			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088032	9019G243			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088032	9019G244										✓											
IR088032	9019G245										✓											
IR088032	9019G246										✓											
IR088032	9019G247										✓											
IR088032	9019G248										✓											
IR088032	9019G249										✓											
IR088033	9016H169			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088033	9016H170			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088033	9016H171			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088033	9016H172										✓											
IR088033	9016H173										✓											
IR088033	9016H174										✓											
IR088033	9016H175										✓											
IR088033	9016H176										✓											
IR088033	9016H177										✓											
IR088033	9016H178										✓											
IR088034	9015G181			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088034	9015G182			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088034	9015G183			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR088034	9015G184										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B034	9015G185										✓											
IR08B034	9015G186										✓											
IR08B034	9015G187										✓											
IR08B034	9015G188										✓											
IR08B034	9015G189										✓											
IR08B034	9015G190										✓											
IR08B035	9015H113			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B035	9015H114			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B035	9015H115			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08B035	9015H116										✓											
IR08B035	9015H117										✓											
IR08B035	9015H118										✓											
IR08B035	9015H119										✓											
IR08B035	9015H120										✓											
IR08B035	9015H121										✓											
IR08B035	9015H122										✓											
IR08B035	9015H123										✓											
IR08B043	9148M412							✓			✓	✓										
IR08B043	9148M413							✓			✓	✓										
IR08B044	9137M166							✓			✓	✓									✓	
IR08B044	9137M167							✓			✓	✓									✓	
IR08B044	9137M168							✓			✓	✓									✓	
IR08B044	9137M169							✓			✓	✓									✓	
IR08B045	9137M176							✓				✓									✓	
IR08B045	9137M177							✓				✓									✓	
IR08B045	9137M178							✓				✓									✓	
IR08B046	9137M173							✓				✓									✓	✓
IR08B046	9137M174							✓				✓									✓	✓
IR08B046	9137M175							✓				✓									✓	✓
IR08B047	9137M171							✓				✓							✓	✓	✓	
IR08B047	9137M172							✓				✓							✓	✓	✓	
IR08B048	9137H868							✓				✓									✓	
IR08B048	9137H869							✓				✓									✓	
IR08B048	9137H870							✓				✓									✓	
IR08B049	9137H864							✓				✓							✓		✓	
IR08B049	9137H865							✓				✓							✓		✓	

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	THICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B049	9137H866							✓				✓							✓		✓	
IR08B050	9137M157							✓				✓							✓		✓	
IR08B050	9137M158							✓				✓							✓		✓	
IR08B050	9137M159							✓				✓							✓		✓	
IR08B051	9148M410										✓	✓										
IR08B051	9148M411										✓	✓										
IR08B052	9542J474									✓	✓								✓		✓	
IR08B052	9542J475									✓	✓								✓		✓	
IR08B052	9542J479									✓	✓								✓		✓	
IR08B052	9542J480									✓	✓								✓		✓	
IR08B052	9542J481									✓	✓								✓		✓	
IR08B052	9542J482									✓	✓								✓		✓	
IR08MW37A	9017H207			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW37A	9017H208			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW37A	9017H209			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW37A	9017H210										✓											
IR08MW37A	9017H211										✓											
IR08MW37A	9017H212										✓											
IR08MW37A	9017H213										✓											
IR08MW37A	9017H214										✓											
IR08MW37A	9017H215										✓											
IR08MW37A	9017H216										✓											
IR08MW38A	9027E114			✓			✓	✓			✓					✓			✓	✓		✓
IR08MW38A	9027E115			✓			✓	✓			✓					✓			✓	✓		✓
IR08MW38A	9027E116										✓											
IR08MW38A	9027E117										✓											
IR08MW38A	9027E118										✓											
IR08MW38A	9027E119										✓											
IR08MW38A	9027E120										✓											
IR08MW38A	9027E121										✓											
IR08MW38A	9027E122										✓											
IR08MW38A	9027E123			✓			✓	✓			✓					✓			✓	✓		✓
IR08MW38A	9027E124										✓											
IR08MW39A	9027H263			✓			✓	✓			✓					✓			✓	✓		✓
IR08MW39A	9027H264			✓			✓	✓			✓					✓			✓	✓		✓
IR08MW39A	9027H265										✓											

TABLE 4.2-1 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08MW39A	9027H266										✓											
IR08MW39A	9027H267										✓											
IR08MW39A	9027H268										✓											
IR08MW39A	9027H269										✓											
IR08MW41A	9019H217			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW41A	9019H218			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW41A	9019H219			✓			✓	✓		✓	✓					✓			✓	✓		✓
IR08MW41A	9019H220										✓											
IR08MW41A	9019H221										✓											
IR08MW41A	9019H222										✓											
IR08MW41A	9019H223										✓											
IR08MW41A	9019H224										✓											
IR08MW41A	9019H225										✓											
IR08MW42A	9137M160										✓	✓										
IR08MW42A	9137M161										✓	✓										
IR08MW42A	9137M162										✓	✓										
IR08MW42A	9137M163										✓	✓										
IR08MW42A	9137M164										✓	✓										
IR08MW42A	9137M165										✓	✓										

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.2-2

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value[e]	Above[g] Res PRG	Industrial PRG Value[e]	Above[f] Ind PRG	HPAL Value	Abo HPA
METAL	ALUMINUM	4,260	45,300	22,600	MG/KG	4.7	90	90	76,700	0	100,000	0		
	ANTIMONY	4.4	11.3	7.4	MG/KG	5.0	89	17	30.7	0	681	0	9.05	
	ARSENIC	0.54	12.9	3.5	MG/KG	0.75	90	82	0.32	82	2.0	59	11.10	
	BARIUM	13.1	540	157	MG/KG	0.15	90	90	5,340	0	100,000	0	314.36	
	BERYLLIUM	0.13	0.74	0.45	MG/KG	0.12	90	45	0.14	44	1.1	0	0.71	
	CADMIUM	0.68	2.5	1.3	MG/KG	0.80	90	18	9.0	0	852	0	3.14	
	CALCIUM	690	44,300	17,000	MG/KG	9.2	90	90						
	CHROMIUM	18.4	1,340	240	MG/KG	0.43	90	90	211	32	1,580	0	h	
	CHROMIUM VI	0.08	0.68	0.25	MG/KG	0.06	93	9	0.20	3	225	0		
	COBALT	6.5	114	34.4	MG/KG	1.8	90	89					h	
	COPPER	7.5	151	63.8	MG/KG	0.56	90	89	2,850	0	63,300	0	124.31	
	IRON	13,000	59,200	35,900	MG/KG	4.2	90	90						
	LEAD	0.21	156	15.6	MG/KG	0.64	90	84	130	1	1,000	0	8.99	3
	MAGNESIUM	2,260	218,000	48,800	MG/KG	6.7	90	90						
	MANGANESE	128	2,540	896	MG/KG	0.16	90	90	382	84	8,300	0	1431.18	
	MERCURY	0.10	4.0	0.29	MG/KG	0.11	90	38	23.0	0	511	0	2.28	
	MOLYBDENUM	1.8	2.7	2.3	MG/KG	1.3	45	2	383	0	8,520	0	2.68	
	NICKEL	17.9	2,310	376	MG/KG	5.7	90	90	150	53	34,100	0	h	
	POTASSIUM	480	3,000	1,250	MG/KG	80.6	90	85						
	SELENIUM	0.54	0.70	0.61	MG/KG	0.48	90	5	383	0	8,520	0	1.95	
	SILVER	0.27	0.47	0.39	MG/KG	0.33	90	4	383	0	8,520	0	1.43	
	SODIUM	91.2	3,390	847	MG/KG	29.2	90	90						

TABLE 4.2-2 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection Frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	VANADIUM	13.6	189	77.8	MG/KG	0.49	90	90	537	0	11,900	0	117.17	13
	ZINC	24.7	275	79.4	MG/KG	0.58	90	90	23,000	0	100,000	0	109.86	13
VOC	1,1,1-TRICHLOROETHANE	1	7	3	UG/KG	5	98	13	3,200,000	0	3,000,000	0		
	1,2-DICHLOROPROPANE	2	2	2	UG/KG	5	98	1	680	0	1,500	0		
	2-BUTANONE	14	31	19	UG/KG	4	98	4	8,700,000	0	34,000,000	0		
	2-HEXANONE	13	13	13	UG/KG	11	98	1						
	ACETONE	2	7	4	UG/KG	11	98	2	2,000,000	0	8,400,000	0		
	BENZENE	2	110	31	UG/KG	4	98	4	1,400	0	3,200	0		
	CARBON DISULFIDE	6	6	6	UG/KG	6	98	1	16,000	0	52,000	0		
	CHLOROBENZENE	3	3	3	UG/KG	6	98	1	160,000	0	570,000	0		
	CHLOROFORM	1	1	1	UG/KG	5	98	1	530	0	1,100	0		
	ETHYLBENZENE	1	1	1	UG/KG	5	98	1	2,900,000	0	3,100,000	0		
	METHYLENE CHLORIDE	2	2	2	UG/KG	5	98	1	11,000	0	25,000	0		
	TETRACHLOROETHENE	1	1	1	UG/KG	6	98	1	7,000	0	25,000	0		
	TOLUENE	1	150	16	UG/KG	5	98	56	1,900,000	0	2,700,000	0		
	TRICHLOROETHENE	1	1	1	UG/KG	6	98	1	7,100	0	17,000	0		
	XYLENE (TOTAL)	2	14	6	UG/KG	5	98	3	980,000	0	980,000	0		
SVOC	1,2,4-TRICHLOROBENZENE	65	2,600	1,300	UG/KG	360	94	2	620,000	0	5,900,000	0		
	1,2-DICHLOROBENZENE	110	110	110	UG/KG	330	94	1	2,300,000	0	2,300,000	0		
	1,3-DICHLOROBENZENE	46	46	46	UG/KG	330	94	1	2,800,000	0	2,800,000	0		
	1,4-DICHLOROBENZENE	73	73	73	UG/KG	330	94	1	7,400	0	20,000	0		
	2-METHYLNAPHTHALENE	34	280	110	UG/KG	370	94	15	800,000	0	800,000	0		

TABLE 4.2-2 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value[e]	Above[g] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	ACENAPHTHYLENE	60	270	170	UG/KG	350	94	2	360,000	0	360,000	0		
	ANTHRACENE	41	240	120	UG/KG	360	94	6	19,000	0	19,000	0		
	BENZO(A)ANTHRACENE	38	730	180	UG/KG	380	94	12	610	1	2,600	0		
	BENZO(A)PYRENE	41	990	190	UG/KG	350	94	9	61	5	260	1		
	BENZO(B)FLUORANTHENE	37	1,600	260	UG/KG	350	94	13	610	1	2,600	0		
	BENZO(G,H,I)PERYLENE	42	160	73	UG/KG	360	94	5	800,000	0	800,000	0		
	BENZO(K)FLUORANTHENE	52	250	110	UG/KG	360	94	4	610	0	26,000	0		
	BIS(2-ETHYLHEXYL)PHTHALATE	81	81	81	UG/KG	350	94	1	32,000	0	140,000	0		
	BUTYLBENZYLPHTHALATE	56	10,000	1,500	UG/KG	410	94	7	13,000,000	0	100,000,00	0		
	CHRYSENE	46	810	170	UG/KG	410	94	27	6,100	0	24,000	0		
	DI-N-BUTYLPHTHALATE	100	320	160	UG/KG	420	94	5	6,500,000	0	68,000,000	0		
	DIBENZOFURAN	34	120	57	UG/KG	360	94	16	260,000	0	2,700,000	0		
	DIETHYLPHTHALATE	38	51	45	UG/KG	360	94	2	52,000,000	0	100,000,00	0		
	FLUORANTHENE	36	1,100	220	UG/KG	430	94	23	2,600,000	0	27,000,000	0		
	FLUORENE	37	90	55	UG/KG	350	94	11	300,000	0	300,000	0		
	INDENO(1,2,3-CD)PYRENE	42	180	78	UG/KG	360	94	4	610	0	2,600	0		
	NAPHTHALENE	36	320	99	UG/KG	360	94	12	800,000	0	800,000	0		
	PHENANTHRENE	37	690	170	UG/KG	400	94	37	800,000	0	800,000	0		
	PYRENE	35	880	170	UG/KG	430	94	29	2,000,000	0	20,000,000	0		
PEST	4,4'-DDD	1	3,000	200	UG/KG	290	307	18	1,900	1	7,900	0		
	4,4'-DDE	1	2,400	160	UG/KG	240	307	18	1,300	1	5,600	0		
	4,4'-DDT	3	430	98	UG/KG	310	306	19	1,300	0	5,600	0		

TABLE 4.2-2 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	ALPHA-CHLORDANE	2	4	3	UG/KG	90	307	2	340	0	1,500	0		
	ENDOSULFAN I	10	10	10	UG/KG	9	307	1	3,300	0	34,000	0		
	ENDRIN KETONE	8	8	8	UG/KG	20	307	1	20,000	0	200,000	0		
	GAMMA-CHLORDANE	4	4	4	UG/KG	90	307	1	340	0	1,500	0		
	AROCLOR-1260	26	7,200	780	UG/KG	810	360	41	66	35	340	16		
TPHEXT	TPH-DIESEL	6	390	57	MG/KG	17	111	24	1,000	0i				
	TPH-EXTRACTABLE UNKNOWN HYDRO.	46	46	46	MG/KG	10	8	1	1,000	0i				
	TPH-MOTOR OIL	11	520	150	MG/KG	22	6	4	1,000	0i				
TRPH	TRPH	70	4,400	1,300	MG/KG	430	27	6	1,000	2i				
O&G	TOTAL OIL & GREASE	50	7,400	1,200	MG/KG	55	120	74	1,000	18i				

TABLE 4.2-2 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 69.365 to 1618.011, 14.528 to 155.017, and 57.223 to 4362.495 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.2-3

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B001	IR08B001	IR08B002	IR08B002	IR08B003	IR08B003	IR08B004
Sampling Depth (feet bgs)	3.25	6.25	3.25	6.25	3.75	6.25	5.75
Sample Number	8940E066	8940E067	8940E074	8940E075	8940E084	8940E085	8941G065
Sample Date	10/02/89	10/02/89	10/02/89	10/02/89	10/03/89	10/03/89	10/10/89
Metal (mg/kg)							
ALUMINUM	NA	41,500	NA	24,600	NA	35,500	34,000
ANTIMONY	NA	ND (7.2)	NA	ND (7.1)	NA	ND (14.8)	ND (7.4)
ARSENIC	NA	ND (0.29)	NA	6.9 *#	NA	7.0 *#	6.4 *#
BARIUM	NA	79.0	NA	383 α	NA	159	197
BERYLLIUM	NA	0.40 *	NA	0.37 *	NA	0.65 *	ND (0.69)
CADMIUM	NA	1.9	NA	2.1	NA	1.6	2.0
CALCIUM	NA	34,100	NA	11,900	NA	11,000	14,800
CHROMIUM	NA	111	NA	193	NA	662 *	537 *
CHROMIUM VI	ND (0.06)	ND (0.06)	ND (0.05)	ND (0.06)	ND (0.05)	ND (0.06)	ND (0.06)
COBALT	NA	32.8	NA	29.4	NA	61.7	49.0
COPPER	NA	78.3	NA	37.6	NA	67.6	56.3
IRON	NA	44,400	NA	34,800	NA	50,700	48,700
LEAD	NA	0.21	NA	6.4	NA	7.5	7.7
MAGNESIUM	NA	19,800	NA	51,400	NA	93,900	95,900
MANGANESE	NA	1,030 *	NA	823 *	NA	940 *	956 *
MERCURY	NA	ND (0.10)	NA	ND (0.10)	NA	0.10	0.10
MOLYBDENUM	NA	ND (1.4)	NA	ND (1.3)	NA	ND (1.4)	ND (1.4)
NICKEL	NA	67.6	NA	349 *	NA	924 *	700 *
POTASSIUM	NA	1,100	NA	1,040	NA	796	2,030
SELENIUM	NA	ND (0.50)	NA	ND (0.49)	NA	ND (0.51)	ND (0.52)
SILVER	NA	ND (0.59)	NA	ND (0.58)	NA	ND (0.61)	ND (0.40)
SODIUM	NA	3,260	NA	733	NA	920	3,180
VANADIUM	NA	118 α	NA	62.6	NA	80.6	88.1
ZINC	NA	63.4	NA	68.4	NA	83.2	74.1
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (1)	ND (1)	ND (1)	ND (1)	NA	3	ND (6)
1,2-DICHLOROPROPANE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
2-BUTANONE	ND (1)	15	ND (1)	31	NA	ND (12)	ND (12)
2-HEXANONE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (12)	ND (12)
ACETONE	ND (6)	ND (7)	ND (6)	ND (1)	NA	ND (12)	ND (43)
BENZENE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
CARBON DISULFIDE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
CHLOROBENZENE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
CHLOROFORM	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
ETHYLBENZENE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B001	IR08B001	IR08B002	IR08B002	IR08B003	IR08B003	IR08B004
Sampling Depth (feet bgs)	3.25	6.25	3.25	6.25	3.75	6.25	5.75
Sample Number	8940E066	8940E067	8940E074	8940E075	8940E084	8940E085	8941G065
Sample Date	10/02/89	10/02/89	10/02/89	10/02/89	10/03/89	10/03/89	10/10/89
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (9)	ND (15)	ND (11)	ND (12)	NA	ND (9)	ND (13)
TETRACHLOROETHENE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
TOLUENE	19	ND (1)	2	14	NA	23	6
TRICHLOROETHENE	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
XYLENE (TOTAL)	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (6)	ND (6)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	65
1,2-DICHLOROBENZENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
1,3-DICHLOROBENZENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
1,4-DICHLOROBENZENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
2-METHYLNAPHTHALENE	ND (390)	ND (370)	ND (340)	67	NA	ND (380)	ND (390)
ACENAPHTHYLENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
ANTHRACENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BENZO(A)ANTHRACENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BENZO(A)PYRENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BENZO(B)FLUORANTHENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BENZO(G,H,I)PERYLENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BENZO(K)FLUORANTHENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (580)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (180)
BUTYLBENZYLPHTHALATE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
CHRYSENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
DI-N-BUTYLPHTHALATE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
DIBENZOFURAN	ND (390)	ND (370)	ND (340)	45	NA	ND (380)	52
DIETHYLPHTHALATE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
FLUORANTHENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
FLUORENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	49
INDENO(1,2,3-CD)PYRENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
NAPHTHALENE	ND (390)	ND (370)	ND (340)	100	NA	ND (380)	ND (390)
PHENANTHRENE	ND (390)	ND (370)	ND (340)	79	NA	ND (380)	ND (390)
PYRENE	ND (390)	ND (370)	ND (340)	ND (370)	NA	ND (380)	ND (390)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (19)	ND (18)	ND (17)	ND (18)	NA	ND (19)	ND (19)
4,4'-DDE	ND (19)	ND (18)	ND (17)	ND (18)	NA	ND (19)	ND (19)
4,4'-DDT	ND (19)	ND (18)	ND (17)	ND (18)	NA	ND (19)	ND (19)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B001	IR08B001	IR08B002	IR08B002	IR08B003	IR08B003	IR08B004
Sampling Depth (feet bgs)	3.25	6.25	3.25	6.25	3.75	6.25	5.75
Sample Number	8940E066	8940E067	8940E074	8940E075	8940E084	8940E085	8941G065
Sample Date	10/02/89	10/02/89	10/02/89	10/02/89	10/03/89	10/03/89	10/10/89
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (95)	ND (90)	ND (84)	ND (88)	NA	ND (93)	ND (95)
ENDOSULFAN I	ND (10)	ND (9)	ND (8)	ND (9)	NA	ND (9)	ND (10)
ENDRIN KETONE	ND (19)	ND (18)	ND (17)	ND (18)	NA	ND (19)	ND (19)
GAMMA-CHLORDANE	ND (95)	ND (90)	ND (84)	ND (88)	NA	ND (93)	ND (95)
AROCLOR-1260	600 *#	ND (180)	ND (170)	ND (180)	NA	ND (190)	4,900 *#
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (600)	41	ND (520)	33	ND (500)	ND (29)	ND (60)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	330	ND (56)	ND (52)	ND (55)	3,800	ND (58)	350
Percent Moisture (%)							
% SOLIDS	NA	88.7	NA	90.4	NA	85.5	84.0
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B005	IR08B005	IR08B005	IR08B006	IR08B006	IR08B007	IR08B007A
Sampling Depth (feet bgs)	2.75	6.25	9.25	3.25	5.75	9.25	29.75
Sample Number	8940G038	8940G039	8940G040	8940G046	8940G047	8940G026	8941G063
Sample Date	10/06/89	10/06/89	10/06/89	10/06/89	10/06/89	10/05/89	10/09/89
Metal (mg/kg)							
ALUMINUM	NA	17,800	NA	23,300	21,700	NA	NA
ANTIMONY	NA	ND (7.6)	NA	7.4	ND (6.4)	NA	NA
ARSENIC	NA	ND (4.4)	NA	ND (5.0)	ND (4.8)	NA	NA
BARIUM	NA	135	NA	131	177	NA	NA
BERYLLIUM	NA	0.34 *	NA	0.41 *	0.46 *	NA	NA
CADMIUM	NA	1.2	NA	1.0	1.2	NA	NA
CALCIUM	NA	9,840	NA	10,100	11,200	NA	NA
CHROMIUM	NA	216 *	NA	367 *	312 *	NA	NA
CHROMIUM VI	ND (0.05)	ND (0.06)	NA	ND (0.06)	ND (0.05)	NA	NA
COBALT	NA	29.8	NA	39.5	31.4	NA	NA
COPPER	NA	74.9	NA	51.7	44.1	NA	NA
IRON	NA	28,900	NA	38,200	33,900	NA	NA
LEAD	NA	25.2 *	NA	4.9	6.4	NA	NA
MAGNESIUM	NA	42,500	NA	86,500	60,800	NA	NA
MANGANESE	NA	578 *	NA	732 *	719 *	NA	NA
MERCURY	NA	0.20	NA	ND (0.10)	ND (0.10)	NA	NA
MOLYBDENUM	NA	ND (1.4)	NA	ND (1.3)	ND (1.2)	NA	NA
NICKEL	NA	309 *	NA	595 *	401 *	NA	NA
POTASSIUM	NA	908	NA	800	1,020	NA	NA
SELENIUM	NA	ND (0.52)	NA	ND (0.49)	ND (0.44)	NA	NA
SILVER	NA	ND (0.61)	NA	ND (0.58)	ND (0.52)	NA	NA
SODIUM	NA	1,640	NA	811	2,450	NA	NA
VANADIUM	NA	55.7	NA	57.8	55.4	NA	NA
ZINC	NA	87.9	NA	65.4	61.6	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
1,2-DICHLOROPROPANE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
2-BUTANONE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
2-HEXANONE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
ACETONE	ND (4)	ND (5)	NA	ND (1)	ND (6)	NA	NA
BENZENE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
CARBON DISULFIDE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
CHLOROBENZENE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
CHLOROFORM	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
ETHYLBENZENE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B005	IR08B005	IR08B005	IR08B006	IR08B006	IR08B007	IR08B007A
Sampling Depth (feet bgs)	2.75	6.25	9.25	3.25	5.75	9.25	29.75
Sample Number	8940G038	8940G039	8940G040	8940G046	8940G047	8940G026	8941G063
Sample Date	10/06/89	10/06/89	10/06/89	10/06/89	10/06/89	10/05/89	10/09/89
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (6)	ND (21)	NA	ND (8)	ND (6)	NA	NA
TETRACHLOROETHENE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
TOLUENE	3	4	NA	48	25	NA	NA
TRICHLOROETHENE	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
XYLENE (TOTAL)	ND (1)	ND (1)	NA	ND (1)	ND (1)	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (330)	ND (390)	NA	ND (360)	2,600	NA	NA
1,2-DICHLOROBENZENE	ND (330)	ND (390)	NA	ND (360)	110	NA	NA
1,3-DICHLOROBENZENE	ND (330)	ND (390)	NA	ND (360)	46	NA	NA
1,4-DICHLOROBENZENE	ND (330)	ND (390)	NA	ND (360)	73	NA	NA
2-METHYLNAPHTHALENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
ACENAPHTHYLENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
ANTHRACENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BENZO(A)ANTHRACENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BENZO(A)PYRENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BENZO(B)FLUORANTHENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BENZO(G,H,I)PERYLENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BENZO(K)FLUORANTHENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
BUTYLBENZYLPHTHALATE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
CHRYSENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
DI-N-BUTYLPHTHALATE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
DIBENZOFURAN	ND (330)	72	NA	49	ND (330)	NA	NA
DIETHYLPHTHALATE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
FLUORANTHENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
FLUORENE	ND (330)	62	NA	46	46	NA	NA
INDENO(1,2,3-CD)PYRENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
NAPHTHALENE	ND (330)	48	NA	ND (360)	ND (330)	NA	NA
PHENANTHRENE	ND (330)	93	NA	ND (360)	ND (330)	NA	NA
PYRENE	ND (330)	ND (390)	NA	ND (360)	ND (330)	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (16)	ND (19)	ND (20)	ND (18)	ND (16)	ND (190)	ND (23)
4,4'-DDE	ND (16)	ND (19)	ND (20)	ND (18)	ND (16)	ND (190)	ND (23)
4,4'-DDT	ND (16)	ND (19)	ND (20)	ND (18)	ND (16)	ND (190)	ND (23)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B005	IR08B005	IR08B005	IR08B006	IR08B006	IR08B007	IR08B007A
Sampling Depth (feet bgs)	2.75	6.25	9.25	3.25	5.75	9.25	29.75
Sample Number	8940G038	8940G039	8940G040	8940G046	8940G047	8940G026	8941G063
Sample Date	10/06/89	10/06/89	10/06/89	10/06/89	10/06/89	10/05/89	10/09/89
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (80)	ND (94)	ND (100)	ND (88)	ND (80)	ND (950)	ND (110)
ENDOSULFAN I	ND (8)	ND (9)	ND (10)	ND (9)	ND (8)	ND (95)	ND (11)
ENDRIN KETONE	ND (16)	ND (19)	ND (20)	ND (18)	ND (16)	ND (190)	ND (23)
GAMMA-CHLORDANE	ND (80)	ND (94)	ND (100)	ND (88)	ND (80)	ND (950)	ND (110)
AROCLOR-1260	ND (160)	ND (190)	160 *	30	ND (160)	1,500 *#	110 *
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (500)	ND (59)	NA	ND (55)	ND (500)	NA	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (92)	970	NA	ND (100)	ND (92)	NA	NA
Percent Moisture (%)							
% SOLIDS	NA	84.6	NA	90.2	NA	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B008	IR08B008	IR08B008	IR08B009	IR08B009	IR08B010	IR08B010
Sampling Depth (feet bgs)	3.25	6.25	25.75	2.75	6.25	3.25	6.25
Sample Number	8940G006	8940G007	8940G012	8941G053	8941G054	8940G017	8940G018
Sample Date	10/04/89	10/04/89	10/04/89	10/09/89	10/09/89	10/04/89	10/04/89
Metal (mg/kg)							
ALUMINUM	5,860	24,800	NA	25,400	33,000	10,100	23,000
ANTIMONY	ND (6.8)	8.9	NA	ND (6.2)	ND (11.8)	8.4	ND (7.2)
ARSENIC	1.6 *	1.0 *	NA	4.2 *#	3.2 *#	1.3 *	3.6 *#
BARIUM	105	126	NA	133	203	70.4	158
BERYLLIUM	0.13	0.52 *	NA	ND (0.58)	0.58 *	0.29 *	0.38 *
CADMIUM	ND (0.78)	1.1	NA	1.7	2.5	ND (0.81)	ND (0.83)
CALCIUM	2,410	6,980	NA	19,200	30,700	19,700	9,270
CHROMIUM	38.2	587 *	NA	366 *	151	803 *	222 *
CHROMIUM VI	ND (0.05)	ND (0.06)	NA	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.06)
COBALT	8.2	61.9	NA	36.1	32.9	71.2	27.5
COPPER	43.4	37.5	NA	122	110	21.1	42.4
IRON	13,000	40,000	NA	41,500	43,900	42,100	31,900
LEAD	ND (2.7)	ND (2.5)	NA	4.8	4.6	ND (1.9)	ND (4.2)
MAGNESIUM	8,800	140,000	NA	67,200	29,700	178,000	44,800
MANGANESE	590 *	860 *	NA	868 *	1,420 *	863 *	714 *
MERCURY	ND (0.10)	ND (0.10)	NA	0.10	0.30	ND (0.10)	ND (0.10)
MOLYBDENUM	ND (1.3)	ND (1.5)	NA	ND (1.2)	1.8	ND (1.3)	ND (1.3)
NICKEL	91.2	1,080 *	NA	447 *	113	1,480 *	346 *
POTASSIUM	847	596	NA	1,190	1,430	ND (252)	644
SELENIUM	ND (0.46)	ND (0.55)	NA	ND (0.44)	ND (0.44)	ND (0.48)	ND (0.49)
SILVER	ND (0.55)	ND (0.65)	NA	ND (0.34)	ND (0.34)	ND (0.57)	ND (0.58)
SODIUM	95.6	3,290	NA	452	876	274	768
VANADIUM	13.6	55.9	NA	88.1	125 *	36.3	54.0
ZINC	27.3	61.1	NA	62.1	66.2	43.3	54.5
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (1)	ND (1)	NA	2	ND (5)	ND (1)	ND (1)
1,2-DICHLOROPROPANE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
2-BUTANONE	ND (1)	ND (1)	NA	ND (10)	ND (10)	14	ND (1)
2-HEXANONE	ND (1)	ND (1)	NA	ND (10)	ND (10)	ND (1)	ND (1)
ACETONE	ND (3)	ND (5)	NA	ND (4)	ND (2)	ND (6)	ND (4)
BENZENE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	9
CARBON DISULFIDE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
CHLOROBENZENE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
CHLOROFORM	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
ETHYLBENZENE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B008	IR08B008	IR08B008	IR08B009	IR08B009	IR08B010	IR08B010
Sampling Depth (feet bgs)	3.25	6.25	25.75	2.75	6.25	3.25	6.25
Sample Number	8940G006	8940G007	8940G012	8941G053	8941G054	8940G017	8940G018
Sample Date	10/04/89	10/04/89	10/04/89	10/09/89	10/09/89	10/04/89	10/04/89
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (6)	ND (7)	NA	ND (18)	ND (13)	ND (9)	ND (9)
TETRACHLOROETHENE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
TOLUENE	ND (1)	1	NA	14	8	63	23
TRICHLOROETHENE	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
XYLENE (TOTAL)	ND (1)	ND (1)	NA	ND (5)	ND (5)	ND (1)	ND (1)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
1,2-DICHLOROBENZENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
1,3-DICHLOROBENZENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
1,4-DICHLOROBENZENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
2-METHYLNAPHTHALENE	ND (350)	ND (410)	NA	34	ND (660)	ND (360)	160
ACENAPHTHYLENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
ANTHRACENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BENZO(A)ANTHRACENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BENZO(A)PYRENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BENZO(B)FLUORANTHENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BENZO(G,H,I)PERYLENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BENZO(K)FLUORANTHENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (83)	ND (120)	NA	ND (230)	ND (250)	ND (110)	ND (110)
BUTYLBENZYLPHTHALATE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
CHRYSENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
DI-N-BUTYLPHTHALATE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
DIBENZOFURAN	ND (350)	ND (410)	NA	46	ND (660)	ND (360)	43
DIETHYLPHTHALATE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
FLUORANTHENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
FLUORENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
NAPHTHALENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	230
PHENANTHRENE	ND (350)	ND (410)	NA	61	ND (660)	ND (360)	110
PYRENE	ND (350)	ND (410)	NA	ND (330)	ND (660)	ND (360)	ND (370)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (17)	ND (20)	ND (20)	ND (16)	ND (16)	ND (18)	ND (18)
4,4'-DDE	ND (17)	ND (20)	ND (20)	ND (16)	ND (16)	ND (18)	ND (18)
4,4'-DDT	ND (17)	ND (20)	ND (20)	ND (16)	ND (16)	16	ND (18)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088008	IR088008	IR088008	IR088009	IR088009	IR088010	IR088010
Sampling Depth (feet bgs)	3.25	6.25	25.75	2.75	6.25	3.25	6.25
Sample Number	8940G006	8940G007	8940G012	8941G053	8941G054	8940G017	8940G018
Sample Date	10/04/89	10/04/89	10/04/89	10/09/89	10/09/89	10/04/89	10/04/89
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (84)	ND (99)	ND (98)	ND (80)	ND (80)	ND (88)	2
ENDOSULFAN I	ND (8)	ND (10)	ND (10)	ND (8)	ND (8)	ND (9)	ND (9)
ENDRIN KETONE	ND (17)	ND (20)	8	ND (16)	ND (16)	ND (18)	ND (18)
GAMMA-CHLORDANE	ND (84)	ND (99)	ND (98)	ND (80)	ND (80)	ND (88)	ND (89)
AROCLOR-1260	26	120 *	ND (200)	ND (160)	ND (160)	ND (180)	ND (180)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (53)	ND (310)	NA	ND (500)	ND (50)	ND (270)	ND (56)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (53)	ND (62)	NA	110	120	110	ND (56)
Percent Moisture (%)							
% SOLIDS	94.7	80.2	NA	NA	NA	90.9	89.5
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B011	IR08B011	IR08B012	IR08B012	IR08B013	IR08B013	IR08B013
Sampling Depth (feet bgs)	3.25	6.25	3.25	5.75	1.75	3.25	6.25
Sample Number	8940E093	8940E094	8940G028	8940G029	9016H134	9016H135	9016H136
Sample Date	10/03/89	10/03/89	10/05/89	10/05/89	04/17/90	04/17/90	04/17/90
Metal (mg/kg)							
ALUMINUM	NA	7,990	NA	NA	18,200	11,000	29,600
ANTIMONY	NA	ND (6.9)	NA	NA	6.1	6.4	4.9
ARSENIC	NA	2.0 *	NA	NA	2.0 *	3.0 *#	0.77 *
BARIUM	NA	138	NA	NA	115	218	122
BERYLLIUM	NA	0.34 *	NA	NA	ND (0.24)	ND (0.08)	ND (0.14)
CADMIUM	NA	ND (0.80)	NA	NA	ND (0.81)	ND (0.81)	ND (0.89)
CALCIUM	NA	4,060	NA	NA	16,500	39,000	23,800
CHROMIUM	NA	69.2	NA	NA	135	68.7	57.7
CHROMIUM VI	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.05)	0.08
COBALT	NA	ND (6.3)	NA	NA	26.1	15.9	34.4
COPPER	NA	24.0	NA	NA	102	50.3	74.3
IRON	NA	19,200	NA	NA	29,700	19,700	39,400
LEAD	NA	7.2	NA	NA	37.4 α	21.4 α	ND (0.39)
MAGNESIUM	NA	10,500	NA	NA	33,500	15,000	30,100
MANGANESE	NA	680 *	NA	NA	749 *	742 *	918 *
MERCURY	NA	0.10	ND (0.10)	NA	0.20	0.20	ND (0.10)
MOLYBDENUM	NA	2.7 α	NA	NA	ND (0.61)	ND (0.61)	ND (0.67)
NICKEL	NA	109	NA	NA	255 *	112	130
POTASSIUM	NA	1,230	NA	NA	922	1,030	493
SELENIUM	NA	ND (0.47)	NA	NA	ND (0.48)	0.54	ND (0.53)
SILVER	NA	ND (0.56)	NA	NA	ND (0.24)	ND (0.24)	ND (0.27)
SODIUM	NA	569	NA	NA	491	492	384
VANADIUM	NA	22.9	NA	NA	69.4	48.9	85.5
ZINC	NA	32.5	NA	NA	185 α	74.5	49.2
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	3	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
1,2-DICHLOROPROPANE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
2-BUTANONE	NA	14	ND (1)	ND (1)	ND (11)	ND (11)	ND (12)
2-HEXANONE	NA	ND (11)	ND (1)	ND (1)	ND (11)	ND (11)	ND (12)
ACETONE	NA	ND (23)	ND (8)	ND (10)	ND (11)	ND (11)	ND (43)
BENZENE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
CARBON DISULFIDE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
CHLOROBENZENE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
CHLOROFORM	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
ETHYLBENZENE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B011	IR08B011	IR08B012	IR08B012	IR08B013	IR08B013	IR08B013
Sampling Depth (feet bgs)	3.25	6.25	3.25	5.75	1.75	3.25	6.25
Sample Number	8940E093	8940E094	8940G028	8940G029	9016H134	9016H135	9016H136
Sample Date	10/03/89	10/03/89	10/05/89	10/05/89	04/17/90	04/17/90	04/17/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	ND (6)	ND (5)	ND (3)	ND (6)	ND (6)	ND (6)
TETRACHLOROETHENE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
TOLUENE	NA	30	5	ND (1)	ND (6)	ND (5)	ND (6)
TRICHLOROETHENE	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
XYLENE (TOTAL)	NA	ND (5)	ND (1)	ND (1)	ND (6)	ND (5)	ND (6)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
1,2-DICHLOROBENZENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
1,3-DICHLOROBENZENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
1,4-DICHLOROBENZENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
2-METHYLNAPHTHALENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
ACENAPHTHYLENE	NA	ND (350)	NA	ND (330)	60	ND (360)	ND (400)
ANTHRACENE	NA	ND (350)	NA	ND (330)	69	ND (360)	ND (400)
BENZO(A)ANTHRACENE	NA	ND (350)	NA	ND (330)	270	ND (360)	ND (400)
BENZO(A)PYRENE	NA	ND (350)	NA	ND (330)	230 *	ND (360)	ND (400)
BENZO(B)FLUORANTHENE	NA	44	NA	ND (330)	460	ND (360)	ND (400)
BENZO(G,H,I)PERYLENE	NA	42	NA	ND (330)	160	ND (360)	ND (400)
BENZO(K)FLUORANTHENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	ND (350)	NA	ND (330)	ND (55)	ND (69)	ND (400)
BUTYLBENZYLPHTHALATE	NA	ND (350)	NA	ND (330)	56	ND (360)	ND (400)
CHRYSENE	NA	48	NA	ND (330)	340	69	ND (400)
DI-N-BUTYLPHTHALATE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
DIBENZOFURAN	NA	ND (350)	NA	ND (330)	46	ND (360)	ND (400)
DIETHYLPHTHALATE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
FLUORANTHENE	NA	56	NA	ND (330)	460	ND (360)	ND (400)
FLUORENE	NA	ND (350)	NA	ND (330)	ND (360)	ND (360)	ND (400)
INDENO(1,2,3-CD)PYRENE	NA	ND (350)	NA	ND (330)	180	ND (360)	ND (400)
NAPHTHALENE	NA	ND (350)	NA	ND (330)	54	ND (360)	ND (400)
PHENANTHRENE	NA	71	NA	47	240	37	ND (400)
PYRENE	NA	74	NA	ND (330)	430	ND (360)	ND (400)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	ND (17)	NA	ND (32)	20	62	ND (23)
4,4'-DDE	NA	ND (17)	NA	ND (32)	7	40	ND (23)
4,4'-DDT	NA	ND (17)	NA	ND (32)	34	130	ND (23)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B011	IR08B011	IR08B012	IR08B012	IR08B013	IR08B013	IR08B013
Sampling Depth (feet bgs)	3.25	6.25	3.25	5.75	1.75	3.25	6.25
Sample Number	8940E093	8940E094	8940G028	8940G029	9016H134	9016H135	9016H136
Sample Date	10/03/89	10/03/89	10/05/89	10/05/89	04/17/90	04/17/90	04/17/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	ND (86)	NA	ND (160)	ND (470)	ND (470)	ND (120)
ENDOSULFAN I	NA	ND (9)	NA	ND (16)	ND (47)	ND (47)	ND (12)
ENDRIN KETONE	NA	ND (17)	NA	ND (32)	ND (95)	ND (95)	ND (23)
GAMMA-CHLORDANE	NA	ND (86)	NA	ND (160)	ND (470)	ND (470)	ND (120)
AROCLOR-1260	NA	ND (170)	NA	68 *	200 *	130 *	ND (230)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (250)	ND (270)	ND (500)	ND (500)	ND (27)	ND (27)	ND (12)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	50	140	ND (92)	200	2,100	6,200	ND (60)
Percent Moisture (%)							
% SOLIDS	NA	92.8	NA	NA	91.4	91.8	83.0
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B014	IR08B014	IR08B014	IR08B015	IR08B015	IR08B015	IR08B016
Sampling Depth (feet bgs)	1.75	3.25	5.75	2.25	3.75	5.75	0.75
Sample Number	9016H152A	9016H153	9016H154	9015H096	9015H097	9015H098	9027E125
Sample Date	04/19/90	04/19/90	04/19/90	04/11/90	04/11/90	04/11/90	07/03/90
Metal (mg/kg)							
ALUMINUM	20,900	36,300	7,510	33,600	39,600	25,100	14,900
ANTIMONY	ND (4.2)	10.9 α	ND (4.1)	ND (4.4)	8.5	ND (4.6)	ND (4.2)
ARSENIC	3.1 *#	7.1 *#	4.9 *#	2.2 *#	2.3 *#	4.2 *#	1.8 *
BARIUM	209	173	330 α	232	79.9	140	85.2
BERYLLIUM	0.33 *	0.52 *	ND (0.08)	0.40 *	0.36 *	0.57 *	0.34 *
CADMIUM	ND (0.78)	ND (0.79)	ND (0.76)	ND (0.80)	ND (0.85)	ND (0.84)	ND (0.78)
CALCIUM	16,800	20,800	15,000	25,700	27,500	9,200	2,060
CHROMIUM	148	268 *	43.3	192	201	528 *	28.7
CHROMIUM VI	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.12)	ND (0.06)	0.58 *
COBALT	27.5	40.2	11.0	38.9	28.9	52.7	8.0
COPPER	63.7	74.7	27.6	65.6	67.2	30.9	39.2
IRON	31,900	46,500	15,800	53,500	45,400	44,600	18,500
LEAD	9.5 α	4.7	4.5	6.9	3.2	2.8	3.7
MAGNESIUM	34,000	51,600	6,410	45,300	21,200	126,000	3,040
MANGANESE	1,160 *	1,270 *	2,540 *α	1,240 *	946 *	824 *	289
MERCURY	0.20	0.20	ND (0.10)	0.10	ND (0.10)	ND (0.10)	0.10
MOLYBDENUM	ND (0.59)	ND (0.60)	ND (0.58)	ND (0.61)	ND (0.64)	ND (0.63)	NA
NICKEL	253 *	350 *	61.5	307 *	89.0	913 *	17.9
POTASSIUM	796	1,390	897	2,680	2,540	1,430	992
SELENIUM	ND (0.46)	ND (0.47)	ND (0.45)	ND (0.48)	ND (0.51)	ND (0.50)	ND (0.47)
SILVER	ND (0.23)	ND (0.24)	ND (0.23)	ND (0.24)	ND (0.25)	ND (0.25)	ND (0.23)
SODIUM	528	1,090	838	917	2,070	602	160
VANADIUM	68.2	111	37.1	115	141 α	78.5	41.2
ZINC	74.6	141 α	51.0	89.1	97.2	74.0	45.1
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
2-BUTANONE	ND (11)	ND (11)	ND (10)	ND (11)	ND (12)	ND (11)	ND (10)
2-HEXANONE	13	ND (11)	ND (10)	ND (11)	ND (12)	ND (11)	ND (10)
ACETONE	2	ND (1)	ND (3)	ND (11)	ND (12)	ND (15)	ND (10)
BENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
CARBON DISULFIDE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
CHLOROBENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
CHLOROFORM	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
ETHYLBENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B014	IR08B014	IR08B014	IR08B015	IR08B015	IR08B015	IR08B016
Sampling Depth (feet bgs)	1.75	3.25	5.75	2.25	3.75	5.75	0.75
Sample Number	9016H152A	9016H153	9016H154	9015H096	9015H097	9015H098	9027E125
Sample Date	04/19/90	04/19/90	04/19/90	04/11/90	04/11/90	04/11/90	07/03/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	2	ND (5)	ND (3)	ND (11)	ND (8)	ND (16)	ND (9)
TETRACHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
TOLUENE	2	4	2	ND (5)	2	ND (6)	2
TRICHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
XYLENE (TOTAL)	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
1,2-DICHLOROBENZENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
1,3-DICHLOROBENZENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
1,4-DICHLOROBENZENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
2-METHYLNAPHTHALENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	38
ACENAPHTHYLENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	270
ANTHRACENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	180
BENZO(A)ANTHRACENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	730 *
BENZO(A)PYRENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	990 *#
BENZO(B)FLUORANTHENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	1,600 *
BENZO(G,H,I)PERYLENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
BENZO(K)FLUORANTHENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
BIS(2-ETHYLHEXYL)PHTHALATE	81	ND (70)	ND (340)	ND (91)	ND (64)	ND (74)	ND (1,700)
BUTYLBENZYLPHTHALATE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
CHRYSENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	810
DI-N-BUTYLPHTHALATE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
DIBENZOFURAN	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	43
DIETHYLPHTHALATE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
FLUORANTHENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	1,000
FLUORENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	49
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
NAPHTHALENE	37	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	ND (330)
PHENANTHRENE	63	44	ND (340)	ND (360)	ND (380)	ND (370)	510
PYRENE	ND (350)	ND (350)	ND (340)	ND (360)	ND (380)	ND (370)	880
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	3	ND (17)	ND (16)	ND (17)	ND (18)	ND (18)	NA
4,4'-DDE	3	ND (17)	ND (16)	ND (17)	ND (18)	ND (18)	NA
4,4'-DDT	11	ND (17)	ND (16)	ND (17)	ND (18)	ND (18)	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B014	IR08B014	IR08B014	IR08B015	IR08B015	IR08B015	IR08B016
Sampling Depth (feet bgs)	1.75	3.25	5.75	2.25	3.75	5.75	0.75
Sample Number	9016H152A	9016H153	9016H154	9015H096	9015H097	9015H098	9027E125
Sample Date	04/19/90	04/19/90	04/19/90	04/11/90	04/11/90	04/11/90	07/03/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (84)	ND (86)	ND (82)	ND (87)	ND (92)	ND (91)	NA
ENDOSULFAN I	ND (8)	ND (9)	ND (8)	ND (9)	ND (9)	ND (9)	NA
ENDRIN KETONE	ND (17)	ND (17)	ND (16)	ND (17)	ND (18)	ND (18)	NA
GAMMA-CHLORDANE	ND (84)	ND (86)	ND (82)	ND (87)	ND (92)	ND (91)	NA
AROCLOR-1260	97 *	ND (170)	ND (160)	ND (170)	ND (180)	ND (180)	3,400 *#
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (11)	ND (10)	ND (11)	ND (12)	ND (11)	26
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	440	ND (54)	ND (52)	91	ND (62)	ND (61)	920
Percent Moisture (%)							
% SOLIDS	95.1	93.3	97.0	92.1	87.0	88.3	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B016	IR08B016	IR08B016A	IR08B016A	IR08B016A	IR08B017	IR08B017
Sampling Depth (feet bgs)	2.25	6.75	0.75	3.25	5.25	1.75	5.25
Sample Number	9027E126	9027E127	9017H202	9017H203	9017H204	9027F053	9027F054
Sample Date	07/03/90	07/03/90	04/27/90	04/27/90	04/27/90	07/06/90	07/06/90
Metal (mg/kg)							
ALUMINUM	23,400	40,100	14,400	6,790	7,480	32,500	29,000
ANTIMONY	ND (14.8)	ND (4.3)	ND (4.3)	ND (4.3)	ND (4.5)	ND (3.6)	ND (5.1)
ARSENIC	2.6 *#	1.1 *	7.9 *#	4.1 *#	3.2 *#	1.2 *	0.76 *
BARIUM	209	127	42.0	30.0	27.8	207	153
BERYLLIUM	0.64 *	0.58 *	0.74 *α	ND (0.13)	ND (0.28)	0.42 *	0.47 *
CADMIUM	0.70	1.4	ND (0.79)	ND (0.79)	ND (0.83)	ND (0.58)	ND (0.65)
CALCIUM	17,300	28,500	7,290	5,750	5,760	24,200	30,200
CHROMIUM	83.7	106	31.4	55.7	42.8	88.7	140
CHROMIUM VI	ND (0.05)	ND (0.10)	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.05)	ND (0.05)
COBALT	16.3	33.4	10.0	6.5	7.1	26.0	30.8
COPPER	35.0	102	14.3	7.5	51.0	93.1	50.1
IRON	29,800	53,800	26,100	15,100	13,900	41,700	41,200
LEAD	21.2 α	1.9	42.9 α	6.5	11.8 α	5.7	1.9
MAGNESIUM	13,200	35,100	10,300	3,700	3,810	26,200	26,400
MANGANESE	561 *	1,200 *	794 *	152	193	1,270 *	1,470 *α
MERCURY	0.10	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	88.7	77.6	28.8	30.5	27.2	85.4	149
POTASSIUM	1,460	1,750	1,060	637	798	1,380	737
SELENIUM	ND (0.84)	ND (0.93)	ND (0.47)	ND (0.47)	ND (0.49)	ND (0.78)	ND (0.88)
SILVER	ND (0.35)	0.42	ND (0.23)	ND (0.24)	ND (0.25)	0.47	ND (0.36)
SODIUM	268	2,010	135	221	334	602	1,590
VANADIUM	78.6	156 α	37.5	41.4	36.2	108	88.3
ZINC	126 α	93.9	31.9	24.7	26.0	70.6	51.7
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (5)	ND (5)	ND (5)	2	ND (5)	ND (5)
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
2-BUTANONE	ND (10)	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (10)
2-HEXANONE	ND (10)	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (10)
ACETONE	ND (11)	ND (10)	ND (11)	ND (11)	ND (11)	ND (12)	ND (25)
BENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
CARBON DISULFIDE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
CHLOROBENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
CHLOROFORM	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
ETHYLBENZENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B016	IR08B016	IR08B016A	IR08B016A	IR08B016A	IR08B017	IR08B017
Sampling Depth (feet bgs)	2.25	6.75	0.75	3.25	5.25	1.75	5.25
Sample Number	9027E126	9027E127	9017H202	9017H203	9017H204	9027F053	9027F054
Sample Date	07/03/90	07/03/90	04/27/90	04/27/90	04/27/90	07/06/90	07/06/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (2)	ND (5)	ND (3)	ND (5)	ND (6)	ND (15)	ND (12)
TETRACHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
TOLUENE	4	ND (5)	ND (5)	ND (5)	ND (6)	9	ND (5)
TRICHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
XYLENE (TOTAL)	ND (5)	ND (5)	ND (5)	ND (5)	ND (6)	ND (5)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
1,2-DICHLOROBENZENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
1,3-DICHLOROBENZENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
1,4-DICHLOROBENZENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
2-METHYLNAPHTHALENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
ACENAPHTHYLENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
ANTHRACENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BENZO(A)ANTHRACENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BENZO(A)PYRENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BENZO(B)FLUORANTHENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BENZO(G,H,I)PERYLENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BENZO(K)FLUORANTHENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (87)	ND (190)	ND (350)	ND (49)	ND (40)	ND (110)	ND (78)
BUTYLBENZYLPHTHALATE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
CHRYSENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
DI-N-BUTYLPHTHALATE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
DIBENZOFURAN	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
DIETHYLPHTHALATE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
FLUORANTHENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
FLUORENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
INDENO(1,2,3-CD)PYRENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
NAPHTHALENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
PHENANTHRENE	ND (330)	ND (330)	63	ND (350)	ND (370)	ND (330)	ND (330)
PYRENE	ND (330)	ND (330)	ND (350)	ND (350)	ND (370)	ND (330)	ND (330)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	ND (17)	ND (17)	ND (18)	NA	NA
4,4'-DDE	NA	NA	ND (17)	ND (17)	ND (18)	NA	NA
4,4'-DDT	NA	NA	ND (17)	ND (17)	ND (18)	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B016	IR08B016	IR08B016A	IR08B016A	IR08B016A	IR08B017	IR08B017
Sampling Depth (feet bgs)	2.25	6.75	0.75	3.25	5.25	1.75	5.25
Sample Number	9027E126	9027E127	9017H202	9017H203	9017H204	9027F053	9027F054
Sample Date	07/03/90	07/03/90	04/27/90	04/27/90	04/27/90	07/06/90	07/06/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	NA	ND (85)	ND (85)	ND (89)	NA	NA
ENDOSULFAN I	NA	NA	ND (9)	ND (9)	ND (9)	NA	NA
ENDRIN KETONE	NA	NA	ND (17)	ND (17)	ND (18)	NA	NA
GAMMA-CHLORDANE	NA	NA	ND (85)	ND (85)	ND (89)	NA	NA
AROCLOR-1260	310 *	ND (50)	54	69 *	ND (180)	ND (50)	ND (50)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (12)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	570	ND (59)	510	250	190	120	ND (56)
Percent Moisture (%)							
% SOLIDS	NA	NA	94.0	93.2	89.2	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B018	IR08B018	IR08B018	IR08B018A	IR08B018A	IR08B018A	IR08B018A
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	5.75	9.75
Sample Number	9026L001	9026L002	9026L003	9017F032	9017F033	9017F034	9017F035
Sample Date	06/28/90	06/28/90	06/28/90	04/25/90	04/25/90	04/25/90	04/25/90
Metal (mg/kg)							
ALUMINUM	21,400	23,600	27,900	6,910	20,200	18,800	NA
ANTIMONY	ND (4.4)	ND (4.5)	ND (4.4)	ND (4.8)	ND (4.7)	5.3	NA
ARSENIC	2.9 *#	2.8 *#	2.4 *#	1.3 *	1.0 *	2.3 *#	NA
BARIUM	111	145	202	36.7	412 α	191	NA
BERYLLIUM	ND (0.30)	ND (0.30)	ND (0.44)	ND (0.08)	ND (0.17)	ND (0.24)	NA
CADMIUM	ND (0.81)	0.84	ND (0.81)	ND (0.89)	ND (0.87)	ND (0.84)	NA
CALCIUM	15,100	22,600	19,900	11,200	22,400	13,500	NA
CHROMIUM	421 *	308 *	218 *	453 *	207	293 *	NA
CHROMIUM VI	NA	NA	NA	ND (0.06)	ND (0.06)	ND (0.06)	NA
COBALT	48.1	62.7	34.5	114	39.6	32.9	NA
COPPER	54.9	54.9	58.3	73.5	56.3	81.5	NA
IRON	40,600	43,900	41,100	59,200	37,000	31,600	NA
LEAD	18.6 α	9.2 α	13.3 α	14.1 α	24.1 α	11.6 α	NA
MAGNESIUM	75,700	88,000	43,400	126,000	48,300	49,700	NA
MANGANESE	762 *	1,140 *	885 *	1,120 *	744 *	788 *	NA
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	729 *	772 *	337 *	1,610 *	444 *	382 *	NA
POTASSIUM	1,470	1,260	1,960	480	1,250	1,230	NA
SELENIUM	ND (0.48)	ND (0.50)	ND (0.48)	ND (0.53)	ND (0.52)	ND (0.50)	NA
SILVER	ND (0.24)	ND (0.25)	ND (0.29)	ND (0.86)	ND (0.76)	ND (0.25)	NA
SODIUM	860	1,340	1,350	550	787	1,150	NA
VANADIUM	78.8	75.8	92.7	41.9	70.9	73.0	NA
ZINC	95.4	74.4	95.2	65.9	74.3	69.7	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
2-BUTANONE	ND (10)	ND (10)	ND (10)	ND (12)	ND (12)	ND (11)	NA
2-HEXANONE	ND (10)	ND (10)	ND (10)	ND (12)	ND (12)	ND (11)	NA
ACETONE	ND (10)	ND (10)	ND (10)	ND (12)	ND (12)	ND (22)	NA
BENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
CARBON DISULFIDE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
CHLOROBENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
CHLOROFORM	1	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
ETHYLBENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088018	IR088018	IR088018	IR088018A	IR088018A	IR088018A	IR088018A
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	5.75	9.75
Sample Number	9026L001	9026L002	9026L003	9017F032	9017F033	9017F034	9017F035
Sample Date	06/28/90	06/28/90	06/28/90	04/25/90	04/25/90	04/25/90	04/25/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (12)	ND (11)	ND (15)	ND (6)	ND (1)	ND (6)	NA
TETRACHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
TOLUENE	7	24	27	ND (6)	1	ND (6)	NA
TRICHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
XYLENE (TOTAL)	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
1,2-DICHLOROBENZENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
1,3-DICHLOROBENZENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
1,4-DICHLOROBENZENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
2-METHYLNAPHTHALENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
ACENAPHTHYLENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
ANTHRACENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BENZO(A)ANTHRACENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BENZO(A)PYRENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BENZO(B)FLUORANTHENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BENZO(G,H,I)PERYLENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BENZO(K)FLUORANTHENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (380)	ND (130)	ND (5,600)	ND (100)	ND (89)	ND (57)	NA
BUTYLBENZYLPHTHALATE	ND (490)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
CHRYSENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
DI-N-BUTYLPHTHALATE	ND (330)	ND (660)	120	ND (400)	ND (390)	ND (370)	NA
DIBENZOFURAN	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
DIETHYLPHTHALATE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
FLUORANTHENE	43	68	ND (660)	ND (400)	ND (390)	ND (370)	NA
FLUORENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
INDENO(1,2,3-CD)PYRENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	ND (370)	NA
NAPHTHALENE	ND (330)	ND (660)	ND (660)	ND (400)	ND (390)	70	NA
PHENANTHRENE	ND (330)	110	ND (660)	ND (400)	ND (390)	57	NA
PYRENE	51	110	ND (660)	ND (400)	ND (390)	48	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	NA	ND (290)	ND (190)	8	ND (18)
4,4'-DDE	NA	NA	NA	ND (290)	ND (190)	3	ND (18)
4,4'-DDT	NA	NA	NA	ND (290)	ND (190)	4	ND (18)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088018	IR088018	IR088018	IR088018A	IR088018A	IR088018A	IR088018A
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	5.75	9.75
Sample Number	9026L001	9026L002	9026L003	9017F032	9017F033	9017F034	9017F035
Sample Date	06/28/90	06/28/90	06/28/90	04/25/90	04/25/90	04/25/90	04/25/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	NA	NA	ND (1,400)	ND (930)	4	ND (90)
ENDOSULFAN I	NA	NA	NA	ND (140)	ND (93)	ND (9)	ND (9)
ENDRIN KETONE	NA	NA	NA	ND (290)	ND (190)	ND (18)	ND (18)
GAMMA-CHLORDANE	NA	NA	NA	ND (1,400)	ND (930)	4	ND (90)
AROCLOR-1260	64	ND (50)	130 *	1,200 *#	710 *#	58	100 *
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (11)	ND (11)	ND (12)	ND (12)	ND (11)	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	57	ND (56)	230	240	250	190	NA
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	83.4	85.4	88.4	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B019	IR08B019	IR08B020	IR08B020	IR08B020	IR08B021	IR08B021
Sampling Depth (feet bgs)	1.75	3.75	1.25	3.25	6.25	1.25	3.25
Sample Number	9016H144	9016H145	9016G223	9016G224	9016G225	9020G255	9020G256
Sample Date	04/17/90	04/17/90	04/18/90	04/18/90	04/18/90	05/14/90	05/14/90
Metal (mg/kg)							
ALUMINUM	37,000	17,300	6,790	12,900	4,960	18,200	24,800
ANTIMONY	6.7	ND (4.8)	ND (4.6)	ND (4.6)	ND (4.9)	ND (4.4)	ND (4.3)
ARSENIC	1.2 *	1.5 *	0.66 *	3.8 *#	ND (0.49)	4.6 *#	12.9 *#a
BARIUM	65.8	79.4	25.3	73.3	13.1	187	135
BERYLLIUM	ND (0.27)	ND (0.16)	ND (0.08)	ND (0.34)	ND (0.08)	ND (0.30)	ND (0.31)
CADMIUM	ND (0.80)	ND (0.89)	ND (0.85)	ND (0.84)	ND (0.90)	ND (0.81)	ND (0.79)
CALCIUM	30,400	7,090	2,500	5,410	690	35,300	18,200
CHROMIUM	116	742 *	886 *	573 *	1,340 *	268 *	70.9
CHROMIUM VI	ND (0.55)	ND (0.06)	ND (0.06)	ND (0.06)	ND (0.06)	0.17	ND (0.05)
COBALT	36.3	67.8	79.2	56.3	101	26.7	22.9
COPPER	73.7	67.5	14.8	70.5	42.5	85.2	83.6
IRON	41,700	37,700	36,100	36,500	35,800	31,500	41,200
LEAD	1.1	2.0	0.69	3.0	ND (0.39)	24.3 a	9.2 a
MAGNESIUM	20,900	173,000	201,000	125,000	218,000	39,800	23,400
MANGANESE	1,040 *	660 *	628 *	872 *	555 *	824 *	1,510 *a
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.10	0.20	0.10
MOLYBDENUM	ND (0.61)	ND (0.67)	ND (0.64)	ND (0.64)	ND (0.68)	NA	NA
NICKEL	68.1	1,220 *	1,450 *	1,000 *	1,880 *	328 *	93.5
POTASSIUM	982	ND (404)	ND (154)	580	ND (91.1)	1,290	1,270
SELENIUM	ND (0.48)	ND (0.53)	ND (0.50)	0.70	ND (0.54)	ND (0.48)	0.60
SILVER	ND (0.24)	ND (0.26)	ND (0.25)	ND (0.25)	ND (0.27)	ND (0.43)	ND (0.52)
SODIUM	2,480	703	198	278	245	678	344
VANADIUM	125 a	52.8	36.1	49.9	35.8	64.8	110
ZINC	68.3	40.4	27.4	42.8	26.5	89.3	96.2
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
1,2-DICHLOROPROPANE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
2-BUTANONE	ND (11)	ND (12)	ND (11)	ND (11)	ND (12)	ND (11)	ND (11)
2-HEXANONE	ND (11)	ND (12)	ND (11)	ND (11)	ND (12)	ND (11)	ND (11)
ACETONE	ND (44)	ND (12)	ND (10)	ND (3)	ND (3)	ND (30)	ND (15)
BENZENE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
CARBON DISULFIDE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
CHLOROBENZENE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
CHLOROFORM	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
ETHYLBENZENE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B019	IR08B019	IR08B020	IR08B020	IR08B020	IR08B021	IR08B021
Sampling Depth (feet bgs)	1.75	3.75	1.25	3.25	6.25	1.25	3.25
Sample Number	9016H144	9016H145	9016G223	9016G224	9016G225	9020G255	9020G256
Sample Date	04/17/90	04/17/90	04/18/90	04/18/90	04/18/90	05/14/90	05/14/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (6)	ND (5)	ND (8)	ND (3)	ND (2)	ND (6)	ND (5)
TETRACHLOROETHENE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
TOLUENE	ND (6)	ND (6)	3	11	27	ND (6)	2
TRICHLOROETHENE	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
XYLENE (TOTAL)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (6)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
1,2-DICHLOROBENZENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
1,3-DICHLOROBENZENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
1,4-DICHLOROBENZENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
2-METHYLNAPHTHALENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
ACENAPHTHYLENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
ANTHRACENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
BENZO(A)ANTHRACENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	81	ND (350)
BENZO(A)PYRENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	51	ND (350)
BENZO(B)FLUORANTHENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	69	ND (350)
BENZO(G,H,I)PERYLENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	62	ND (350)
BENZO(K)FLUORANTHENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	54	ND (350)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (360)	ND (400)	ND (380)	ND (120)	ND (60)	ND (2,400)	ND (350)
BUTYLBENZYLPHTHALATE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	10,000	ND (350)
CHRYSENE	ND (360)	ND (400)	ND (380)	48	ND (400)	90	ND (350)
DI-N-BUTYLPHTHALATE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	320	ND (350)
DIBENZOFURAN	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
DIETHYLPHTHALATE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
FLUORANTHENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	110	ND (350)
FLUORENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	ND (350)
INDENO(1,2,3-CD)PYRENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	42	ND (350)
NAPHTHALENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	ND (360)	36
PHENANTHRENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (400)	150	70
PYRENE	ND (360)	ND (400)	ND (380)	41	ND (400)	130	ND (350)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (19)	ND (23)	ND (21)	ND (91)	ND (19)	9	ND (17)
4,4'-DDE	ND (19)	ND (23)	ND (21)	ND (91)	ND (19)	7	ND (17)
4,4'-DDT	ND (19)	ND (23)	ND (21)	ND (91)	ND (19)	38	ND (17)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B019	IR08B019	IR08B020	IR08B020	IR08B020	IR08B021	IR08B021
Sampling Depth (feet bgs)	1.75	3.75	1.25	3.25	6.25	1.25	3.25
Sample Number	9016H144	9016H145	9016G223	9016G224	9016G225	9020G255	9020G256
Sample Date	04/17/90	04/17/90	04/18/90	04/18/90	04/18/90	05/14/90	05/14/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (97)	ND (110)	ND (100)	ND (450)	ND (97)	ND (88)	ND (85)
ENDOSULFAN I	ND (10)	ND (11)	ND (10)	ND (45)	ND (10)	ND (9)	ND (9)
ENDRIN KETONE	ND (19)	ND (23)	ND (21)	ND (91)	ND (19)	ND (18)	ND (17)
GAMMA-CHLORDANE	ND (97)	ND (110)	ND (100)	ND (450)	ND (97)	ND (88)	ND (85)
AROCLOR-1260	ND (190)	ND (230)	ND (210)	ND (910)	ND (190)	100 *	ND (170)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (12)	ND (11)	ND (11)	ND (12)	13	ND (11)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (55)	ND (60)	ND (57)	1,400	ND (61)	1,800	ND (53)
Percent Moisture (%)							
% SOLIDS	92.1	83.5	87.3	88.0	82.1	90.8	93.8
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088021	IR088022	IR088022	IR088022	IR088022	IR088023	IR088023
Sampling Depth (feet bgs)	5.75	1.25	3.25	5.75	8.75	2.25	3.25
Sample Number	9020G257	9016G212	9016G213	9016G214	9016G215	9015H124	9015H125
Sample Date	05/14/90	04/18/90	04/18/90	04/18/90	04/18/90	04/13/90	04/13/90
Metal (mg/kg)							
ALUMINUM	23,800	16,000	10,800	21,600	NA	23,900	13,100
ANTIMONY	NA	ND (4.5)	6.5	ND (4.6)	NA	ND (4.6)	ND (4.5)
ARSENIC	ND (2.2)	2.9 *#	2.8 *#	3.0 *#	NA	4.6 *#	1.6 *
BARIUM	148	160	145	196	NA	215	95.5
BERYLLIUM	ND (0.07)	ND (0.33)	ND (0.08)	ND (0.35)	NA	0.37 *	ND (0.07)
CADMIUM	ND (0.82)	ND (0.83)	ND (0.86)	ND (0.84)	NA	ND (0.84)	ND (0.82)
CALCIUM	16,600	32,600	20,600	16,500	NA	14,500	6,520
CHROMIUM	375 *	136	167	261 *	NA	466 *	1,290 *
CHROMIUM VI	ND (0.06)	0.10	0.15	0.68 *	NA	ND (0.06)	ND (0.11)
COBALT	49.7	23.5	31.8	35.0	NA	61.6	78.3
COPPER	69.2	82.4	82.7	67.5	NA	134 α	29.2
IRON	35,100	27,300	25,000	34,500	NA	42,300	45,600
LEAD	0.38	67.5 α	156 *α	9.0 α	NA	13.5 α	3.3
MAGNESIUM	83,900	31,100	51,100	58,900	NA	97,600	165,000
MANGANESE	1,050 *	743 *	700 *	1,150 *	NA	1,470 *α	888 *
MERCURY	ND (0.10)	0.20	0.80	0.10	NA	0.50	0.10
MOLYBDENUM	NA	ND (0.63)	ND (0.65)	ND (0.64)	NA	ND (0.64)	ND (0.62)
NICKEL	587 *	281 *	434 *	399 *	NA	860 *	1,450 *
POTASSIUM	929	1,260	732	1,110	NA	1,190	711
SELENIUM	ND (0.49)	ND (0.49)	ND (0.51)	0.57	NA	ND (0.50)	ND (0.49)
SILVER	ND (0.48)	ND (0.25)	ND (0.26)	ND (0.25)	NA	ND (0.25)	ND (0.25)
SODIUM	2,130	729	523	731	NA	918	328
VANADIUM	85.8	58.1	48.6	75.1	NA	80.4	68.4
ZINC	52.0	137 α	275 α	79.4	NA	65.2	42.3
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (6)	2	3	ND (6)	NA	ND (6)	ND (6)
1,2-DICHLOROPROPANE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
2-BUTANONE	ND (11)	ND (11)	ND (12)	ND (11)	NA	ND (11)	ND (11)
2-HEXANONE	ND (11)	ND (11)	ND (12)	ND (11)	NA	ND (11)	ND (11)
ACETONE	ND (19)	ND (11)	ND (2)	ND (5)	NA	ND (10)	ND (7)
BENZENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
CARBON DISULFIDE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
CHLOROBENZENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
CHLOROFORM	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
ETHYLBENZENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088021	IR088022	IR088022	IR088022	IR088022	IR088023	IR088023
Sampling Depth (feet bgs)	5.75	1.25	3.25	5.75	8.75	2.25	3.25
Sample Number	9020G257	9016G212	9016G213	9016G214	9016G215	9015H124	9015H125
Sample Date	05/14/90	04/18/90	04/18/90	04/18/90	04/18/90	04/13/90	04/13/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (6)	ND (4)	ND (8)	ND (17)	NA	ND (6)	ND (7)
TETRACHLOROETHENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
TOLUENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	6	ND (6)
TRICHLOROETHENE	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
XYLENE (TOTAL)	ND (6)	ND (6)	ND (6)	ND (6)	NA	ND (6)	ND (6)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
1,2-DICHLOROBENZENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
1,3-DICHLOROBENZENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
1,4-DICHLOROBENZENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
2-METHYLNAPHTHALENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
ACENAPHTHYLENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
ANTHRACENE	ND (370)	44	ND (1,500)	ND (380)	NA	41	ND (370)
BENZO(A)ANTHRACENE	ND (370)	90	ND (1,500)	ND (380)	NA	140	ND (370)
BENZO(A)PYRENE	ND (370)	43	ND (1,500)	ND (380)	NA	83 *	ND (370)
BENZO(B)FLUORANTHENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	110	ND (370)
BENZO(G,H,I)PERYLENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	50	ND (370)
BENZO(K)FLUORANTHENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	89	ND (370)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (370)	ND (380)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
BUTYLBENZYLPHTHALATE	230	74	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
CHRYSENE	ND (370)	130	ND (1,500)	ND (380)	NA	180	ND (370)
DI-N-BUTYLPHTHALATE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
DIBENZOFURAN	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
DIETHYLPHTHALATE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
FLUORANTHENE	ND (370)	190	ND (1,500)	ND (380)	NA	230	ND (370)
FLUORENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
INDENO(1,2,3-CD)PYRENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	46	ND (370)
NAPHTHALENE	ND (370)	ND (370)	ND (1,500)	ND (380)	NA	ND (360)	ND (370)
PHENANTHRENE	ND (370)	310	ND (1,500)	ND (380)	NA	180	ND (370)
PYRENE	ND (370)	190	ND (1,500)	ND (380)	NA	180	ND (370)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (18)	ND (200)	ND (430)	6	ND (97)	ND (18)	ND (18)
4,4'-DDE	ND (18)	ND (200)	ND (430)	7	ND (97)	ND (18)	ND (18)
4,4'-DDT	ND (18)	170	390	ND (100)	88	ND (18)	ND (18)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088021	IR088022	IR088022	IR088022	IR088022	IR088023	IR088023
Sampling Depth (feet bgs)	5.75	1.25	3.25	5.75	8.75	2.25	3.25
Sample Number	9020G257	9016G212	9016G213	9016G214	9016G215	9015H124	9015H125
Sample Date	05/14/90	04/18/90	04/18/90	04/18/90	04/18/90	04/13/90	04/13/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (89)	ND (1,000)	ND (2,100)	ND (510)	ND (480)	ND (88)	ND (89)
ENDOSULFAN I	ND (9)	ND (100)	ND (210)	ND (51)	ND (48)	ND (9)	ND (9)
ENDRIN KETONE	ND (18)	ND (200)	ND (430)	ND (100)	ND (97)	ND (18)	ND (18)
GAMMA-CHLORDANE	ND (89)	ND (1,000)	ND (2,100)	ND (510)	ND (480)	ND (88)	ND (89)
AROCLOR-1260	ND (180)	690 *#	2,700 *#	ND (1,000)	450 *#	ND (180)	ND (180)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	21	ND (12)	ND (11)	NA	ND (11)	ND (11)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (56)	3,700	4,400	280	NA	ND (55)	390
Percent Moisture (%)							
% SOLIDS	90.3	89.0	86.1	87.6	NA	87.6	89.7
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B024	IR08B024	IR08B024	IR08B025	IR08B025	IR08B025	IR08B027
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	6.25	1.25
Sample Number	9017H179	9017H180	9017H181	9017H191	9017H192	9017H193	9026G289
Sample Date	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	06/29/90
Metal (mg/kg)							
ALUMINUM	30,700	30,900	4,260	19,900	40,300	27,300	15,000
ANTIMONY	4.4	4.4	ND (4.5)	ND (4.3)	ND (4.3)	9.5 a	ND (4.4)
ARSENIC	2.8 *#	2.5 *#	0.54 *	2.4 *#	1.0 *	6.4 *#	2.7 *#
BARIUM	318 a	197	21.5	114	109	178	164
BERYLLIUM	0.60 *	0.57 *	ND (0.15)	0.34 *	0.26 *	0.45 *	0.38 *
CADMIUM	ND (0.79)	ND (0.79)	ND (0.83)	ND (0.80)	ND (0.80)	ND (0.80)	1.2
CALCIUM	18,400	26,000	4,200	21,800	33,900	20,000	2,890
CHROMIUM	160	170	653 *	272 *	119	255 *	46.2
CHROMIUM VI	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.06)	ND (0.05)	ND (0.05)	NA
COBALT	30.8	27.2	112	50.2	34.1	31.8	15.3
COPPER	63.4	68.0	ND (15.8)	40.5	79.8	54.6	70.3
IRON	42,500	40,700	50,600	39,200	46,100	41,300	19,400
LEAD	8.5	7.0	0.36	21.4 a	1.5	6.3	34.3 a
MAGNESIUM	19,200	23,300	214,000	32,600	22,500	55,000	3,270
MANGANESE	1,160 *	1,020 *	525 *	959 *	997 *	786 *	703 *
MERCURY	0.30	0.10	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.30
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	141	151 *	2,310 *	514 *	96.8	385 *	28.5
POTASSIUM	1,700	2,430	ND (83.6)	1,340	1,440	1,150	1,390
SELENIUM	ND (0.47)	ND (0.47)	ND (0.49)	ND (0.47)	ND (0.47)	ND (0.48)	ND (0.48)
SILVER	ND (0.24)	ND (0.23)	ND (0.25)	ND (0.24)	ND (0.24)	ND (0.24)	0.27
SODIUM	258	566	154	295	910	472	145
VANADIUM	111	115	22.2	93.0	134 a	91.9	51.7
ZINC	88.3	89.8	33.8	74.2	79.0	96.8	96.0
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	3	3	2	ND (5)	7	ND (5)
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
2-BUTANONE	ND (11)	ND (11)	ND (11)	ND (11)	ND (11)	ND (11)	ND (10)
2-HEXANONE	ND (11)	ND (11)	ND (11)	ND (11)	ND (11)	ND (11)	ND (10)
ACETONE	ND (11)	ND (5)	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)
BENZENE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
CARBON DISULFIDE	ND (5)	ND (5)	6	ND (6)	ND (5)	ND (5)	ND (5)
CHLOROBENZENE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
CHLOROFORM	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
ETHYLBENZENE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088024	IR088024	IR088024	IR088025	IR088025	IR088025	IR088027
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	6.25	1.25
Sample Number	9017H179	9017H180	9017H181	9017H191	9017H192	9017H193	9026G289
Sample Date	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	06/29/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (4)	ND (4)	ND (6)	ND (6)	ND (4)	ND (4)	ND (10)
TETRACHLOROETHENE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
TOLUENE	ND (5)	2	2	ND (6)	ND (5)	ND (5)	55
TRICHLOROETHENE	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
XYLENE (TOTAL)	ND (5)	ND (5)	ND (6)	ND (6)	ND (5)	ND (5)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
1,2-DICHLOROBENZENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
1,3-DICHLOROBENZENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
1,4-DICHLOROBENZENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
2-METHYLNAPHTHALENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
ACENAPHTHYLENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
ANTHRACENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BENZO(A)ANTHRACENE	ND (350)	38	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BENZO(A)PYRENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BENZO(B)FLUORANTHENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BENZO(G,H,I)PERYLENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BENZO(K)FLUORANTHENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (350)	ND (200)	ND (3,100)	ND (360)	ND (360)	ND (360)	ND (1,300)
BUTYLBENZYLPHTHALATE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
CHRYSENE	ND (350)	46	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
DI-N-BUTYLPHTHALATE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
DIBENZOFURAN	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
DIETHYLPHTHALATE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
FLUORANTHENE	ND (350)	75	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
FLUORENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
NAPHTHALENE	ND (350)	ND (350)	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
PHENANTHRENE	ND (350)	59	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
PYRENE	ND (350)	78	ND (380)	ND (360)	ND (360)	ND (360)	ND (1,300)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (17)	ND (17)	ND (18)	ND (17)	ND (17)	ND (17)	NA
4,4'-DDE	ND (17)	ND (17)	ND (18)	ND (17)	ND (17)	ND (17)	NA
4,4'-DDT	ND (17)	ND (17)	ND (18)	ND (17)	ND (17)	ND (17)	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B024	IR08B024	IR08B024	IR08B025	IR08B025	IR08B025	IR08B027
Sampling Depth (feet bgs)	1.25	3.25	5.75	0.75	3.25	6.25	1.25
Sample Number	9017H179	9017H180	9017H181	9017H191	9017H192	9017H193	9026G289
Sample Date	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	04/24/90	06/29/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (85)	ND (85)	ND (91)	ND (87)	ND (86)	ND (86)	NA
ENDOSULFAN I	ND (9)	ND (9)	ND (9)	ND (9)	ND (9)	ND (9)	NA
ENDRIN KETONE	ND (17)	ND (17)	ND (18)	ND (17)	ND (17)	ND (17)	NA
GAMMA-CHLORDANE	ND (85)	ND (85)	ND (91)	ND (87)	ND (86)	ND (86)	NA
AROCLOR-1260	ND (170)	83 *	ND (180)	ND (170)	ND (170)	ND (170)	64
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	13	ND (11)	ND (11)	ND (11)	ND (11)	210
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (53)	750	ND (57)	200	54	56	250
Percent Moisture (%)							
% SOLIDS	93.5	93.8	89.5	92.7	92.7	92.1	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B027	IR08B027A	IR08B028	IR08B029	IR08B029	IR08B030	IR08B030
Sampling Depth (feet bgs)	5.75	1.25	1.25	1.25	2.75	1.25	3.25
Sample Number	9026G290	9017F038A	9016H163	9017F026	9017F027	9026K001	9026K002
Sample Date	06/29/90	04/25/90	04/19/90	04/23/90	04/23/90	06/27/90	06/27/90
Metal (mg/kg)							
ALUMINUM	40,100	16,400	14,000	31,700	35,700	33,000	29,600
ANTIMONY	ND (4.2)	ND (4.8)	ND (4.2)	6.6	11.3 α	ND (4.4)	ND (4.4)
ARSENIC	ND (2.1)	3.8 *#	7.3 *#	0.80 *	1.3 *	4.8 *#	3.5 *#
BARIUM	157	155	540 α	168	152	171	150
BERYLLIUM	ND (0.29)	ND (0.28)	0.63 *	ND (0.19)	ND (0.26)	0.49 *	ND (0.33)
CADMIUM	1.1	ND (0.88)	ND (0.78)	ND (0.78)	ND (0.78)	ND (0.82)	ND (0.81)
CALCIUM	34,600	19,200	3,720	26,100	33,600	44,300	23,700
CHROMIUM	102	212 *	37.4	126	106	197	148
CHROMIUM VI	ND (0.05)	ND (0.06)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
COBALT	31.8	48.1	26.2	36.6	32.0	34.8	31.0
COPPER	84.4	70.8	68.0	76.0	78.4	82.9	83.0
IRON	47,400	37,300	27,400	46,400	47,600	46,300	41,400
LEAD	0.88	47.1 α	12.6 α	2.4	2.7	6.2	3.2
MAGNESIUM	32,400	49,800	7,900	37,800	34,400	44,400	36,500
MANGANESE	880 *	755 *	1,980 *α	900 *	848 *	1,110 *	1,170 *
MERCURY	NA	0.10	0.20	ND (0.10)	0.10	ND (0.10)	ND (0.10)
MOLYBDENUM	NA	NA	ND (0.59)	ND (0.59)	ND (0.59)	NA	NA
NICKEL	64.8	573 *	73.0	104	68.4	262 *	184 *
POTASSIUM	1,040	1,460	2,190	805	1,010	1,730	1,400
SELENIUM	0.63	ND (0.52)	ND (0.46)	ND (0.47)	ND (2.3)	ND (0.49)	ND (0.48)
SILVER	ND (0.33)	ND (0.98)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.24)	ND (0.46)
SODIUM	550	498	385	367	581	1,560	1,100
VANADIUM	122 α	75.5	41.4	116	129 α	101	98.1
ZINC	80.7	127 α	72.2	86.1	87.4	94.7	69.3
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (6)	ND (5)	2	ND (5)	ND (5)	ND (5)
1,2-DICHLOROPROPANE	2	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
2-BUTANONE	ND (10)	ND (12)	ND (11)	ND (11)	ND (10)	ND (10)	ND (10)
2-HEXANONE	ND (10)	ND (12)	ND (11)	ND (11)	ND (10)	ND (10)	ND (10)
ACETONE	ND (10)	ND (12)	ND (11)	ND (11)	ND (35)	ND (10)	ND (10)
BENZENE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
CARBON DISULFIDE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
CHLOROBENZENE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
CHLOROFORM	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
ETHYLBENZENE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088027	IR088027A	IR088028	IR088029	IR088029	IR088030	IR088030
Sampling Depth (feet bgs)	5.75	1.25	1.25	1.25	2.75	1.25	3.25
Sample Number	9026G290	9017F038A	9016H163	9017F026	9017F027	9026K001	9026K002
Sample Date	06/29/90	04/25/90	04/19/90	04/23/90	04/23/90	06/27/90	06/27/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (9)	ND (6)	ND (5)	ND (2)	ND (5)	ND (7)	ND (15)
TETRACHLOROETHENE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
TOLUENE	ND (5)	ND (6)	2	5	ND (5)	8	6
TRICHLOROETHENE	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
XYLENE (TOTAL)	ND (5)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
1,2-DICHLOROBENZENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
1,3-DICHLOROBENZENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
1,4-DICHLOROBENZENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
2-METHYLNAPHTHALENE	ND (330)	ND (780)	190	ND (350)	ND (350)	ND (330)	ND (330)
ACENAPHTHYLENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
ANTHRACENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
BENZO(A)ANTHRACENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
BENZO(A)PYRENE	ND (330)	ND (780)	41	ND (350)	ND (350)	ND (330)	ND (330)
BENZO(B)FLUORANTHENE	ND (330)	ND (780)	37	ND (350)	ND (350)	ND (330)	ND (330)
BENZO(G,H,I)PERYLENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
BENZO(K)FLUORANTHENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (1,400)	ND (120)	ND (350)	ND (46)	ND (41)	ND (70)	ND (37)
BUTYLBENZYLPHTHALATE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
CHRYSENE	ND (330)	130	59	ND (350)	ND (350)	ND (330)	ND (330)
DI-N-BUTYLPHTHALATE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
DIBENZOFURAN	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
DIETHYLPHTHALATE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
FLUORANTHENE	ND (330)	130	44	ND (350)	ND (350)	ND (330)	ND (330)
FLUORENE	ND (330)	ND (780)	90	ND (350)	ND (350)	ND (330)	ND (330)
INDENO(1,2,3-CD)PYRENE	ND (330)	ND (780)	ND (350)	ND (350)	ND (350)	ND (330)	ND (330)
NAPHTHALENE	ND (330)	ND (780)	80	ND (350)	ND (350)	ND (330)	ND (330)
PHENANTHRENE	ND (330)	130	370	ND (350)	ND (350)	ND (330)	ND (330)
PYRENE	ND (330)	130	78	ND (350)	ND (350)	ND (330)	ND (330)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	ND (280)	ND (84)	ND (17)	ND (17)	NA	NA
4,4'-DDE	NA	ND (280)	ND (84)	ND (17)	ND (17)	NA	NA
4,4'-DDT	NA	ND (280)	ND (84)	ND (17)	ND (17)	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088027	IR088027A	IR088028	IR088029	IR088029	IR088030	IR088030
Sampling Depth (feet bgs)	5.75	1.25	1.25	1.25	2.75	1.25	3.25
Sample Number	9026G290	9017F038A	9016H163	9017F026	9017F027	9026K001	9026K002
Sample Date	06/29/90	04/25/90	04/19/90	04/23/90	04/23/90	06/27/90	06/27/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	ND (1,400)	ND (420)	ND (84)	ND (83)	NA	NA
ENDOSULFAN I	NA	ND (140)	ND (42)	ND (8)	ND (8)	NA	NA
ENDRIN KETONE	NA	ND (280)	ND (84)	ND (17)	ND (17)	NA	NA
GAMMA-CHLORDANE	NA	ND (1,400)	ND (420)	ND (84)	ND (83)	NA	NA
AROCLOR-1260	ND (50)	450 *#	ND (840)	ND (170)	ND (170)	ND (50)	ND (50)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (10)	82	19	ND (11)	ND (10)	ND (11)	21
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (52)	670	140	320	510	1,300	590
Percent Moisture (%)							
% SOLIDS	NA	84.3	94.8	94.5	95.3	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B030	IR08B031	IR08B031	IR08B032	IR08B032	IR08B032	IR08B032
Sampling Depth (feet bgs)	5.75	1.25	5.25	1.25	3.25	6.25	11.75
Sample Number	9026K003	9027F049	9027F050	9019G241	9019G242	9019G243	9019G244
Sample Date	06/27/90	07/05/90	07/05/90	05/11/90	05/11/90	05/11/90	05/11/90
Metal (mg/kg)							
ALUMINUM	17,400	16,500	36,100	21,900	14,400	27,900	NA
ANTIMONY	ND (4.9)	ND (3.8)	ND (4.3)	ND (4.4)	ND (4.4)	ND (4.3)	NA
ARSENIC	5.1 *#	3.9 *#	1.3 *	8.0 *#	5.3 *#	6.1 *#	NA
BARIUM	89.3	164	200	219	145	211	NA
BERYLLIUM	ND (0.33)	0.43 *	0.67 *	ND (0.35)	ND (0.35)	ND (0.72)	NA
CADMIUM	ND (0.91)	0.68	0.94	ND (0.81)	0.84	ND (0.80)	NA
CALCIUM	2,210	11,500	25,800	19,700	25,700	13,800	NA
CHROMIUM	97.4	137	161	178	132	122	NA
CHROMIUM VI	ND (0.05)	ND (0.05)	ND (0.05)	0.10	0.28 *	ND (0.06)	NA
COBALT	9.4	18.8	30.3	29.5	16.5	20.9	NA
COPPER	23.5	151 α	73.9	129 α	62.6	55.0	NA
IRON	24,800	32,400	51,200	35,400	23,700	35,900	NA
LEAD	6.1	77.2 α	13.4 α	27.6 α	67.6 α	4.8	NA
MAGNESIUM	5,880	21,600	32,800	36,800	16,400	30,800	NA
MANGANESE	461 *	575 *	949 *	1,160 *	543 *	871 *	NA
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	0.20	0.10	ND (0.10)	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	98.8	167 *	161 *	298 *	141	170 *	NA
POTASSIUM	950	954	1,810	1,340	1,190	3,000	NA
SELENIUM	ND (0.54)	ND (0.82)	ND (0.92)	ND (0.48)	ND (0.48)	ND (0.48)	NA
SILVER	ND (0.27)	ND (0.33)	0.41	ND (0.80)	ND (0.84)	ND (0.78)	NA
SODIUM	872	217	973	551	321	901	NA
VANADIUM	45.1	75.5	189 α	74.9	51.0	59.7	NA
ZINC	40.2	137 α	93.8	125 α	125 α	89.7	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (5)	ND (5)	ND (6)	3	ND (6)	NA
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
2-BUTANONE	ND (10)	ND (10)	ND (10)	ND (11)	ND (11)	ND (11)	NA
2-HEXANONE	ND (10)	ND (10)	ND (10)	ND (11)	ND (11)	ND (11)	NA
ACETONE	ND (10)	ND (10)	ND (10)	ND (11)	ND (94)	ND (11)	NA
BENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	110	NA
CARBON DISULFIDE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
CHLOROBENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
CHLOROFORM	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
ETHYLBENZENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B030	IR08B031	IR08B031	IR08B032	IR08B032	IR08B032	IR08B032
Sampling Depth (feet bgs)	5.75	1.25	5.25	1.25	3.25	6.25	11.75
Sample Number	9026K003	9027F049	9027F050	9019G241	9019G242	9019G243	9019G244
Sample Date	06/27/90	07/05/90	07/05/90	05/11/90	05/11/90	05/11/90	05/11/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (8)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
TETRACHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
TOLUENE	ND (5)	8	3	51	150	47	NA
TRICHLOROETHENE	ND (5)	ND (5)	ND (5)	ND (6)	ND (6)	ND (6)	NA
XYLENE (TOTAL)	ND (5)	ND (5)	ND (5)	ND (6)	2	2	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
1,2-DICHLOROBENZENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
1,3-DICHLOROBENZENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
1,4-DICHLOROBENZENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
2-METHYLNAPHTHALENE	ND (330)	ND (660)	ND (330)	61	41	280	NA
ACENAPHTHYLENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
ANTHRACENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
BENZO(A)ANTHRACENE	ND (330)	150	ND (330)	39	44	ND (360)	NA
BENZO(A)PYRENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
BENZO(B)FLUORANTHENE	ND (330)	ND (660)	ND (330)	90	ND (360)	ND (360)	NA
BENZO(G,H,I)PERYLENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
BENZO(K)FLUORANTHENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (110)	ND (490)	ND (68)	ND (140)	ND (320)	ND (200)	NA
BUTYLBENZYLPHTHALATE	ND (330)	ND (660)	ND (330)	ND (360)	56	ND (360)	NA
CHRYSENE	ND (330)	150	ND (330)	75	89	47	NA
DI-N-BUTYLPHTHALATE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	100	NA
DIBENZOFURAN	ND (330)	ND (660)	ND (330)	35	ND (360)	87	NA
DIETHYLPHTHALATE	ND (330)	ND (660)	ND (330)	51	ND (360)	ND (360)	NA
FLUORANTHENE	ND (330)	250	ND (330)	110	120	ND (360)	NA
FLUORENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	37	NA
INDENO(1,2,3-CD)PYRENE	ND (330)	ND (660)	ND (330)	ND (360)	ND (360)	ND (360)	NA
NAPHTHALENE	ND (330)	ND (660)	ND (330)	52	ND (360)	320	NA
PHENANTHRENE	ND (330)	170	ND (330)	120	140	200	NA
PYRENE	ND (330)	300	ND (330)	110	130	35	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	NA	6	30	ND (17)	7
4,4'-DDE	NA	NA	NA	5	30	ND (17)	6
4,4'-DDT	NA	NA	NA	30	96	ND (17)	13

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088030	IR088031	IR088031	IR088032	IR088032	IR088032	IR088032
Sampling Depth (feet bgs)	5.75	1.25	5.25	1.25	3.25	6.25	11.75
Sample Number	9026K003	9027F049	9027F050	9019G241	9019G242	9019G243	9019G244
Sample Date	06/27/90	07/05/90	07/05/90	05/11/90	05/11/90	05/11/90	05/11/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	NA	NA	ND (88)	ND (440)	ND (87)	ND (100)
ENDOSULFAN I	NA	NA	NA	ND (9)	ND (44)	ND (9)	ND (10)
ENDRIN KETONE	NA	NA	NA	ND (18)	ND (88)	ND (17)	ND (20)
GAMMA-CHLORDANE	NA	NA	NA	ND (88)	ND (440)	ND (87)	ND (100)
AROCLOR-1260	ND (50)	190 *	ND (50)	130 *	570 *#	ND (170)	110 *
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (12)	19	66	8	19	ND (11)	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (62)	700	490	380	1,100	85	NA
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	90.8	90.8	92.0	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B033	IR08B033	IR08B033	IR08B033	IR08B034	IR08B034	IR08B034
Sampling Depth (feet bgs)	1.75	3.25	5.75	10.75	1.25	3.25	5.75
Sample Number	9016H169	9016H170	9016H171	9016H172	9015G181	9015G182	9015G183
Sample Date	04/20/90	04/20/90	04/20/90	04/20/90	04/12/90	04/12/90	04/12/90
Metal (mg/kg)							
ALUMINUM	20,400	17,100	31,600	NA	19,400	37,100	28,300
ANTIMONY	ND (4.4)	ND (4.3)	9.1 α	NA	ND (4.3)	ND (4.4)	ND (4.1)
ARSENIC	3.5 *#	3.0 *#	ND (2.2)	NA	2.6 *#	11.6 *#α	3.4 *#
BARIUM	195	118	129	NA	167	243	218
BERYLLIUM	ND (0.45)	ND (0.21)	ND (0.07)	NA	0.45 *	0.55 *	0.70 *
CADMIUM	ND (0.81)	ND (0.78)	ND (0.82)	NA	ND (0.79)	ND (0.81)	ND (0.75)
CALCIUM	15,600	11,800	23,700	NA	25,300	21,000	12,500
CHROMIUM	160	217 *	128	NA	198	312 *	130
CHROMIUM VI	ND (0.06)	ND (0.05)	ND (0.06)	NA	ND (0.05)	ND (0.06)	ND (0.05)
COBALT	25.3	28.4	37.7	NA	25.6	40.0	24.6
COPPER	64.6	30.3	107	NA	81.3	80.0	29.3
IRON	32,700	28,300	37,500	NA	34,000	50,900	38,700
LEAD	82.0 α	12.5 α	1.8	NA	14.7 α	6.8	5.8
MAGNESIUM	29,800	42,000	17,200	NA	35,500	58,300	18,100
MANGANESE	1,040 *	790 *	1,130 *	NA	872 *	1,550 *α	763 *
MERCURY	4.0 α	0.20	ND (0.10)	NA	0.20	ND (0.10)	0.20
MOLYBDENUM	ND (0.61)	ND (0.59)	ND (0.62)	NA	ND (0.60)	ND (0.61)	ND (0.57)
NICKEL	244 *	327 *	108	NA	343 *	380 *	145
POTASSIUM	1,430	885	1,810	NA	1,500	2,110	1,080
SELENIUM	ND (0.48)	ND (0.47)	ND (0.49)	NA	ND (0.47)	ND (0.48)	ND (0.45)
SILVER	ND (0.24)	ND (0.23)	ND (0.25)	NA	ND (0.24)	ND (0.24)	ND (0.22)
SODIUM	537	388	3,390	NA	542	533	1,500
VANADIUM	72.6	70.5	156 α	NA	80.1	128 α	108
ZINC	103	47.5	88.3	NA	90.0	135 α	73.4
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
1,2-DICHLOROPROPANE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
2-BUTANONE	ND (11)	ND (11)	ND (11)	NA	ND (11)	ND (11)	ND (10)
2-HEXANONE	ND (11)	ND (11)	ND (11)	NA	ND (11)	ND (11)	ND (10)
ACETONE	ND (11)	ND (11)	ND (11)	NA	ND (11)	ND (11)	ND (10)
BENZENE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
CARBON DISULFIDE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
CHLOROBENZENE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
CHLOROFORM	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
ETHYLBENZENE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B033	IR08B033	IR08B033	IR08B033	IR08B034	IR08B034	IR08B034
Sampling Depth (feet bgs)	1.75	3.25	5.75	10.75	1.25	3.25	5.75
Sample Number	9016H169	9016H170	9016H171	9016H172	9015G181	9015G182	9015G183
Sample Date	04/20/90	04/20/90	04/20/90	04/20/90	04/12/90	04/12/90	04/12/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (3)	ND (2)	ND (6)	NA	ND (6)	ND (6)	ND (5)
TETRACHLOROETHENE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
TOLUENE	6	36	ND (6)	NA	ND (5)	1	ND (5)
TRICHLOROETHENE	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
XYLENE (TOTAL)	ND (6)	ND (5)	ND (6)	NA	ND (5)	ND (6)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
1,2-DICHLOROBENZENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
1,3-DICHLOROBENZENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
1,4-DICHLOROBENZENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
2-METHYLNAPHTHALENE	ND (360)	ND (350)	ND (360)	NA	180	ND (360)	ND (340)
ACENAPHTHYLENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
ANTHRACENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
BENZO(A)ANTHRACENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
BENZO(A)PYRENE	86 *	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
BENZO(B)FLUORANTHENE	83	ND (350)	ND (360)	NA	130	ND (360)	ND (340)
BENZO(G,H,I)PERYLENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
BENZO(K)FLUORANTHENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (75)	ND (350)	ND (360)	NA	ND (260)	ND (100)	ND (99)
BUTYLBENZYLPHTHALATE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
CHRYSENE	150	ND (350)	ND (360)	NA	240	ND (360)	ND (340)
DI-N-BUTYLPHTHALATE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
DIBENZOFURAN	ND (360)	ND (350)	ND (360)	NA	ND (350)	43	ND (340)
DIETHYLPHTHALATE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
FLUORANTHENE	47	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
FLUORENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
INDENO(1,2,3-CD)PYRENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
NAPHTHALENE	ND (360)	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
PHENANTHRENE	140	ND (350)	ND (360)	NA	120	55	ND (340)
PYRENE	110	ND (350)	ND (360)	NA	ND (350)	ND (360)	ND (340)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (170)	ND (17)	ND (18)	ND (88)	15	ND (17)	ND (16)
4,4'-DDE	ND (170)	ND (17)	ND (18)	ND (88)	9	ND (17)	ND (16)
4,4'-DDT	91	ND (17)	ND (18)	48	36	ND (17)	ND (16)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088033	IR088033	IR088033	IR088033	IR088034	IR088034	IR088034
Sampling Depth (feet bgs)	1.75	3.25	5.75	10.75	1.25	3.25	5.75
Sample Number	9016H169	9016H170	9016H171	9016H172	9015G181	9015G182	9015G183
Sample Date	04/20/90	04/20/90	04/20/90	04/20/90	04/12/90	04/12/90	04/12/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (870)	ND (84)	ND (88)	ND (440)	ND (170)	ND (87)	ND (81)
ENDOSULFAN I	ND (87)	ND (8)	ND (9)	ND (44)	ND (17)	ND (9)	ND (8)
ENDRIN KETONE	ND (170)	ND (17)	ND (18)	ND (88)	ND (34)	ND (17)	ND (16)
GAMMA-CHLORDANE	ND (870)	ND (84)	ND (88)	ND (440)	ND (170)	ND (87)	ND (81)
AROCLOR-1260	ND (1,700)	ND (170)	ND (180)	ND (880)	ND (340)	ND (170)	ND (160)
TPH-Extractable (mg/kg)							
TPH-DIESEL	63	ND (11)	ND (11)	NA	32	ND (11)	ND (10)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	6,500	59	60	NA	6,900	72	ND (55)
Percent Moisture (%)							
% SOLIDS	91.4	94.5	89.7	NA	93.1	91.7	98.4
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035
Sampling Depth (feet bgs)	1.75	3.25	5.75	9.25	13.25	16.25	19.25
Sample Number	9015H113	9015H114	9015H115	9015H116	9015H117	9015H118	9015H119
Sample Date	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90
Metal (mg/kg)							
ALUMINUM	26,800	19,400	15,900	NA	NA	NA	NA
ANTIMONY	ND (4.3)	ND (4.4)	ND (4.4)	NA	NA	NA	NA
ARSENIC	5.8 *#	2.9 *#	3.9 *#	NA	NA	NA	NA
BARIUM	121	170	160	NA	NA	NA	NA
BERYLLIUM	0.52 *	0.35 *	0.32 *	NA	NA	NA	NA
CADMIUM	ND (0.79)	ND (0.80)	ND (0.81)	NA	NA	NA	NA
CALCIUM	18,600	25,800	12,700	NA	NA	NA	NA
CHROMIUM	166	197	121	NA	NA	NA	NA
CHROMIUM VI	ND (0.05)	0.09	ND (0.06)	NA	NA	NA	NA
COBALT	25.9	17.9	18.5	NA	NA	NA	NA
COPPER	63.0	46.0	127 α	NA	NA	NA	NA
IRON	39,200	28,100	25,600	NA	NA	NA	NA
LEAD	26.0 α	23.9 α	53.8 α	NA	NA	NA	NA
MAGNESIUM	35,100	26,400	17,000	NA	NA	NA	NA
MANGANESE	932 *	789 *	936 *	NA	NA	NA	NA
MERCURY	0.20	0.20	0.20	NA	NA	NA	NA
MOLYBDENUM	ND (0.60)	ND (0.61)	ND (0.61)	NA	NA	NA	NA
NICKEL	235 *	205 *	135	NA	NA	NA	NA
POTASSIUM	1,630	2,010	1,670	NA	NA	NA	NA
SELENIUM	ND (0.47)	ND (0.48)	ND (0.48)	NA	NA	NA	NA
SILVER	ND (0.24)	ND (0.24)	ND (0.24)	NA	NA	NA	NA
SODIUM	744	642	1,400	NA	NA	NA	NA
VANADIUM	94.3	69.9	67.2	NA	NA	NA	NA
ZINC	112 α	90.0	259 α	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
1,2-DICHLOROPROPANE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
2-BUTANONE	ND (11)	ND (11)	ND (11)	NA	NA	NA	NA
2-HEXANONE	ND (11)	ND (11)	ND (11)	NA	NA	NA	NA
ACETONE	ND (11)	ND (19)	ND (11)	NA	NA	NA	NA
BENZENE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
CARBON DISULFIDE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
CHLOROBENZENE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
CHLOROFORM	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
ETHYLBENZENE	ND (5)	1	ND (6)	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035	IR08B035
Sampling Depth (feet bgs)	1.75	3.25	5.75	9.25	13.25	16.25	19.25
Sample Number	9015H113	9015H114	9015H115	9015H116	9015H117	9015H118	9015H119
Sample Date	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (7)	ND (12)	ND (9)	NA	NA	NA	NA
TETRACHLOROETHENE	ND (5)	ND (5)	1	NA	NA	NA	NA
TOLUENE	ND (5)	2	3	NA	NA	NA	NA
TRICHLOROETHENE	ND (5)	ND (5)	ND (6)	NA	NA	NA	NA
XYLENE (TOTAL)	ND (5)	14	ND (6)	NA	NA	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
1,2-DICHLOROBENZENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
1,3-DICHLOROBENZENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
1,4-DICHLOROBENZENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
2-METHYLNAPHTHALENE	ND (350)	160	ND (720)	NA	NA	NA	NA
ACENAPHTHYLENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
ANTHRACENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
BENZO(A)ANTHRACENE	71	88	ND (720)	NA	NA	NA	NA
BENZO(A)PYRENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	130	130	ND (720)	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
CHRYSENE	59	240	370	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
DIBENZOFURAN	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
DIETHYLPHTHALATE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
FLUORANTHENE	ND (350)	150	ND (720)	NA	NA	NA	NA
FLUORENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
NAPHTHALENE	ND (350)	ND (360)	ND (720)	NA	NA	NA	NA
PHENANTHRENE	53	350	ND (720)	NA	NA	NA	NA
PYRENE	38	170	140	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (170)	3,000 *	74	17	280	9	8
4,4'-DDE	ND (170)	2,400 *	28	34	220	8	7
4,4'-DDT	ND (170)	430	210	ND (92)	NA	ND (22)	3

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088035	IR088035	IR088035	IR088035	IR088035	IR088035	IR088035
Sampling Depth (feet bgs)	1.75	3.25	5.75	9.25	13.25	16.25	19.25
Sample Number	9015H113	9015H114	9015H115	9015H116	9015H117	9015H118	9015H119
Sample Date	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90	04/13/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (85)	ND (13,000)	ND (4,400)	ND (460)	ND (990)	ND (110)	ND (98)
ENDOSULFAN I	ND (9)	ND (1,300)	ND (440)	ND (46)	ND (99)	ND (11)	ND (10)
ENDRIN KETONE	ND (170)	ND (2,600)	ND (1,800)	ND (92)	ND (200)	ND (22)	ND (20)
GAMMA-CHLORDANE	ND (85)	ND (13,000)	ND (4,400)	ND (460)	ND (990)	ND (110)	ND (98)
AROCLOR-1260	430 *#	ND (26,000)	ND (8,800)	ND (920)	ND (2,000)	ND (220)	ND (200)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	71	23	NA	NA	NA	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	760	6,700	4,400	NA	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	93.6	92.4	91.2	NA	NA	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B035	IR08B035	IR08B043	IR08B043	IR08B044	IR08B044	IR08B044
Sampling Depth (feet bgs)	22.25	25.25	0.25	9.25	2.25	3.25	7.25
Sample Number	9015H120	9015H121	9148M412	9148M413	9137M166	9137M167	9137M168
Sample Date	04/13/90	04/13/90	11/26/91	11/26/91	09/10/91	09/10/91	09/10/91
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA
CALCIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM VI	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA
IRON	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA
POTASSIUM	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA
SODIUM	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B035	IR08B035	IR08B043	IR08B043	IR08B044	IR08B044	IR08B044
Sampling Depth (feet bgs)	22.25	25.25	0.25	9.25	2.25	3.25	7.25
Sample Number	9015H120	9015H121	9148M412	9148M413	9137M166	9137M167	9137M168
Sample Date	04/13/90	04/13/90	11/26/91	11/26/91	09/10/91	09/10/91	09/10/91
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
XYLENE (TOTAL)	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	NA
DIETHYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
FLUORENE	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA
PYRENE	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	2	1	ND (17)	ND (17)	ND (16)	ND (17)	ND (20)
4,4'-DDE	2	1	ND (17)	ND (17)	ND (16)	ND (17)	ND (20)
4,4'-DDT	ND (20)	ND (19)	ND (17)	ND (17)	ND (16)	ND (17)	ND (20)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B035	IR08B035	IR08B043	IR08B043	IR08B044	IR08B044	IR08B044
Sampling Depth (feet bgs)	22.25	25.25	0.25	9.25	2.25	3.25	7.25
Sample Number	9015H120	9015H121	9148M412	9148M413	9137M166	9137M167	9137M168
Sample Date	04/13/90	04/13/90	11/26/91	11/26/91	09/10/91	09/10/91	09/10/91
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (100)	ND (94)	ND (84)	ND (85)	ND (82)	ND (83)	ND (99)
ENDOSULFAN I	ND (10)	ND (9)	ND (8)	ND (9)	ND (8)	ND (8)	ND (10)
ENDRIN KETONE	ND (20)	ND (19)	ND (17)	ND (17)	ND (16)	ND (17)	ND (20)
GAMMA-CHLORDANE	ND (100)	ND (94)	ND (84)	ND (85)	ND (82)	ND (83)	ND (99)
AROCLOR-1260	ND (200)	ND (190)	ND (170)	ND (170)	ND (160)	ND (170)	ND (200)
TPH-Extractable (mg/kg)							
TPH-DIESEL	NA	NA	NA	NA	NA	NA	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	ND (21)	ND (21)	ND (25)
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	ND (50)	ND (50)	ND (51)	ND (52)	ND (62)
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	NA	NA	6.2	9.1	8.6	8.5	8.3

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B044	IR08B045	IR08B045	IR08B045	IR08B046	IR08B046	IR08B046
Sampling Depth (feet bgs)	10.25	2.25	4.25	7.25	1.75	3.75	7.25
Sample Number	9137M169	9137M176	9137M177	9137M178	9137M173	9137M174	9137M175
Sample Date	09/10/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA
CALCIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM VI	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA
IRON	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA
POTASSIUM	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA
SODIUM	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
1,2-DICHLOROPROPANE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
2-BUTANONE	NA	NA	NA	NA	ND (10)	ND (11)	ND (11)
2-HEXANONE	NA	NA	NA	NA	ND (10)	ND (11)	ND (11)
ACETONE	NA	NA	NA	NA	ND (3)	7	ND (11)
BENZENE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
CARBON DISULFIDE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
CHLOROBENZENE	NA	NA	NA	NA	ND (5)	3	ND (6)
CHLOROFORM	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
ETHYLBENZENE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B044	IR08B045	IR08B045	IR08B045	IR08B046	IR08B046	IR08B046
Sampling Depth (feet bgs)	10.25	2.25	4.25	7.25	1.75	3.75	7.25
Sample Number	9137M169	9137M176	9137M177	9137M178	9137M173	9137M174	9137M175
Sample Date	09/10/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
TETRACHLOROETHENE	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
TOLUENE	NA	NA	NA	NA	ND (5)	3	ND (6)
TRICHLOROETHENE	NA	NA	NA	NA	ND (5)	1	ND (6)
XYLENE (TOTAL)	NA	NA	NA	NA	ND (5)	ND (6)	ND (6)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	NA
DIETHYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
FLUORENE	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA
PYRENE	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (19)	NA	NA	NA	NA	NA	NA
4,4'-DDE	ND (19)	NA	NA	NA	NA	NA	NA
4,4'-DDT	ND (19)	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B044	IR08B045	IR08B045	IR08B045	IR08B046	IR08B046	IR08B046
Sampling Depth (feet bgs)	10.25	2.25	4.25	7.25	1.75	3.75	7.25
Sample Number	9137M169	9137M176	9137M177	9137M178	9137M173	9137M174	9137M175
Sample Date	09/10/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91	09/11/91
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (93)	NA	NA	NA	NA	NA	NA
ENDOSULFAN I	ND (9)	NA	NA	NA	NA	NA	NA
ENDRIN KETONE	ND (19)	NA	NA	NA	NA	NA	NA
GAMMA-CHLORDANE	ND (93)	NA	NA	NA	NA	NA	NA
AROCLOR-1260	ND (190)	NA	NA	NA	NA	NA	NA
TPH-Extractable (mg/kg)							
TPH-DIESEL	NA	NA	NA	NA	NA	NA	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	74	4,400	ND (22)	ND (23)	ND (21)	ND (23)	ND (22)
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	160	7,400	ND (76)	ND (60)	ND (110)	ND (120)	ND (110)
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	8.7	8.3	8.2	8.5	9.1	8.7	8.8

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B047	IR08B047	IR08B048	IR08B048	IR08B048	IR08B049	IR08B049
Sampling Depth (feet bgs)	2.25	4.25	1.75	4.25	7.25	2.25	4.25
Sample Number	9137M171	9137M172	9137H868	9137H869	9137H870	9137H864	9137H865
Sample Date	09/11/91	09/11/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA
CALCIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM VI	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA
IRON	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA
POTASSIUM	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA
SODIUM	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B047	IR08B047	IR08B048	IR08B048	IR08B048	IR08B049	IR08B049
Sampling Depth (feet bgs)	2.25	4.25	1.75	4.25	7.25	2.25	4.25
Sample Number	9137H171	9137H172	9137H868	9137H869	9137H870	9137H864	9137H865
Sample Date	09/11/91	09/11/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
XYLENE (TOTAL)	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	NA
DIETHYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
FLUORENE	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA
PYRENE	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B047	IR08B047	IR08B048	IR08B048	IR08B048	IR08B049	IR08B049
Sampling Depth (feet bgs)	2.25	4.25	1.75	4.25	7.25	2.25	4.25
Sample Number	9137H171	9137H172	9137H868	9137H869	9137H870	9137H864	9137H865
Sample Date	09/11/91	09/11/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	NA	NA	NA	NA	NA	NA
ENDOSULFAN I	NA	NA	NA	NA	NA	NA	NA
ENDRIN KETONE	NA	NA	NA	NA	NA	NA	NA
GAMMA-CHLORDANE	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1260	NA	NA	NA	NA	NA	NA	NA
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (10)	NA	NA	NA	ND (11)	ND (11)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	ND (11)	ND (10)	NA	NA	NA	ND (11)	ND (11)
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (22)	ND (21)	ND (21)	ND (23)	ND (24)	ND (22)	96
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	56	ND (130)	58	ND (57)	ND (60)	130	57
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	8.0	8.9	8.5	8.5	8.1	8.4	8.0

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B050	IR08B050	IR08B050	IR08B051	IR08B051	IR08B052
Sampling Depth (feet bgs)	7.25	2.25	4.25	6.75	1.25	7.25	0.75
Sample Number	9137M866	9137M157	9137M158	9137M159	9148M410	9148M411	9542J474
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	11/26/91	11/26/91	10/16/95
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	NA	NA
ANTIMONY	NA	NA	NA	NA	NA	NA	NA
ARSENIC	NA	NA	NA	NA	NA	NA	NA
BARIUM	NA	NA	NA	NA	NA	NA	NA
BERYLLIUM	NA	NA	NA	NA	NA	NA	NA
CADMIUM	NA	NA	NA	NA	NA	NA	NA
CALCIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM	NA	NA	NA	NA	NA	NA	NA
CHROMIUM VI	NA	NA	NA	NA	NA	NA	NA
COBALT	NA	NA	NA	NA	NA	NA	NA
COPPER	NA	NA	NA	NA	NA	NA	NA
IRON	NA	NA	NA	NA	NA	NA	NA
LEAD	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	NA	NA	NA	NA	NA	NA	NA
MANGANESE	NA	NA	NA	NA	NA	NA	NA
MERCURY	NA	NA	NA	NA	NA	NA	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	NA	NA
POTASSIUM	NA	NA	NA	NA	NA	NA	NA
SELENIUM	NA	NA	NA	NA	NA	NA	NA
SILVER	NA	NA	NA	NA	NA	NA	NA
SODIUM	NA	NA	NA	NA	NA	NA	NA
VANADIUM	NA	NA	NA	NA	NA	NA	NA
ZINC	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	NA	NA
2-BUTANONE	NA	NA	NA	NA	NA	NA	NA
2-HEXANONE	NA	NA	NA	NA	NA	NA	NA
ACETONE	NA	NA	NA	NA	NA	NA	NA
BENZENE	NA	NA	NA	NA	NA	NA	NA
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	NA
CHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
CHLOROFORM	NA	NA	NA	NA	NA	NA	NA
ETHYLBENZENE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B050	IR08B050	IR08B050	IR08B051	IR08B051	IR08B052
Sampling Depth (feet bgs)	7.25	2.25	4.25	6.75	1.25	7.25	0.75
Sample Number	9137H866	9137M157	9137M158	9137M159	9148M410	9148M411	9542J474
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	11/26/91	11/26/91	10/16/95
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
TOLUENE	NA	NA	NA	NA	NA	NA	NA
TRICHLOROETHENE	NA	NA	NA	NA	NA	NA	NA
XYLENE (TOTAL)	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	NA	NA	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
ACENAPHTHYLENE	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	NA
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
CHRYSENE	NA	NA	NA	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	NA
DIETHYLPHTHALATE	NA	NA	NA	NA	NA	NA	NA
FLUORANTHENE	NA	NA	NA	NA	NA	NA	NA
FLUORENE	NA	NA	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	NA
NAPHTHALENE	NA	NA	NA	NA	NA	NA	NA
PHENANTHRENE	NA	NA	NA	NA	NA	NA	NA
PYRENE	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	ND (18)	ND (19)	ND (17)
4,4'-DDE	NA	NA	NA	NA	ND (18)	ND (19)	ND (17)
4,4'-DDT	NA	NA	NA	NA	ND (18)	ND (19)	ND (17)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B050	IR08B050	IR08B050	IR08B051	IR08B051	IR08B052
Sampling Depth (feet bgs)	7.25	2.25	4.25	6.75	1.25	7.25	0.75
Sample Number	9137M866	9137M157	9137M158	9137M159	9148M410	9148M411	9542J474
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	11/26/91	11/26/91	10/16/95
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	NA	NA	NA	NA	ND (88)	ND (93)	ND (9)
ENDOSULFAN I	NA	NA	NA	NA	ND (9)	ND (9)	10
ENDRIN KETONE	NA	NA	NA	NA	ND (18)	ND (19)	ND (17)
GAMMA-CHLORDANE	NA	NA	NA	NA	ND (88)	ND (93)	ND (9)
AROCLOR-1260	NA	NA	NA	NA	ND (180)	ND (190)	980 *#
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (10)	ND (12)	ND (11)	NA	NA	50
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	ND (11)	46	ND (12)	ND (11)	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	520
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (22)	560	ND (23)	ND (22)	NA	NA	2,600
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	ND (56)	420	63	ND (54)	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	NA	NA	NA	96.1
pH (pH units)							
PH	8.9	8.2	7.6	9.1	8.2	8.5	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B052	IR08B052	IR08B052	IR08B052	IR08B052	IR08MW37A	IR08MW37A
Sampling Depth (feet bgs)	6.25	11.25	16.25	21.25	26.25	1.25	3.25
Sample Number	9542J475	9542J479	9542J480	9542J481	9542J482	9017H207	9017H208
Sample Date	10/16/95	10/16/95	10/16/95	10/16/95	10/16/95	04/27/90	04/27/90
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	19,200	26,700
ANTIMONY	NA	NA	NA	NA	NA	ND (4.2)	ND (4.5)
ARSENIC	NA	NA	NA	NA	NA	8.5 *#	3.0 *#
BARIUM	NA	NA	NA	NA	NA	38.7	252
BERYLLIUM	NA	NA	NA	NA	NA	ND (0.58)	ND (0.29)
CADMIUM	NA	NA	NA	NA	NA	ND (0.77)	ND (0.82)
CALCIUM	NA	NA	NA	NA	NA	7,260	22,300
CHROMIUM	NA	NA	NA	NA	NA	47.5	152
CHROMIUM VI	NA	NA	NA	NA	NA	ND (0.05)	ND (0.06)
COBALT	NA	NA	NA	NA	NA	14.8	29.6
COPPER	NA	NA	NA	NA	NA	42.6	105
IRON	NA	NA	NA	NA	NA	35,100	42,000
LEAD	NA	NA	NA	NA	NA	4.3	19.9 α
MAGNESIUM	NA	NA	NA	NA	NA	13,100	28,900
MANGANESE	NA	NA	NA	NA	NA	753 *	1,630 *α
MERCURY	NA	NA	NA	NA	NA	ND (0.10)	0.20
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	NA	NA	NA	NA	NA	56.5	195 *
POTASSIUM	NA	NA	NA	NA	NA	1,040	1,350
SELENIUM	NA	NA	NA	NA	NA	ND (0.46)	ND (0.49)
SILVER	NA	NA	NA	NA	NA	ND (0.23)	ND (0.80)
SODIUM	NA	NA	NA	NA	NA	234	1,370
VANADIUM	NA	NA	NA	NA	NA	57.9	98.8
ZINC	NA	NA	NA	NA	NA	48.0	131 α
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	NA	NA	NA	NA	NA	ND (5)	ND (6)
1,2-DICHLOROPROPANE	NA	NA	NA	NA	NA	ND (5)	ND (6)
2-BUTANONE	NA	NA	NA	NA	NA	ND (10)	ND (11)
2-HEXANONE	NA	NA	NA	NA	NA	ND (10)	ND (11)
ACETONE	NA	NA	NA	NA	NA	ND (39)	ND (11)
BENZENE	NA	NA	NA	NA	NA	ND (5)	ND (6)
CARBON DISULFIDE	NA	NA	NA	NA	NA	ND (5)	ND (6)
CHLOROBENZENE	NA	NA	NA	NA	NA	ND (5)	ND (6)
CHLOROFORM	NA	NA	NA	NA	NA	ND (5)	ND (6)
ETHYLBENZENE	NA	NA	NA	NA	NA	ND (5)	ND (6)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B052	IR08B052	IR08B052	IR08B052	IR08B052	IR08MW37A	IR08MW37A
Sampling Depth (feet bgs)	6.25	11.25	16.25	21.25	26.25	1.25	3.25
Sample Number	9542J475	9542J479	9542J480	9542J481	9542J482	9017H207	9017H208
Sample Date	10/16/95	10/16/95	10/16/95	10/16/95	10/16/95	04/27/90	04/27/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	NA	NA	NA	NA	NA	ND (5)	ND (6)
TETRACHLOROETHENE	NA	NA	NA	NA	NA	ND (5)	ND (6)
TOLUENE	NA	NA	NA	NA	NA	ND (5)	ND (6)
TRICHLOROETHENE	NA	NA	NA	NA	NA	ND (5)	ND (6)
XYLENE (TOTAL)	NA	NA	NA	NA	NA	ND (5)	ND (6)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
1,2-DICHLOROBENZENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
1,3-DICHLOROBENZENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
1,4-DICHLOROBENZENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	99	ND (370)
ACENAPHTHYLENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
ANTHRACENE	NA	NA	NA	NA	NA	ND (690)	120
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
BENZO(A)PYRENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	ND (690)	ND (200)
BUTYLBENZYLPHTHALATE	NA	NA	NA	NA	NA	ND (690)	ND (370)
CHRYSENE	NA	NA	NA	NA	NA	220	100
DI-N-BUTYLPHTHALATE	NA	NA	NA	NA	NA	ND (690)	ND (370)
DIBENZOFURAN	NA	NA	NA	NA	NA	ND (690)	43
DIETHYLPHTHALATE	NA	NA	NA	NA	NA	ND (690)	ND (370)
FLUORANTHENE	NA	NA	NA	NA	NA	190	270
FLUORENE	NA	NA	NA	NA	NA	ND (690)	55
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
NAPHTHALENE	NA	NA	NA	NA	NA	ND (690)	ND (370)
PHENANTHRENE	NA	NA	NA	NA	NA	260	690
PYRENE	NA	NA	NA	NA	NA	150	210
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (4)	ND (4)	ND (4)	ND (4)	ND (5)	ND (170)	ND (88)
4,4'-DDE	ND (4)	ND (4)	ND (4)	ND (4)	ND (5)	ND (170)	ND (18)
4,4'-DDT	ND (4)	ND (4)	ND (4)	ND (4)	ND (5)	ND (170)	16

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B052	IR08B052	IR08B052	IR08B052	IR08B052	IR08MW37A	IR08MW37A
Sampling Depth (feet bgs)	6.25	11.25	16.25	21.25	26.25	1.25	3.25
Sample Number	9542J475	9542J479	9542J480	9542J481	9542J482	9017H207	9017H208
Sample Date	10/16/95	10/16/95	10/16/95	10/16/95	10/16/95	04/27/90	04/27/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (830)	ND (88)
ENDOSULFAN I	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (83)	ND (9)
ENDRIN KETONE	ND (4)	ND (4)	ND (4)	ND (4)	ND (5)	ND (170)	ND (88)
GAMMA-CHLORDANE	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (830)	ND (88)
AROCLOR-1260	ND (35)	ND (36)	ND (42)	ND (40)	ND (46)	ND (1,700)	ND (880)
TPH-Extractable (mg/kg)							
TPH-DIESEL	6	ND (11)	ND (13)	ND (12)	ND (14)	390	18
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	30	ND (11)	11	ND (12)	40	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	70	ND (11)	ND (13)	ND (12)	ND (14)	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	6,200	500
Percent Moisture (%)							
% SOLIDS	96.1	92.9	79.8	82.8	72.7	96.0	90.2
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW38A	IR08MW38A	IR08MW38A	IR08MW39A	IR08MW39A	IR08MW41A
Sampling Depth (feet bgs)	5.25	3.25	5.75	2.25	2.12	3.75	1.25
Sample Number	9017H209	9027E114	9027E115	9027E123	9027H263	9027H264	9019H217
Sample Date	04/27/90	07/03/90	07/03/90	07/03/90	07/02/90	07/02/90	05/10/90
Metal (mg/kg)							
ALUMINUM	12,000	16,300	16,800	16,500	14,000	19,300	18,200
ANTIMONY	ND (4.8)	ND (4.4)	ND (4.4)	ND (4.4)	ND (4.1)	ND (4.2)	ND (4.2)
ARSENIC	4.5 *#	4.6 *#	1.7 *	3.3 *#	2.5 *#	2.6 *#	5.4 *#
BARIUM	67.7	128	166	149	290	113	147
BERYLLIUM	ND (0.13)	0.38 *	0.40 *	0.44 *	0.37 *	0.27 *	ND (0.39)
CADMIUM	ND (0.88)	ND (0.82)	ND (0.82)	ND (0.82)	ND (0.76)	ND (0.78)	ND (0.79)
CALCIUM	8,050	3,930	2,110	3,940	1,760	2,400	19,800
CHROMIUM	202	18.4	38.1	23.2	41.6	40.3	144
CHROMIUM VI	ND (0.06)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
COBALT	27.7	9.3	14.0	14.3	13.1	6.7	22.7
COPPER	28.6	30.0	35.0	41.2	38.2	34.3	82.4
IRON	24,300	23,700	17,900	23,900	18,200	21,200	30,600
LEAD	7.2	4.3	6.1	4.6	3.4	8.1	19.7 *
MAGNESIUM	42,700	4,040	2,260	4,430	2,800	4,370	29,600
MANGANESE	527 *	343	705 *	366	552 *	128	823 *
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	0.20
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	386 *	21.7	25.1	24.2	27.6	22.8	227 *
POTASSIUM	900	1,500	680	1,530	546	772	1,240
SELENIUM	ND (0.52)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.45)	ND (0.46)	ND (0.47)
SILVER	ND (0.26)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.23)	ND (0.23)	ND (0.67)
SODIUM	1,070	543	91.2	577	318	315	654
VANADIUM	43.9	52.8	50.1	57.4	46.7	48.4	56.9
ZINC	37.6	58.2	39.4	55.1	36.4	44.6	76.3
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
1,2-DICHLOROPROPANE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
2-BUTANONE	ND (12)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (11)
2-HEXANONE	ND (12)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (11)
ACETONE	ND (12)	ND (16)	ND (17)	ND (12)	ND (10)	ND (15)	ND (11)
BENZENE	ND (6)	2	5	ND (5)	ND (5)	ND (5)	ND (5)
CARBON DISULFIDE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
CHLOROBENZENE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
CHLOROFORM	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
ETHYLBENZENE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW38A	IR08MW38A	IR08MW38A	IR08MW39A	IR08MW39A	IR08MW41A
Sampling Depth (feet bgs)	5.25	3.25	5.75	2.25	2.12	3.75	1.25
Sample Number	9017H209	9027E114	9027E115	9027E123	9027H263	9027H264	9019H217
Sample Date	04/27/90	07/03/90	07/03/90	07/03/90	07/02/90	07/02/90	05/10/90
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (3)	ND (5)	ND (9)	ND (7)	ND (6)	ND (4)	ND (5)
TETRACHLOROETHENE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
TOLUENE	ND (6)	2	6	2	ND (5)	ND (5)	22
TRICHLOROETHENE	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
XYLENE (TOTAL)	ND (6)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
1,2-DICHLOROBENZENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
1,3-DICHLOROBENZENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
1,4-DICHLOROBENZENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
2-METHYLNAPHTHALENE	ND (790)	110	93	110	ND (330)	ND (330)	42
ACENAPHTHYLENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
ANTHRACENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	240
BENZO(A)ANTHRACENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	410
BENZO(A)PYRENE	ND (790)	ND (330)	ND (330)	48	ND (330)	ND (330)	160 *
BENZO(B)FLUORANTHENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	340
BENZO(G,H,I)PERYLENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	53
BENZO(K)FLUORANTHENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	250
BIS(2-ETHYLHEXYL)PHTHALATE	ND (82)	ND (120)	ND (230)	ND (120)	ND (330)	ND (66)	ND (140)
BUTYLBENZYLPHTHALATE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	92
CHRYSENE	ND (790)	65	83	82	ND (330)	ND (330)	580
DI-N-BUTYLPHTHALATE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	140
DIBENZOFURAN	ND (790)	120	86	72	ND (330)	ND (330)	34
DIETHYLPHTHALATE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	ND (350)
FLUORANTHENE	190	36	ND (330)	63	ND (330)	ND (330)	1,100
FLUORENE	ND (790)	65	56	ND (330)	ND (330)	ND (330)	50
INDENO(1,2,3-CD)PYRENE	ND (790)	ND (330)	ND (330)	ND (330)	ND (330)	ND (330)	42
NAPHTHALENE	ND (790)	ND (330)	70	93	ND (330)	ND (330)	ND (350)
PHENANTHRENE	330	170	110	150	ND (330)	ND (330)	340
PYRENE	120	46	42	68	ND (330)	ND (330)	730
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (19)	NA	NA	NA	NA	NA	ND (170)
4,4'-DDE	ND (19)	NA	NA	NA	NA	NA	ND (170)
4,4'-DDT	ND (19)	NA	NA	NA	NA	NA	ND (170)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW38A	IR08MW38A	IR08MW38A	IR08MW39A	IR08MW39A	IR08MW41A
Sampling Depth (feet bgs)	5.25	3.25	5.75	2.25	2.12	3.75	1.25
Sample Number	9017H209	9027E114	9027E115	9027E123	9027H263	9027H264	9019H217
Sample Date	04/27/90	07/03/90	07/03/90	07/03/90	07/02/90	07/02/90	05/10/90
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (95)	NA	NA	NA	NA	NA	ND (840)
ENDOSULFAN I	ND (10)	NA	NA	NA	NA	NA	ND (84)
ENDRIN KETONE	ND (19)	NA	NA	NA	NA	NA	ND (170)
GAMMA-CHLORDANE	ND (95)	NA	NA	NA	NA	NA	ND (840)
AROCLOR-1260	ND (190)	360 *#	ND (50)	220 *	ND (50)	ND (50)	ND (1,700)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (12)	21	ND (11)	ND (11)	ND (10)	ND (11)	100
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	370	1,400	410	4,100	76	72	3,800
Percent Moisture (%)							
% SOLIDS	83.9	NA	NA	NA	NA	NA	94.2
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW41A	IR08MW41A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A
Sampling Depth (feet bgs)	3.75	6.25	1.75	6.25	11.25	16.25	18.75
Sample Number	9019H218	9019H219	9137M160	9137M161	9137M162	9137M163	9137M164
Sample Date	05/10/90	05/10/90	09/10/91	09/10/91	09/10/91	09/10/91	09/10/91
Metal (mg/kg)							
ALUMINUM	39,000	45,300	NA	NA	NA	NA	NA
ANTIMONY	ND (4.3)	ND (4.2)	NA	NA	NA	NA	NA
ARSENIC	3.9 *#	2.0 *	NA	NA	NA	NA	NA
BARIUM	124	197	NA	NA	NA	NA	NA
BERYLLIUM	ND (0.27)	ND (0.29)	NA	NA	NA	NA	NA
CADMIUM	ND (0.80)	ND (0.79)	NA	NA	NA	NA	NA
CALCIUM	26,700	33,600	NA	NA	NA	NA	NA
CHROMIUM	229 *	179	NA	NA	NA	NA	NA
CHROMIUM VI	ND (0.05)	ND (0.05)	NA	NA	NA	NA	NA
COBALT	37.5	37.6	NA	NA	NA	NA	NA
COPPER	74.8	82.4	NA	NA	NA	NA	NA
IRON	50,900	53,900	NA	NA	NA	NA	NA
LEAD	12.9 #	2.1	NA	NA	NA	NA	NA
MAGNESIUM	37,300	47,600	NA	NA	NA	NA	NA
MANGANESE	1,130 *	942 *	NA	NA	NA	NA	NA
MERCURY	ND (0.10)	ND (0.10)	NA	NA	NA	NA	NA
MOLYBDENUM	NA	NA	NA	NA	NA	NA	NA
NICKEL	249 *	149	NA	NA	NA	NA	NA
POTASSIUM	1,150	895	NA	NA	NA	NA	NA
SELENIUM	ND (0.48)	ND (0.47)	NA	NA	NA	NA	NA
SILVER	ND (0.96)	ND (34.8)	NA	NA	NA	NA	NA
SODIUM	629	738	NA	NA	NA	NA	NA
VANADIUM	133 #	129 #	NA	NA	NA	NA	NA
ZINC	89.0	73.6	NA	NA	NA	NA	NA
Volatile Organic Compound (ug/kg)							
1,1,1-TRICHLOROETHANE	1	ND (5)	NA	NA	NA	NA	NA
1,2-DICHLOROPROPANE	ND (5)	ND (5)	NA	NA	NA	NA	NA
2-BUTANONE	ND (11)	ND (11)	NA	NA	NA	NA	NA
2-HEXANONE	ND (11)	ND (11)	NA	NA	NA	NA	NA
ACETONE	ND (11)	ND (11)	NA	NA	NA	NA	NA
BENZENE	ND (5)	ND (5)	NA	NA	NA	NA	NA
CARBON DISULFIDE	ND (5)	ND (5)	NA	NA	NA	NA	NA
CHLOROBENZENE	ND (5)	ND (5)	NA	NA	NA	NA	NA
CHLOROFORM	ND (5)	ND (5)	NA	NA	NA	NA	NA
ETHYLBENZENE	ND (5)	ND (5)	NA	NA	NA	NA	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW41A	IR08MW41A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A
Sampling Depth (feet bgs)	3.75	6.25	1.75	6.25	11.25	16.25	18.75
Sample Number	9019H218	9019H219	9137M160	9137M161	9137M162	9137M163	9137M164
Sample Date	05/10/90	05/10/90	09/10/91	09/10/91	09/10/91	09/10/91	09/10/91
Volatile Organic Compound (ug/kg)							
METHYLENE CHLORIDE	ND (5)	ND (5)	NA	NA	NA	NA	NA
TETRACHLOROETHENE	ND (5)	ND (5)	NA	NA	NA	NA	NA
TOLUENE	4	23	NA	NA	NA	NA	NA
TRICHLOROETHENE	ND (5)	ND (5)	NA	NA	NA	NA	NA
XYLENE (TOTAL)	ND (5)	ND (5)	NA	NA	NA	NA	NA
Semivolatile Organic Compound (ug/kg)							
1,2,4-TRICHLOROBENZENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
2-METHYLNAPHTHALENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
ACENAPHTHYLENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
ANTHRACENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
BENZO(A)ANTHRACENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
BENZO(A)PYRENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
BENZO(B)FLUORANTHENE	97	ND (350)	NA	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
BENZO(K)FLUORANTHENE	52	ND (350)	NA	NA	NA	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (110)	ND (230)	NA	NA	NA	NA	NA
BUTYLBENZYLPHTHALATE	280	ND (350)	NA	NA	NA	NA	NA
CHRYSENE	86	ND (350)	NA	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE	130	ND (350)	NA	NA	NA	NA	NA
DIBENZOFURAN	ND (350)	ND (350)	NA	NA	NA	NA	NA
DIETHYLPHTHALATE	ND (350)	38	NA	NA	NA	NA	NA
FLUORANTHENE	63	ND (350)	NA	NA	NA	NA	NA
FLUORENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
NAPHTHALENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
PHENANTHRENE	ND (350)	ND (350)	NA	NA	NA	NA	NA
PYRENE	85	ND (350)	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (17)	ND (17)	ND (17)	ND (90)	ND (19)	ND (190)	ND (190)
4,4'-DDE	ND (17)	ND (17)	ND (17)	ND (90)	ND (19)	ND (190)	ND (190)
4,4'-DDT	ND (17)	ND (17)	ND (17)	ND (90)	ND (19)	ND (190)	ND (190)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW41A	IR08MW41A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A	IR08MW42A
Sampling Depth (feet bgs)	3.75	6.25	1.75	6.25	11.25	16.25	18.75
Sample Number	9019H218	9019H219	9137M160	9137M161	9137M162	9137M163	9137M164
Sample Date	05/10/90	05/10/90	09/10/91	09/10/91	09/10/91	09/10/91	09/10/91
Pesticide/Polychlorinated Biphenyl (ug/kg)							
ALPHA-CHLORDANE	ND (85)	ND (84)	ND (86)	ND (450)	ND (95)	ND (940)	ND (950)
ENDOSULFAN I	ND (9)	ND (8)	ND (9)	ND (45)	ND (10)	ND (94)	ND (95)
ENDRIN KETONE	ND (17)	ND (17)	ND (17)	ND (90)	ND (19)	ND (190)	ND (190)
GAMMA-CHLORDANE	ND (85)	ND (84)	ND (86)	ND (450)	ND (95)	ND (940)	ND (950)
AROCLOR-1260	ND (170)	ND (170)	ND (170)	220 *	82 *	7,200 *#	2,800 *#
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (11)	NA	NA	NA	NA	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	940	110	NA	NA	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	92.4	94.2	NA	NA	NA	NA	NA
pH (pH units)							
PH	NA	NA	8.2	8.4	8.7	8.5	8.6

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW42A
Sampling Depth (feet bgs)	24.25
Sample Number	9137M165
Sample Date	09/10/91
Metal (mg/kg)	
ALUMINUM	NA
ANTIMONY	NA
ARSENIC	NA
BARIUM	NA
BERYLLIUM	NA
CADMIUM	NA
CALCIUM	NA
CHROMIUM	NA
CHROMIUM VI	NA
COBALT	NA
COPPER	NA
IRON	NA
LEAD	NA
MAGNESIUM	NA
MANGANESE	NA
MERCURY	NA
MOLYBDENUM	NA
NICKEL	NA
POTASSIUM	NA
SELENIUM	NA
SILVER	NA
SODIUM	NA
VANADIUM	NA
ZINC	NA
Volatile Organic Compound (ug/kg)	
1,1,1-TRICHLOROETHANE	NA
1,2-DICHLOROPROPANE	NA
2-BUTANONE	NA
2-HEXANONE	NA
ACETONE	NA
BENZENE	NA
CARBON DISULFIDE	NA
CHLOROBENZENE	NA
CHLOROFORM	NA
ETHYLBENZENE	NA

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW42A
Sampling Depth (feet bgs)	24.25
Sample Number	9137M165
Sample Date	09/10/91
Volatile Organic Compound (ug/kg)	
METHYLENE CHLORIDE	NA
TETRACHLOROETHENE	NA
TOLUENE	NA
TRICHLOROETHENE	NA
XYLENE (TOTAL)	NA
Semivolatile Organic Compound (ug/kg)	
1,2,4-TRICHLOROBENZENE	NA
1,2-DICHLOROBENZENE	NA
1,3-DICHLOROBENZENE	NA
1,4-DICHLOROBENZENE	NA
2-METHYLNAPHTHALENE	NA
ACENAPHTHYLENE	NA
ANTHRACENE	NA
BENZO(A)ANTHRACENE	NA
BENZO(A)PYRENE	NA
BENZO(B)FLUORANTHENE	NA
BENZO(G,H,I)PERYLENE	NA
BENZO(K)FLUORANTHENE	NA
BIS(2-ETHYLHEXYL)PHTHALATE	NA
BUTYLBENZYLPHTHALATE	NA
CHRYSENE	NA
DI-N-BUTYLPHTHALATE	NA
DIBENZOFURAN	NA
DIETHYLPHTHALATE	NA
FLUORANTHENE	NA
FLUORENE	NA
INDENO(1,2,3-CD)PYRENE	NA
NAPHTHALENE	NA
PHENANTHRENE	NA
PYRENE	NA
Pesticide/Polychlorinated Biphenyl (ug/kg)	
4,4'-DDD	ND (20)
4,4'-DDE	ND (20)
4,4'-DDT	ND (20)

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW42A
Sampling Depth (feet bgs)	24.25
Sample Number	9137M165
Sample Date	09/10/91
Pesticide/Polychlorinated Biphenyl (ug/kg)	
ALPHA-CHLORDANE	ND (99)
ENDOSULFAN I	ND (10)
ENDRIN KETONE	ND (20)
GAMMA-CHLORDANE	ND (99)
AROCLOR-1260	ND (200)
TPH-Extractable (mg/kg)	
TPH-DIESEL	NA
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA
TPH-MOTOR OIL	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)	
TRPH	NA
Oil and Grease (mg/kg)	
TOTAL OIL & GREASE	NA
Percent Moisture (%)	
% SOLIDS	NA
pH (pH units)	
PH	9.0

TABLE 4.2-3 (Continued)

SOIL ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.2-4

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08MW37A	9028H279	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW37A	9028H280	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW37A	9101J119										✓											
IR08MW37A	9101J120	✓				✓	✓		✓		✓				✓							✓
IR08MW37A	9101J121	✓				✓	✓		✓		✓				✓							✓
IR08MW37A	9128X091	✓		✓		✓	✓		✓		✓				✓				✓			✓
IR08MW37A	9128X092	✓		✓		✓	✓		✓		✓				✓							✓
IR08MW37A	9145B001													✓	✓							
IR08MW37A	9145B002													✓	✓							
IR08MW37A	9151X352	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW37A	9212X585													✓	✓							
IR08MW37A	9344X052						✓				✓					✓						✓
IR08MW37A	9405N295						✓				✓					✓						✓
IR08MW37A	9405N296						✓				✓					✓						✓
IR08MW37A	9419X278						✓				✓					✓						✓
IR08MW37A	9434M578						✓				✓					✓						✓
IR08MW38A	9028H273	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW38A	9101J122										✓											
IR08MW38A	9101J123	✓				✓	✓		✓		✓				✓							✓
IR08MW38A	9128X094	✓		✓		✓	✓		✓		✓				✓				✓			✓
IR08MW38A	9145B003													✓	✓							
IR08MW38A	9151X358	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW38A	9344X050						✓				✓					✓						✓
IR08MW38A	9344X051						✓				✓					✓						✓
IR08MW38A	9405N298						✓				✓					✓						✓
IR08MW38A	9419X277						✓				✓					✓						✓
IR08MW38A	9434M579						✓				✓					✓						✓
IR08MW39A	9028H274	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW39A	9101J125										✓											
IR08MW39A	9101J126	✓				✓	✓		✓		✓				✓							✓
IR08MW39A	9128X095	✓		✓		✓	✓		✓		✓				✓				✓			✓
IR08MW39A	9145B004													✓	✓							
IR08MW39A	9151X359	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW39A	9151X360	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW39A	9435E158						✓				✓					✓						✓
IR08MW40A	9028H276	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW40A	9028H277	✓		✓			✓				✓				✓	✓			✓	✓		✓

TABLE 4.2-4 (Continued)

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08MW40A	9101J127										✓											
IR08MW40A	9101J128	✓				✓	✓		✓		✓				✓							✓
IR08MW40A	9128X093	✓		✓		✓	✓		✓		✓				✓				✓			✓
IR08MW40A	9145B005													✓	✓							
IR08MW40A	9151X353	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW40A	9151X354	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW40A	9212X581													✓	✓							
IR08MW40A	9212X582													✓	✓							
IR08MW40A	9345X055						✓				✓					✓						✓
IR08MW40A	9345X056						✓				✓					✓						✓
IR08MW40A	9406X183						✓				✓					✓						✓
IR08MW40A	9419X287						✓				✓					✓						✓
IR08MW40A	9435E160						✓				✓					✓						✓
IR08MW41A	9028H281	✓		✓			✓				✓				✓	✓			✓	✓		✓
IR08MW41A	9101J129										✓											
IR08MW41A	9101J130	✓				✓	✓		✓		✓				✓							✓
IR08MW41A	9128X098	✓		✓		✓	✓		✓		✓				✓				✓			✓
IR08MW41A	9145B007													✓	✓							
IR08MW41A	9151X355	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW41A	9212X583													✓	✓							
IR08MW41A	9212X584													✓	✓							
IR08MW41A	9344X053						✓				✓					✓						✓
IR08MW41A	9406X181						✓				✓					✓						✓
IR08MW41A	9406X182						✓				✓					✓						✓
IR08MW41A	9419X286						✓				✓					✓						✓
IR08MW41A	9435E159						✓				✓					✓						✓
IR08MW42A	9141X203	✓				✓	✓		✓		✓				✓				✓	✓		✓
IR08MW42A	9141X204	✓				✓	✓		✓		✓				✓				✓	✓		✓
IR08MW42A	9151X362	✓				✓	✓		✓		✓				✓				✓			✓
IR08MW42A	9344X045						✓				✓					✓						✓
IR08MW42A	9344X046						✓				✓					✓						✓
IR08MW42A	9406X185						✓				✓					✓						✓
IR08MW42A	9419X275						✓				✓					✓						✓
IR08MW42A	9419X276						✓				✓					✓						✓
IR08MW42A	9434M577						✓				✓					✓						✓
IR08MW43A	9440X501						✓				✓	✓				✓			✓	✓	✓	✓

TABLE 4.2-4 (Continued)

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08MW43A	9440X502						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW43A	9606W066						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW43A	9610J913						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW44A	9440X504						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW44A	9440X505						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW44A	9606W064						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW44A	9606W065						✓				✓	✓				✓			✓	✓	✓	✓
IR08MW44A	9610J914						✓				✓	✓				✓			✓	✓	✓	✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.2-5

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
METAL	ALUMINUM	27.9	75.6	48.9	UG/L	26.6	28	5	37,000	0				
	ANTIMONY	1.6	37.7	15.7	UG/L	10.8	28	10	15.0	4	6.0	6	500	0
	ARSENIC	1.5	4.7	2.7	UG/L	1.8	28	16	0.04	16	50.0	0	36.0	0
	BARIUM	37.4	408	152	UG/L	0.91	28	28	2,600	0	1,000	0		
	BERYLLIUM	0.54	0.54	0.54	UG/L	0.16	28	5	0.02	5	4.0	0		
	CALCIUM	30,200	687,000	228,000	UG/L	25.6	28	28						
	CHROMIUM	0.69	1.9	1.3	UG/L	1.1	28	2			50.0	0		
	COBALT	0.51	8.2	3.5	UG/L	3.1	28	9						
	COPPER	0.52	54.2	15.1	UG/L	3.6	28	11	1,400	0			2.4	9
	IRON	59.1	1,290	626	UG/L	12.1	28	19						
	MAGNESIUM	101,000	1,000,000	580,000	UG/L	37.4	28	28						
	MANGANESE	70.4	12,900	1,980	UG/L	0.37	28	28	180	26				
	MERCURY	0.16	0.47	0.36	UG/L	0.13	49	4	11.0	0	2.0	0	0.03	4
	MOLYBDENUM	3.6	30.6	13.9	UG/L	1.1	18	4	180	0				
	NICKEL	1.9	41.4	22.9	UG/L	9.6	28	6	730	0	100	0	8.2	4
	POTASSIUM	36,100	416,000	126,000	UG/L	787	28	28						
	SELENIUM	2.3	2.3	2.3	UG/L	2.3	28	1	180	0	50.0	0	71.0	0
	SODIUM	555	7,560,000	3,790,000	UG/L	272	28	28						
	THALLIUM	1.5	11.8	6.7	UG/L	2.0	28	2			2.0	1		
	VANADIUM	1.8	7.9	4.2	UG/L	1.1	28	7	260	0				
	ZINC	2.2	57.3	15.7	UG/L	2.1	28	12	11,000	0			81.0	0
VOC	1,2-DICHLOROETHENE (TOTAL)	0.3	0.4	0.4	UG/L	0.5	28	2	55	0				

TABLE 4.2-5 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
	CARBON DISULFIDE	0.4	9	4	UG/L	5	17	2	21	0				
	CHLOROFORM	0.7	3	2	UG/L	0.5	28	2	0.2	2	100	0		
	ETHYLBENZENE	1	1	1	UG/L	5	49	1	1,300	0	700	0		
	TOLUENE	2	3	2	UG/L	5	49	2	720	0	150	0		
	XYLENE (TOTAL)	1	5	3	UG/L	5	49	3	1,400	0	1,800	0		
SVOC	4-NITROPHENOL	16	16	16	UG/L	25	32	1						
	BENZO(A)PYRENE	0.1	0.1	0.1	UG/L	0.05	49	1	0.002	1	0.2	0		
	BENZO(B)FLUORANTHENE	0.02	0.07	0.05	UG/L	0.02	49	2	0.09	0				
	BENZO(G,H,I)PERYLENE	0.1	0.1	0.1	UG/L	0.08	49	1	240	0				
	BENZO(K)FLUORANTHENE	0.03	0.03	0.03	UG/L	0.02	49	1	0.9	0				
	BIS(2-ETHYLHEXYL)PHTHALATE	10	10	10	UG/L	10	32	1	5	1	4	1	360	0
PEST	AROCLOR-1260	1	3	2	UG/L	3	54	2	0.009	2				
TPHPRG	TPH-GASOLINE	26	32	29	UG/L	50	11	4	100	01				
TPHEXT	TPH-DIESEL	77	120	99	UG/L	100	23	2	100	11				
	TPH-MOTOR OIL	52	950	320	UG/L	120	6	6	100	51				
TRPH	TRPH	750	750	750	UG/L	1,000	6	1	100	11				
ANION	CHLORIDE	1,420,000	13,900,000	8,420,000	UG/L	823,000	22	22						
	NITRATE	2,500	5,600	4,050	UG/L	2,750	22	2	58,000	0				
	SULFATE	58,600	2,050,000	998,000	UG/L	87,700	22	22						
SOLIDS	TOTAL DISSOLVED SOLIDS	7,500	26,000,000	15,000,000	UG/L	65,000	30	30						
DIOXIN	DIBENZOFURAN	0.02	0.07	0.04	UG/L	0.001	10	2	150	0				

TABLE 4.2-5 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.2-6

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A
Sample Number	9028H279	9028H280	9101J120	9101J121	9128X091	9128X092	91458001
Sample Date	07/11/90	07/11/90	01/03/91	01/03/91	07/10/91	07/10/91	11/07/91
Metal (ug/L)							
ALUMINUM	38.6	ND (34.5)	ND (14.6)	ND (14.6)	ND (20.7)	ND (20.7)	NA
ANTIMONY	ND (18.0)	19.8 *δ	ND (23.8)	ND (23.8)	ND (16.7)	ND (16.7)	NA
ARSENIC	ND (2.0)	ND (2.0)	ND (2.5)	ND (2.5)	ND (1.6)	2.3 *	NA
BARIUM	208	198	125	128	76.4	74.6	NA
BERYLLIUM	ND (1.2)	ND (1.2)	ND (1.6)	ND (1.6)	0.54 *	0.54 *	NA
CALCIUM	212,000	201,000	242,000	249,000	116,000	117,000	NA
CHROMIUM	ND (3.3)	ND (2.8)	ND (2.8)	ND (2.8)	ND (1.7)	ND (1.7)	NA
COBALT	ND (8.6)	ND (8.6)	ND (8.4)	ND (8.4)	ND (6.3)	ND (6.3)	NA
COPPER	49.2 B	18.9 B	ND (2.3)	ND (2.3)	6.7 B	ND (2.5)	NA
IRON	416	347	205	271	ND (138)	ND (149)	NA
MAGNESIUM	732,000	706,000	615,000	625,000	496,000	490,000	NA
MANGANESE	1,220 *	1,160 *	1,000 *	1,040 *	550 *	549 *	NA
MERCURY	ND (0.40)	ND (0.20)	ND (0.20)	0.80 B	ND (0.20)	ND (0.20)	NA
MOLYBDENUM	NA	NA	NA	NA	ND (3.0)	ND (5.2)	NA
NICKEL	ND (22.8)	ND (28.3)	ND (33.7)	ND (22.9)	20.4 B	19.3 B	NA
POTASSIUM	156,000	148,000	204,000	210,000	ND (277)	132,000	NA
SELENIUM	ND (19.5)	ND (19.5)	ND (21.0)	ND (21.0)	ND (34.0)	ND (34.0)	NA
SODIUM	5,930,000	5,810,000	4,760,000	5,360,000	3,890,000	3,800,000	NA
THALLIUM	ND (23.0)	ND (23.0)	ND (11.0)	ND (11.0)	ND (17.0)	ND (17.0)	NA
VANADIUM	ND (1.9)	ND (1.9)	ND (43.4)	ND (45.5)	1.6	2.1	NA
ZINC	20.7	11.9	2.1	2.2	ND (8.6)	ND (10.3)	NA
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	ND (5)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	NA
CARBON DISULFIDE	ND (5)	ND (5)	NA	NA	NA	NA	NA
CHLOROFORM	ND (5)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	NA
ETHYLBENZENE	ND (5)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	NA
TOLUENE	ND (5)	ND (5)	ND (0.5)	ND (0.5)	ND (2)	ND (3)	NA
XYLENE (TOTAL)	2	ND (5)	ND (1)	ND (1)	ND (1)	ND (1)	NA
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	ND (50)	ND (50)	NA	NA	NA	NA	NA
BENZO(A)PYRENE	ND (10)	ND (10)	ND (0.05)	ND (0.5)	ND (0.05)	ND (0.05)	NA
BENZO(B)FLUORANTHENE	ND (10)	ND (10)	ND (0.02)	ND (0.2)	ND (0.02)	ND (0.02)	NA
BENZO(G,H,I)PERYLENE	ND (10)	ND (10)	ND (0.08)	ND (0.8)	ND (0.08)	ND (0.08)	NA
BENZO(K)FLUORANTHENE	ND (10)	ND (10)	ND (0.02)	ND (0.2)	ND (0.02)	ND (0.02)	NA
BIS(2-ETHYLHEXYL)PHTHALATE	ND (10)	ND (10)	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A
Sample Number	9028H279	9028H280	9101J120	9101J121	9128X091	9128X092	9145B001
Sample Date	07/11/90	07/11/90	01/03/91	01/03/91	07/10/91	07/10/91	11/07/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	NA
TPH-Purgeable (ug/L)							
TPH-GASOLINE	ND (500)	ND (500)	NA	NA	NA	NA	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (500)	ND (500)	NA	NA	ND (500)	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	10,800,000	10,600,000	9,850,000	9,820,000	6,270,000	7,670,000	NA
NITRATE	ND (5,000)	ND (5,000)	ND (5,000)	ND (5,000)	ND (500)	ND (500)	NA
SULFATE	1,420,000	1,380,000	1,400,000	1,400,000	971,000	1,140,000	NA
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	18,000,000	20,000,000	17,000,000	19,000,000	14,000,000	19,000,000	20,000,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	ND (0.009)	ND (0.009)	ND (0.004)	ND (0.007)	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW38A	IR08MW38A	IR08MW38A
Sample Number	9145B002	9151X352	9212X585	9434M578	9028H273	9101J123	9128X094
Sample Date	11/07/91	12/19/91	03/17/92	08/26/94	07/10/90	01/03/91	07/10/91
Metal (ug/L)							
ALUMINUM	NA	ND (15.3)	NA	NA	52.9	ND (14.6)	ND (20.7)
ANTIMONY	NA	ND (27.6)	NA	NA	ND (18.0)	ND (23.8)	ND (16.7)
ARSENIC	NA	ND (1.4)	NA	NA	2.6 *	2.5 *	2.2 *
BARIUM	NA	155	NA	NA	134	167	59.8
BERYLLIUM	NA	ND (0.35)	NA	NA	ND (1.2)	ND (1.6)	0.54 *
CALCIUM	NA	195,000	NA	NA	240,000	326,000	110,000
CHROMIUM	NA	ND (3.0)	NA	NA	ND (3.7)	ND (2.8)	ND (1.7)
COBALT	NA	ND (10.4)	NA	NA	ND (8.6)	ND (8.4)	ND (6.3)
COPPER	NA	ND (8.6)	NA	NA	54.2 B	ND (2.3)	ND (2.5)
IRON	NA	313	NA	NA	366	1,230	ND (185)
MAGNESIUM	NA	740,000	NA	NA	490,000	608,000	378,000
MANGANESE	NA	967 *	NA	NA	1,560 *	2,040 *	677 *
MERCURY	NA	ND (0.20)	NA	0.16 B	ND (0.40)	ND (0.20)	ND (0.20)
MOLYBDENUM	NA	ND (6.7)	NA	NA	NA	NA	ND (9.7)
NICKEL	NA	ND (27.1)	NA	NA	ND (25.8)	ND (22.9)	31.2 B
POTASSIUM	NA	176,000	NA	NA	68,500	152,000	53,700
SELENIUM	NA	ND (25.0)	NA	NA	ND (19.5)	ND (21.0)	ND (34.0)
SODIUM	NA	4,980,000	NA	NA	3,540,000	5,780,000	2,490,000
THALLIUM	NA	ND (40.0)	NA	NA	ND (11.5)	ND (11.0)	ND (17.0)
VANADIUM	NA	ND (3.9)	NA	NA	ND (4.2)	ND (42.4)	3.6
ZINC	NA	ND (6.1)	NA	NA	26.4	3.0	ND (4.7)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	NA	ND (5)	NA	NA	ND (5)	ND (0.5)	ND (0.5)
CARBON DISULFIDE	NA	ND (5)	NA	NA	ND (5)	NA	NA
CHLOROFORM	NA	ND (5)	NA	NA	ND (5)	ND (0.5)	ND (0.5)
ETHYLBENZENE	NA	ND (5)	NA	ND (0.5)	ND (5)	ND (0.5)	ND (0.5)
TOLUENE	NA	ND (5)	NA	ND (0.5)	ND (5)	ND (0.5)	ND (2)
XYLENE (TOTAL)	NA	ND (5)	NA	ND (1)	ND (5)	ND (1)	ND (1)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	NA	NA	ND (25)	ND (50)	NA	NA
BENZO(A)PYRENE	NA	ND (0.05)	NA	ND (10)	ND (10)	ND (0.5)	ND (0.05)
BENZO(B)FLUORANTHENE	NA	ND (0.02)	NA	ND (10)	ND (10)	ND (0.2)	ND (0.02)
BENZO(G,H,I)PERYLENE	NA	ND (0.08)	NA	ND (10)	ND (10)	ND (0.8)	ND (0.08)
BENZO(K)FLUORANTHENE	NA	ND (0.02)	NA	ND (10)	ND (10)	ND (0.2)	ND (0.02)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	ND (4)	ND (7)	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW37A	IR08MW38A	IR08MW38A	IR08MW38A
Sample Number	9145B002	9151X352	9212X585	9434H578	9028H273	9101J123	9128X094
Sample Date	11/07/91	12/19/91	03/17/92	08/26/94	07/10/90	01/03/91	07/10/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	NA	ND (1)	NA	ND (0.5)	ND (1)	ND (1)	ND (1)
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	NA	NA	NA	ND (500)	NA	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	NA	ND (500)	NA	NA	ND (500)	NA	ND (500)
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	NA	9,960,000	NA	NA	7,540,000	10,700,000	4,990,000
NITRATE	NA	ND (500)	NA	NA	ND (5,000)	ND (5,000)	ND (500)
SULFATE	NA	1,600,000	NA	NA	1,220,000	1,550,000	1,040,000
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	21,000,000	19,000,000	5,200,000	NA	14,000,000	20,000,000	12,000,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	NA	NA	NA	0.02	ND (0.006)
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW38A	IR08MW38A	IR08MW39A	IR08MW39A	IR08MW39A	IR08MW39A	IR08MW39A
Sample Number	9145B003	9151X358	9028H274	9101J126	9128X095	9145B004	9151X359
Sample Date	11/07/91	12/20/91	07/10/90	01/03/91	07/10/91	11/07/91	12/20/91
Metal (ug/L)							
ALUMINUM	NA	ND (15.3)	ND (34.5)	ND (14.6)	ND (20.7)	NA	ND (15.3)
ANTIMONY	NA	ND (27.6)	34.2 *	ND (23.8)	ND (16.7)	NA	ND (27.6)
ARSENIC	NA	1.5 *	ND (2.0)	ND (2.5)	ND (1.6)	NA	ND (1.4)
BARIUM	NA	128	92.2	71.2	99.3	NA	94.6
BERYLLIUM	NA	ND (0.35)	ND (1.2)	ND (1.6)	0.54 *	NA	ND (0.57)
CALCIUM	NA	258,000	277,000	289,000	324,000	NA	441,000
CHROMIUM	NA	ND (3.0)	ND (2.8)	ND (2.8)	ND (1.7)	NA	ND (3.0)
COBALT	NA	ND (10.4)	ND (8.6)	ND (8.4)	6.6	NA	ND (10.4)
COPPER	NA	ND (5.7)	24.4 *	ND (6.9)	9.1 *	NA	ND (3.9)
IRON	NA	983	ND (34.6)	ND (15.3)	ND (9.4)	NA	ND (12.5)
MAGNESIUM	NA	1,000,000	539,000	538,000	576,000	NA	813,000
MANGANESE	NA	2,820 *	1,500 *	1,410 *	1,310 *	NA	2,020 *
MERCURY	NA	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	NA	ND (0.20)
MOLYBDENUM	NA	ND (12.7)	NA	NA	ND (2.7)	NA	ND (6.7)
NICKEL	NA	ND (50.2)	ND (25.3)	ND (22.9)	ND (14.1)	NA	ND (17.8)
POTASSIUM	NA	99,700	121,000	169,000	125,000	NA	181,000
SELENIUM	NA	ND (25.0)	ND (3.9)	ND (21.0)	ND (34.0)	NA	ND (25.0)
SODIUM	NA	4,200,000	4,190,000	4,260,000	4,040,000	NA	5,780,000
THALLIUM	NA	ND (2.0)	ND (2.3)	ND (11.0)	ND (17.0)	NA	ND (20.0)
VANADIUM	NA	ND (3.9)	ND (8.3)	ND (44.1)	7.9	NA	ND (3.9)
ZINC	NA	10.5	10.5	2.8	57.3	NA	ND (6.1)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	NA	ND (5)	ND (5)	ND (0.5)	ND (0.5)	NA	ND (5)
CARBON DISULFIDE	NA	ND (5)	ND (5)	NA	NA	NA	ND (5)
CHLOROFORM	NA	ND (5)	ND (5)	ND (0.5)	ND (0.5)	NA	ND (5)
ETHYLBENZENE	NA	ND (5)	ND (5)	ND (0.5)	ND (0.5)	NA	ND (5)
TOLUENE	NA	ND (5)	ND (5)	ND (0.5)	ND (2)	NA	ND (5)
XYLENE (TOTAL)	NA	ND (5)	ND (5)	ND (1)	ND (1)	NA	ND (5)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	NA	ND (50)	NA	NA	NA	NA
BENZO(A)PYRENE	NA	ND (0.05)	ND (10)	ND (0.5)	ND (0.05)	NA	ND (0.05)
BENZO(B)FLUORANTHENE	NA	ND (0.02)	ND (10)	ND (0.02)	ND (0.02)	NA	ND (0.02)
BENZO(G,H,I)PERYLENE	NA	ND (0.08)	ND (10)	ND (0.8)	ND (0.08)	NA	ND (0.08)
BENZO(K)FLUORANTHENE	NA	ND (0.02)	ND (10)	ND (0.2)	ND (0.02)	NA	ND (0.02)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	ND (6)	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW38A	IR08MW38A	IR08MW39A	IR08MW39A	IR08MW39A	IR08MW39A	IR08MW39A
Sample Number	9145B003	9151X358	9028H274	9101J126	9128X095	9145B004	9151X359
Sample Date	11/07/91	12/20/91	07/10/90	01/03/91	07/10/91	11/07/91	12/20/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	NA	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (1)
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	NA	ND (500)	NA	NA	NA	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	NA	ND (500)	ND (500)	NA	ND (500)	NA	ND (500)
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	NA	10,300,000	7,660,000	8,380,000	7,730,000	NA	14,100,000
NITRATE	NA	ND (500)	ND (5,000)	ND (5,000)	2,500	NA	ND (500)
SULFATE	NA	2,050,000	1,040,000	1,170,000	1,140,000	NA	1,890,000
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	370,000	20,000,000	14,000,000	16,000,000	15,000,000	7,500	26,000,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	NA	ND (0.02)	ND (0.004)	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW39A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A
Sample Number	9151X360	9028H276	9028H277	9101J128	9128X093	9145B005	9151X353
Sample Date	12/20/91	07/10/90	07/10/90	01/04/91	07/10/91	11/07/91	12/19/91
Metal (ug/L)							
ALUMINUM	ND (15.3)	ND (34.5)	ND (34.5)	ND (14.6)	ND (20.7)	NA	ND (15.3)
ANTIMONY	ND (27.6)	39.5 *d	ND (18.0)	ND (23.8)	25.5 *6	NA	ND (27.6)
ARSENIC	ND (1.4)	4.1 *	ND (2.0)	4.7 *	4.6 *	NA	3.9 *
BARIUM	85.2	237	246	221	204	NA	231
BERYLLIUM	ND (0.35)	ND (1.2)	ND (1.2)	ND (1.6)	0.54 *	NA	ND (0.57)
CALCIUM	466,000	171,000	180,000	161,000	160,000	NA	146,000
CHROMIUM	ND (3.0)	ND (2.8)	ND (2.8)	ND (2.8)	ND (1.7)	NA	ND (3.0)
COBALT	ND (10.4)	ND (8.6)	10.4	ND (8.4)	ND (6.3)	NA	ND (10.4)
COPPER	ND (2.2)	ND (15.3)	ND (14.7)	ND (2.3)	6.0 B	NA	ND (6.0)
IRON	ND (8.6)	99.6	119	950	617	NA	273
MAGNESIUM	875,000	724,000	756,000	770,000	812,000	NA	804,000
MANGANESE	2,260 *	1,300 *	1,370 *	1,310 *	1,200 *	NA	1,180 *
MERCURY	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	NA	ND (0.20)
MOLYBDENUM	ND (5.8)	NA	NA	NA	30.6	NA	ND (35.0)
NICKEL	ND (17.8)	ND (27.3)	ND (45.2)	ND (39.6)	40.8 B	NA	ND (17.8)
POTASSIUM	196,000	106,000	110,000	185,000	134,000	NA	138,000
SELENIUM	ND (25.0)	ND (19.5)	ND (19.5)	ND (21.0)	ND (34.0)	NA	ND (25.0)
SODIUM	6,570,000	4,120,000	4,290,000	5,390,000	4,690,000	NA	4,960,000
THALLIUM	ND (20.0)	ND (2.3)	ND (2.3)	ND (12.5)	ND (17.0)	NA	ND (20.0)
VANADIUM	ND (3.9)	ND (2.7)	ND (4.4)	ND (49.6)	ND (1.6)	NA	ND (3.9)
ZINC	ND (6.1)	25.5	21.1	ND (3.6)	ND (6.3)	NA	ND (6.1)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	ND (5)	ND (5)	ND (5)	ND (0.5)	ND (0.5)	NA	ND (5)
CARBON DISULFIDE	ND (5)	ND (5)	ND (5)	NA	NA	NA	ND (5)
CHLOROFORM	ND (5)	ND (5)	ND (5)	ND (0.5)	ND (0.5)	NA	ND (5)
ETHYLBENZENE	ND (5)	ND (5)	1	ND (0.5)	ND (0.5)	NA	ND (5)
TOLUENE	ND (5)	ND (5)	3	ND (0.5)	ND (2)	NA	ND (5)
XYLENE (TOTAL)	ND (5)	ND (5)	8	ND (1)	ND (1)	NA	ND (5)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	ND (50)	ND (50)	NA	NA	NA	NA
BENZO(A)PYRENE	ND (0.05)	ND (10)	ND (10)	ND (0.05)	ND (0.05)	NA	ND (0.05)
BENZO(B)FLUORANTHENE	ND (0.02)	ND (10)	ND (10)	ND (0.02)	ND (0.02)	NA	ND (0.02)
BENZO(G,H,I)PERYLENE	ND (0.08)	ND (10)	ND (10)	ND (0.08)	ND (0.08)	NA	ND (0.08)
BENZO(K)FLUORANTHENE	ND (0.02)	ND (10)	ND (10)	ND (0.02)	ND (0.02)	NA	ND (0.02)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	ND (10)	ND (10)	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW39A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A
Sample Number	9151X360	9028H276	9028H277	9101J128	9128X093	9145B005	9151X353
Sample Date	12/20/91	07/10/90	07/10/90	01/04/91	07/10/91	11/07/91	12/19/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	NA	ND (1)
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	ND (500)	ND (500)	NA	NA	NA	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (500)	ND (500)	ND (500)	NA	ND (500)	NA	ND (500)
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	13,700,000	8,870,000	8,950,000	9,990,000	9,420,000	NA	10,800,000
NITRATE	ND (500)	ND (500)	ND (500)	ND (5,000)	ND (500)	NA	ND (500)
SULFATE	1,900,000	334,000	319,000	300,000	284,000	NA	253,000
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	26,000,000	15,000,000	15,000,000	19,000,000	18,000,000	17,000,000	18,000,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	NA	ND (0.01)	ND (0.006)	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW41A	IR08MW41A
Sample Number	9151X354	9212X581	9212X582	9345X055	9345X056	9028H281	9101J130
Sample Date	12/19/91	03/17/92	03/17/92	11/08/93	11/08/93	07/11/90	01/04/91
Metal (ug/L)							
ALUMINUM	ND (15.3)	NA	NA	NA	NA	ND (34.5)	ND (14.6)
ANTIMONY	ND (27.6)	NA	NA	NA	NA	37.7 *B	ND (23.8)
ARSENIC	3.9 *	NA	NA	NA	NA	2.3 *	3.5 *
BARIUM	221	NA	NA	NA	NA	204	37.4
BERYLLIUM	ND (0.35)	NA	NA	NA	NA	ND (1.2)	ND (1.6)
CALCIUM	144,000	NA	NA	NA	NA	104,000	30,200
CHROMIUM	ND (3.0)	NA	NA	NA	NA	ND (3.2)	ND (2.8)
COBALT	11.1	NA	NA	NA	NA	ND (8.6)	ND (8.4)
COPPER	ND (1.7)	NA	NA	NA	NA	18.3 B	ND (2.3)
IRON	162	NA	NA	NA	NA	59.1	177
MAGNESIUM	787,000	NA	NA	NA	NA	252,000	101,000
MANGANESE	1,150 *	NA	NA	NA	NA	810 *	336 *
MERCURY	ND (0.20)	NA	NA	0.40 B	0.54 B	ND (0.20)	ND (0.20)
MOLYBDENUM	ND (33.3)	NA	NA	NA	NA	NA	NA
NICKEL	ND (30.5)	NA	NA	NA	NA	ND (21.6)	ND (22.9)
POTASSIUM	133,000	NA	NA	NA	NA	77,200	40,800
SELENIUM	ND (25.0)	NA	NA	NA	NA	ND (3.9)	ND (2.1)
SODIUM	4,760,000	NA	NA	NA	NA	2,510,000	1,020,000
THALLIUM	ND (2.0)	NA	NA	NA	NA	ND (2.3)	ND (2.5)
VANADIUM	ND (3.9)	NA	NA	NA	NA	ND (7.1)	ND (21.1)
ZINC	ND (6.1)	NA	NA	NA	NA	11.3	ND (1.9)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	ND (5)	NA	NA	NA	NA	ND (5)	ND (0.5)
CARBON DISULFIDE	ND (5)	NA	NA	NA	NA	ND (5)	NA
CHLOROFORM	ND (5)	NA	NA	NA	NA	ND (5)	ND (0.5)
ETHYLBENZENE	ND (5)	NA	NA	ND (1)	ND (1)	ND (5)	ND (0.5)
TOLUENE	ND (5)	NA	NA	ND (1)	ND (1)	ND (5)	ND (0.5)
XYLENE (TOTAL)	ND (5)	NA	NA	ND (1)	ND (1)	ND (5)	ND (1)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	NA	NA	ND (25)	20	ND (50)	NA
BENZO(A)PYRENE	ND (0.05)	NA	NA	ND (10)	ND (10)	ND (10)	ND (0.05)
BENZO(B)FLUORANTHENE	ND (0.02)	NA	NA	ND (10)	ND (10)	ND (10)	ND (0.02)
BENZO(G,H,I)PERYLENE	ND (0.08)	NA	NA	ND (10)	ND (10)	ND (10)	ND (0.08)
BENZO(K)FLUORANTHENE	ND (0.02)	NA	NA	ND (10)	ND (10)	ND (10)	ND (0.02)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	15 *B	ND (11)	ND (10)	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW40A	IR08MW41A	IR08MW41A
Sample Number	9151X354	9212X581	9212X582	9345X055	9345X056	9028H281	9101J130
Sample Date	12/19/91	03/17/92	03/17/92	11/08/93	11/08/93	07/11/90	01/04/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	ND (1)	NA	NA	ND (1)	ND (1)	ND (1)	ND (1)
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	NA	NA	NA	NA	ND (500)	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (500)	NA	NA	NA	NA	ND (500)	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	10,200,000	NA	NA	NA	NA	3,930,000	1,420,000
NITRATE	ND (500)	NA	NA	NA	NA	ND (500)	ND (500)
SULFATE	251,000	NA	NA	NA	NA	463,000	58,600
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	18,000,000	17,000,000	17,000,000	NA	NA	7,400,000	2,400,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	0.07
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW42A
Sample Number	9128X098	9145B007	9151X355	9212X583	9212X584	9344X053	9141X203
Sample Date	07/11/91	11/07/91	12/19/91	03/17/92	03/17/92	11/05/93	10/07/91
Metal (ug/L)							
ALUMINUM	ND (20.7)	NA	ND (15.3)	NA	NA	NA	43.2
ANTIMONY	ND (16.7)	NA	ND (27.6)	NA	NA	NA	18.8 *δ
ARSENIC	2.5 *	NA	1.8 *	NA	NA	NA	ND (2.5)
BARIUM	408	NA	406	NA	NA	NA	176
BERYLLIUM	0.54 *	NA	ND (0.35)	NA	NA	NA	ND (0.24)
CALCIUM	166,000	NA	216,000	NA	NA	NA	221,000
CHROMIUM	1.9	NA	ND (3.0)	NA	NA	NA	ND (2.1)
COBALT	ND (6.3)	NA	ND (10.4)	NA	NA	NA	ND (4.9)
COPPER	ND (2.5)	NA	ND (3.1)	NA	NA	NA	1.4
IRON	1,290	NA	1,090	NA	NA	NA	292
MAGNESIUM	441,000	NA	564,000	NA	NA	NA	760,000
MANGANESE	3,510 *	NA	4,210 *	NA	NA	NA	1,530 *
MERCURY	ND (0.20)	NA	ND (0.20)	NA	NA	0.36 δ	ND (0.20)
MOLYBDENUM	ND (2.7)	NA	ND (3.1)	NA	NA	NA	ND (13.9)
NICKEL	41.4 δ	NA	ND (21.5)	NA	NA	NA	ND (52.5)
POTASSIUM	113,000	NA	126,000	NA	NA	NA	143,000
SELENIUM	ND (34.0)	NA	ND (25.0)	NA	NA	NA	ND (29.0)
SODIUM	3,160,000	NA	3,890,000	NA	NA	NA	551
THALLIUM	ND (17.0)	NA	ND (2.0)	NA	NA	NA	ND (15.0)
VANADIUM	7.6	NA	ND (3.9)	NA	NA	NA	ND (1.6)
ZINC	ND (1.3)	NA	ND (6.1)	NA	NA	NA	ND (1.6)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	ND (0.5)	NA	ND (5)	NA	NA	NA	ND (0.5)
CARBON DISULFIDE	NA	NA	ND (5)	NA	NA	NA	NA
CHLOROFORM	ND (0.5)	NA	ND (5)	NA	NA	NA	ND (0.5)
ETHYLBENZENE	ND (0.5)	NA	ND (5)	NA	NA	ND (1)	ND (0.3)
TOLUENE	ND (1)	NA	ND (5)	NA	NA	ND (1)	ND (0.3)
XYLENE (TOTAL)	ND (1)	NA	ND (5)	NA	NA	ND (1)	ND (0.6)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	NA	NA	NA	NA	ND (25)	NA
BENZO(A)PYRENE	ND (0.05)	NA	ND (0.05)	NA	NA	ND (10)	0.1 *
BENZO(B)FLUORANTHENE	ND (0.02)	NA	ND (0.02)	NA	NA	ND (10)	0.06
BENZO(G,H,I)PERYLENE	ND (0.08)	NA	ND (0.08)	NA	NA	ND (10)	0.1
BENZO(K)FLUORANTHENE	ND (0.02)	NA	ND (0.02)	NA	NA	ND (10)	0.03
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	NA	NA	NA	ND (4)	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW41A	IR08MW42A
Sample Number	9128X098	9145B007	9151X355	9212X583	9212X584	9344X053	9141X203
Sample Date	07/11/91	11/07/91	12/19/91	03/17/92	03/17/92	11/05/93	10/07/91
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	ND (1)	NA	ND (1)	NA	NA	ND (1)	4 *
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	NA	NA	NA	NA	NA	NA
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (500)	NA	ND (500)	NA	NA	NA	ND (500)
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	NA	NA	NA	NA	NA
Anion (ug/L)							
CHLORIDE	5,560,000	NA	6,890,000	NA	NA	NA	9,980,000
NITRATE	ND (500)	NA	ND (500)	NA	NA	NA	8,700
SULFATE	290,000	NA	536,000	NA	NA	NA	1,470,000
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	11,000,000	19,000,000	15,000,000	14,000,000	13,000,000	NA	20,000,000
Dioxins and Furans (ug/L)							
DIBENZOFURAN	ND (0.01)	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	NA	NA	NA	NA	NA	NA	NA

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW42A	IR08MW42A	IR08MW43A	IR08MW43A	IR08MW43A	IR08MW43A	IR08MW44A
Sample Number	9141X204	9151X362	9440X501	9440X502	9606W066	9610J913	9440X504
Sample Date	10/07/91	12/20/91	10/03/94	10/03/94	02/05/96	03/07/96	10/04/94
Metal (ug/L)							
ALUMINUM	108	ND (15.3)	ND (14.4)	ND (14.4)	ND (19.1)	46.5	ND (14.4)
ANTIMONY	ND (14.3)	ND (27.6)	2.1	2.0	ND (1.6)	ND (1.6)	2.9
ARSENIC	ND (2.5)	2.1 *	ND (1.7)	ND (1.7)	ND (1.4)	1.5 *	2.9 *
BARIUM	176	170	52.6	69.3	39.9	43.4	238
BERYLLIUM	ND (0.24)	ND (0.35)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
CALCIUM	219,000	227,000	259,000	300,000	87,600	122,000	722,000
CHROMIUM	ND (2.1)	ND (3.0)	ND (0.80)	ND (0.80)	ND (0.70)	0.69	ND (0.80)
COBALT	ND (4.9)	ND (10.4)	1.8	1.1	0.69	0.67	3.2
COPPER	ND (1.3)	ND (1.8)	ND (0.30)	ND (2.1)	11.0 B	3.5 B	ND (0.30)
IRON	307	1,240	ND (10.1)	ND (10.1)	ND (18.7)	ND (11.0)	832
MAGNESIUM	760,000	728,000	509,000	449,000	134,000	268,000	831,000
MANGANESE	1,520 *	1,800 *	1,050 *	657 *	86.0	70.4	11,900 *
MERCURY	ND (0.20)	ND (0.20)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
MOLYBDENUM	ND (8.5)	ND (13.6)	ND (5.7)	ND (5.3)	ND (2.4)	3.6	ND (3.8)
NICKEL	ND (25.9)	ND (23.2)	ND (4.1)	ND (3.4)	ND (2.2)	2.3	ND (3.9)
POTASSIUM	144,000	116,000	478,000	354,000	36,100	86,300	138,000
SELENIUM	ND (14.5)	ND (25.0)	ND (2.3)	ND (2.3)	2.3	ND (2.3)	ND (3.4)
SODIUM	558	5,200,000	8,830,000	6,290,000	1,310,000	2,380,000	2,250,000
THALLIUM	ND (15.0)	ND (20.0)	ND (2.0)	2.0	ND (1.9)	ND (1.9)	9.5 B
VANADIUM	ND (1.6)	ND (3.9)	ND (0.90)	ND (0.90)	4.4	2.4	ND (0.90)
ZINC	ND (1.6)	ND (6.1)	ND (13.3)	ND (16.2)	ND (20.8)	17.7	ND (2.2)
Volatile Organic Compound (ug/L)							
1,2-DICHLOROETHENE (TOTAL)	ND (0.5)	ND (5)	ND (10)	ND (10)	ND (0.5)	ND (0.5)	ND (10)
CARBON DISULFIDE	NA	ND (5)	ND (10)	ND (10)	ND (0.5)	ND (0.5)	9
CHLOROFORM	ND (0.5)	ND (5)	ND (10)	ND (10)	0.7 *	3 *	ND (10)
ETHYLBENZENE	ND (0.3)	ND (5)	ND (10)	ND (10)	ND (0.5)	ND (0.5)	ND (10)
TOLUENE	ND (0.3)	2	ND (10)	ND (10)	ND (0.5)	ND (0.5)	ND (10)
XYLENE (TOTAL)	ND (0.6)	1	ND (10)	ND (10)	ND (0.5)	ND (0.5)	ND (10)
Semivolatile Organic Compound (ug/L)							
4-NITROPHENOL	NA	NA	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)
BENZO(A)PYRENE	0.1 *	ND (0.05)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(B)FLUORANTHENE	0.07	0.02	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(G,H,I)PERYLENE	0.1	ND (0.08)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(K)FLUORANTHENE	0.03	ND (0.02)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	ND (21)	ND (4)	ND (4)	ND (4)	ND (13)

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW42A	IR08MW42A	IR08MW43A	IR08MW43A	IR08MW43A	IR08MW43A	IR08MW44A
Sample Number	9141X204	9151X362	9440X501	9440X502	9606W066	9610J913	9440X504
Sample Date	10/07/91	12/20/91	10/03/94	10/03/94	02/05/96	03/07/96	10/04/94
Pesticide/Polychlorinated Biphenyl (ug/L)							
AROCLOR-1260	2 *	1 *	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
TPH-Purgeable (ug/L)							
TPH-GASOLINE	NA	NA	ND (50)	27	29	ND (50)	36
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (500)	ND (500)	ND (100)	ND (100)	120	77	ND (200)
TPH-MOTOR OIL	NA	NA	360	530	180	200	930
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	NA	NA	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)	500
Anion (ug/L)							
CHLORIDE	9,820,000	10,100,000	NA	NA	NA	NA	NA
NITRATE	ND (5,000)	ND (500)	NA	NA	NA	NA	NA
SULFATE	1,430,000	1,430,000	NA	NA	NA	NA	NA
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	21,000,000	19,000,000	NA	NA	NA	NA	NA
Dioxins and Furans (ug/L)							
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	NA	NA	7.1	7.1	7.5	7.5	7.2

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW44A	IR08MW44A	IR08MW44A	IR08MW44A
Sample Number	9440X505	9606W064	9606W065	9610J914
Sample Date	10/04/94	02/05/96	02/05/96	03/07/96
Metal (ug/L)				
ALUMINUM	ND (72.0)	ND (19.1)	ND (19.1)	41.5
ANTIMONY	ND (5.5)	1.9	1.6	1.6
ARSENIC	ND (8.5)	ND (1.4)	ND (1.4)	ND (1.4)
BARIUM	305	59.7	61.3	88.3
BERYLLIUM	ND (0.50)	ND (0.10)	ND (0.10)	ND (0.10)
CALCIUM	652,000	167,000	170,000	388,000
CHROMIUM	ND (4.0)	ND (0.40)	ND (0.40)	ND (0.40)
COBALT	7.3	0.53	0.49	1.1
COPPER	ND (1.5)	ND (2.1)	ND (1.4)	0.52
IRON	744	396	441	1,120
MAGNESIUM	1,050,000	341,000	346,000	576,000
MANGANESE	13,800 *	1,610 *	1,640 *	5,440 *
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
MOLYBDENUM	ND (7.8)	13.0	13.2	8.4
NICKEL	ND (7.0)	ND (1.6)	ND (1.3)	1.9
POTASSIUM	103,000	54,500	51,200	65,800
SELENIUM	ND (11.5)	ND (2.3)	ND (2.3)	ND (2.3)
SODIUM	2,290,000	1,510,000	1,450,000	1,760,000
THALLIUM	14.1 B	ND (1.9)	ND (1.9)	ND (1.9)
VANADIUM	ND (4.5)	ND (0.84)	ND (0.51)	1.8
ZINC	ND (8.2)	ND (10.9)	ND (7.9)	7.6
Volatile Organic Compound (ug/L)				
1,2-DICHLOROETHENE (TOTAL)	ND (10)	0.4	0.4	0.3
CARBON DISULFIDE	8	ND (0.5)	ND (0.5)	0.4
CHLOROFORM	ND (10)	ND (0.5)	ND (0.5)	ND (0.5)
ETHYLBENZENE	ND (10)	ND (0.5)	ND (0.5)	ND (0.5)
TOLUENE	ND (10)	ND (0.5)	ND (0.5)	ND (0.5)
XYLENE (TOTAL)	ND (10)	ND (0.5)	ND (0.5)	ND (0.5)
Semivolatile Organic Compound (ug/L)				
4-NITROPHENOL	ND (25)	ND (25)	ND (25)	ND (25)
BENZO(A)PYRENE	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(B)FLUORANTHENE	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(G,H,I)PERYLENE	ND (10)	ND (10)	ND (10)	ND (10)
BENZO(K)FLUORANTHENE	ND (10)	ND (10)	ND (10)	ND (10)
BIS(2-ETHYLHEXYL)PHTHALATE	ND (3)	ND (4)	ND (4)	ND (4)

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08MW44A	IR08MW44A	IR08MW44A	IR08MW44A
Sample Number	9440X505	9606W064	9606W065	9610J914
Sample Date	10/04/94	02/05/96	02/05/96	03/07/96
Pesticide/Polychlorinated Biphenyl (ug/L)				
AROCLOR-1260	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
TPH-Purgeable (ug/L)				
TPH-GASOLINE	28	31	ND (50)	ND (50)
TPH-Extractable (ug/L)				
TPH-DIESEL	ND (200)	ND (100)	ND (100)	ND (100)
TPH-MOTOR OIL	970	ND (100)	53	120
Total Recoverable Petroleum Hydrocarbons (ug/L)				
TRPH	1,000	ND (1,000)	ND (1,000)	ND (1,000)
Anion (ug/L)				
CHLORIDE	NA	NA	NA	NA
NITRATE	NA	NA	NA	NA
SULFATE	NA	NA	NA	NA
Solids (ug/L)				
TOTAL DISSOLVED SOLIDS	NA	NA	NA	NA
Dioxins and Furans (ug/L)				
DIBENZOFURAN	NA	NA	NA	NA
pH (pH units)				
PH	7.2	7.4	7.5	7.3

TABLE 4.2-6 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
ppt	Parts per thousand
µg/L	Microgram per liter
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
ß	Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ	Detected concentration greater than maximum contaminant level (MCL) U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.2-7

SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL TESTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B052	9542J478										✓								✓		✓	

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.2-8

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
TPHEXT	TPH-DIESEL	99	99	99	UG/L	100	1	1	100	0i				
	TPH-MOTOR OIL	2,100	2,100	2,100	UG/L	100	1	1	100	1i				

TABLE 4.2-8 (Continued)

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

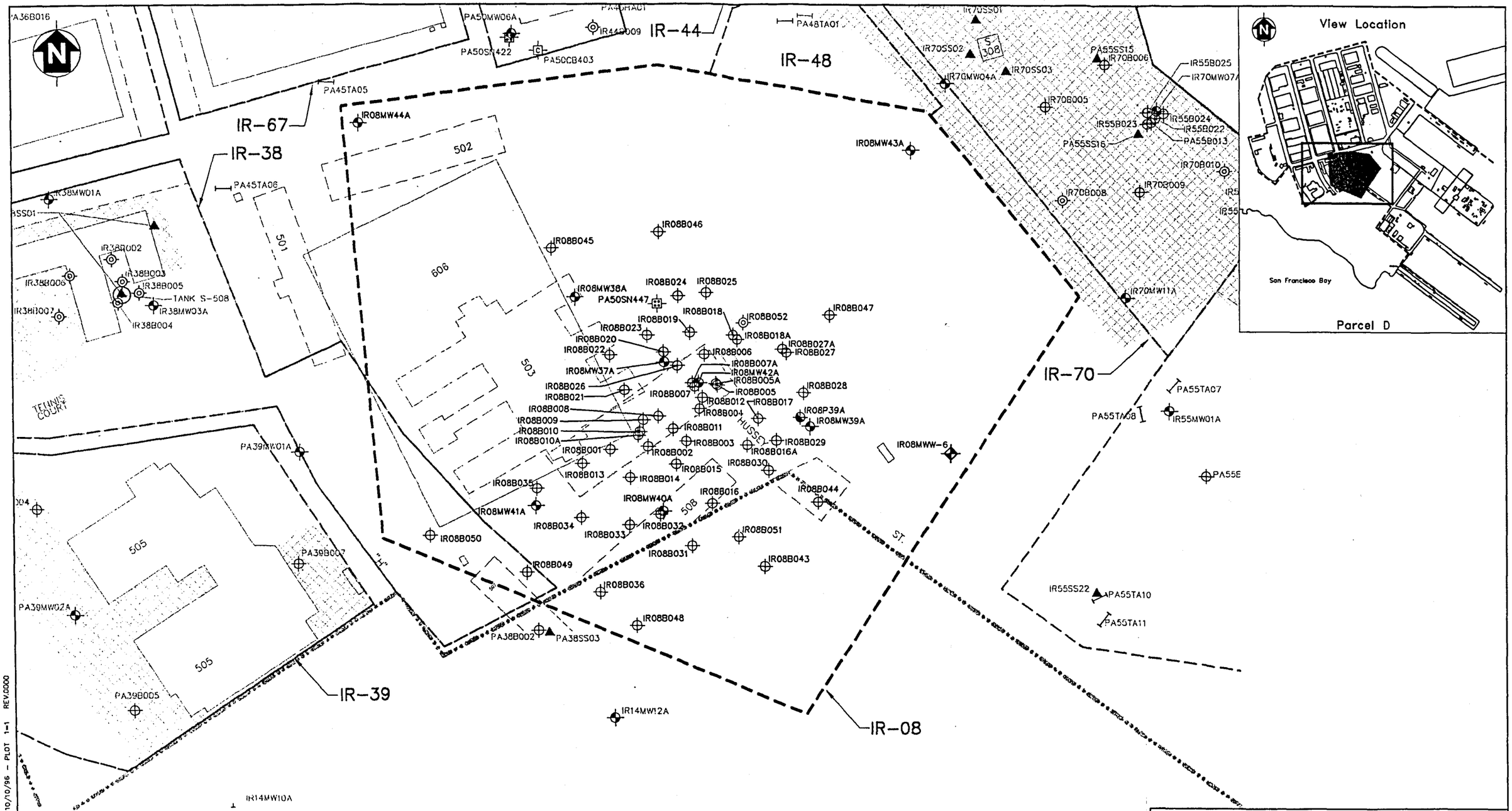
TABLE 4.2-9

HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-08
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR088052
Sample Number	9542J478
Sample Date	10/16/95
TPH-Extractable (ug/L)	
TPH-DIESEL	99
TPH-MOTOR OIL	2,100

Notes:

NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
ppt	Parts per thousand
µg/L	Microgram per liter



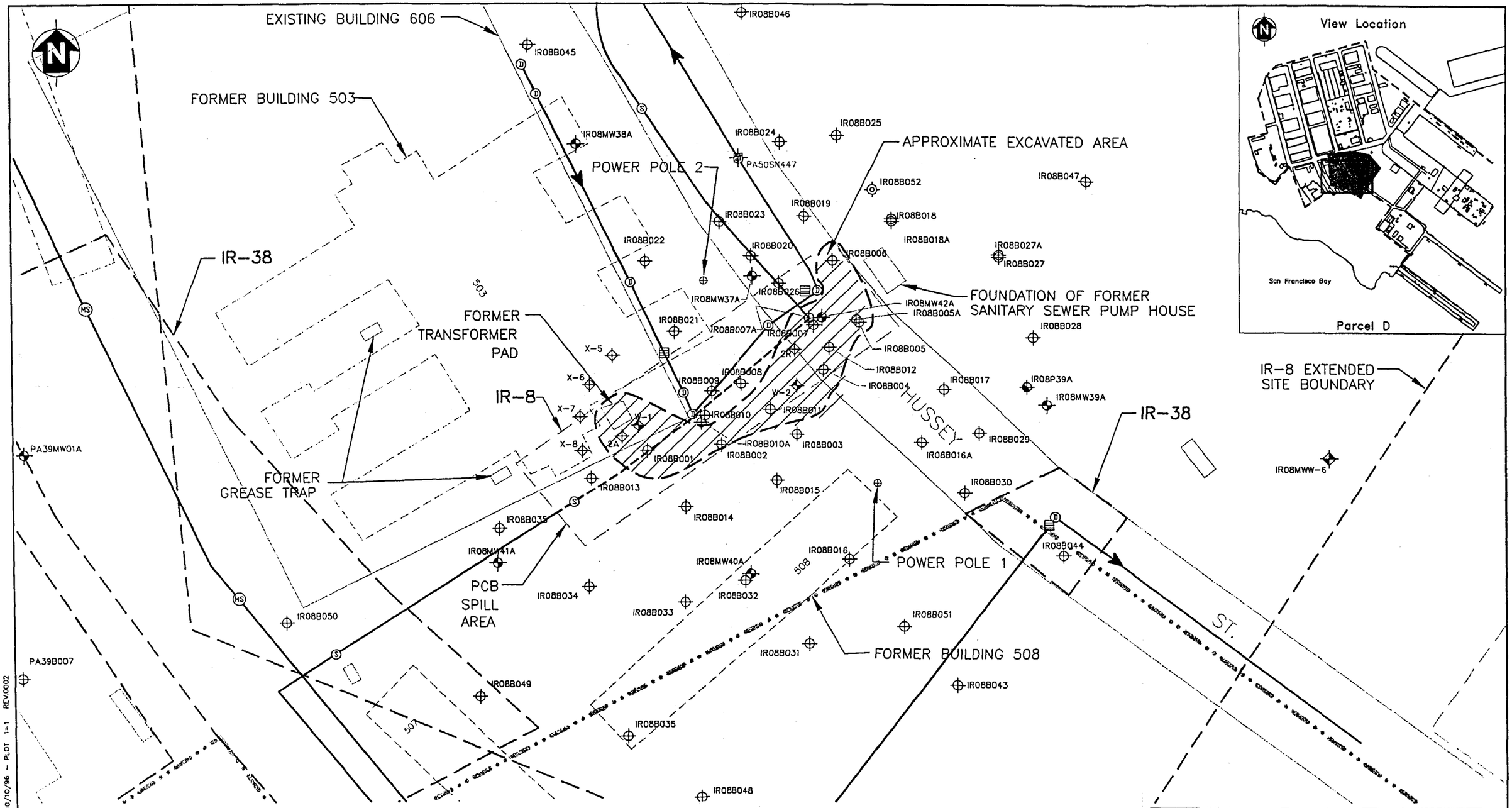
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.2-1
PARCEL D
IR-08 SITE BOUNDARY
SOIL AND GROUNDWATER SAMPLE LOCATIONS

JK (UA)(200-09)08SITELO.DWG - 10/10/96 - PLOT 1=1 REV.0000



LEGEND

- SOIL BORING
- SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
- A-AQUIFER MONITORING WELL
- PIEZOMETER
- ERM-WEST SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- CATCH BASIN WITH DRY WELL
- SANITARY SEWER
- IR SITE BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)
- PARCEL BOUNDARY
- SOIL EXCAVATED AREA (APPROX.)
- STORM DRAIN LINE SHOWING MANHOLE
- APPROXIMATE LOCATION OF SUSPECTED STEAMLINES
- APPROXIMATE LOCATION OF MAPPED STEAMLINES
- SEGMENT OF STEAMLINE SUSPECTED TO BE DAMAGED DURING CONSTRUCTION ACTIVITIES AT FORMER BUILDING 503

25 0 25 50
SCALE IN FEET

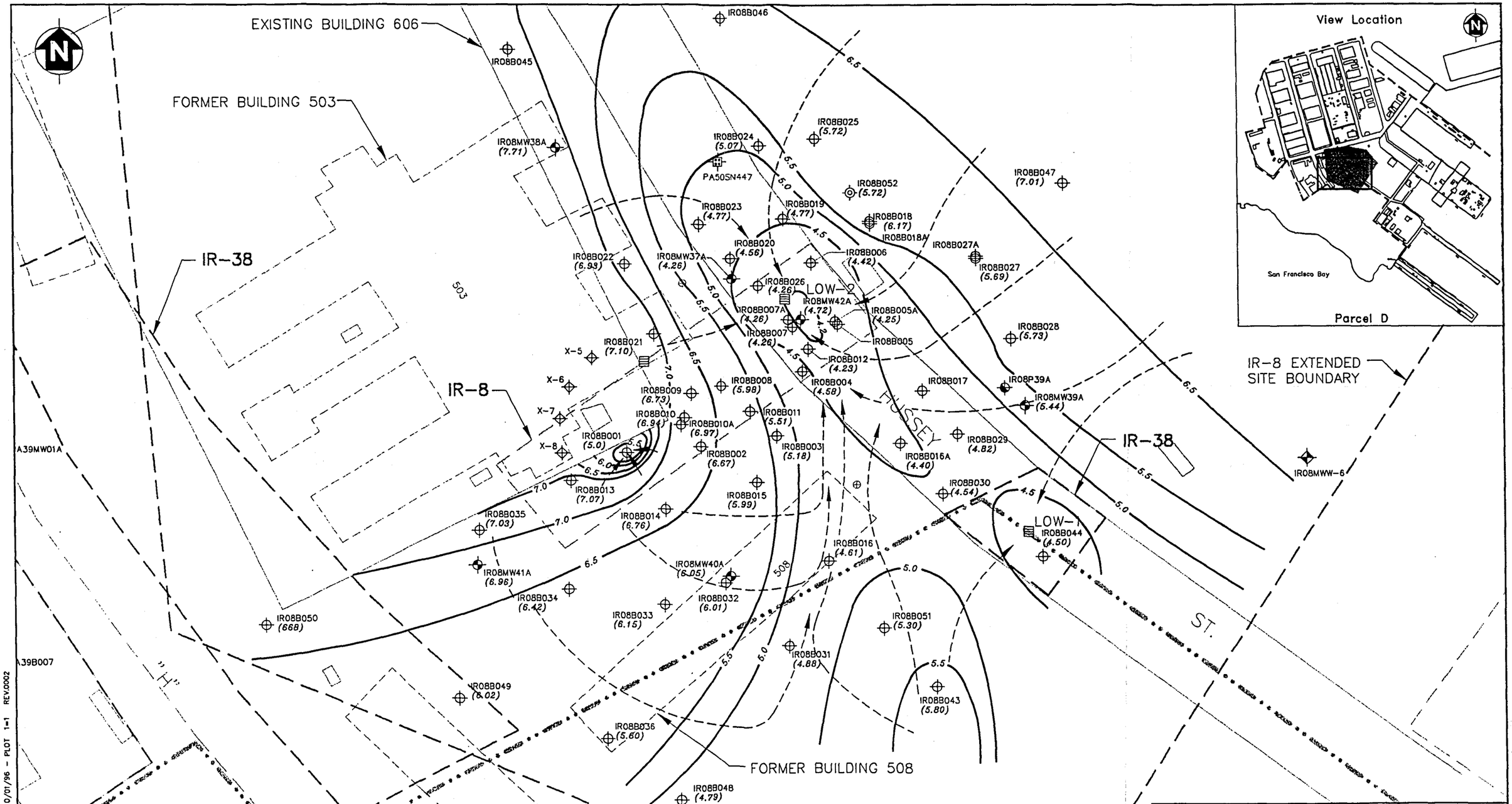
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.2-1A
DETAIL OF
PCB SPILL AREA
AT IR-08
PARCEL D REMEDIAL INVESTIGATION

JK (UA)(200-09)08FIG001.DWG - 10/10/96 - PLOT 1=1 REV.0002



LEGEND

- SOIL BORING
- SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
- A-AQUIFER MONITORING WELL
- PIEZOMETER
- ERM-WEST SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- CATCH BASIN WITH DRY WELL
- SANITARY SEWER
- IR SITE BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)
- PARCEL BOUNDARY
- IR08B049 — LOCATION IDENTIFICATION NUMBER
- (7.01) — SURFACE ELEVATION (FEET ABOVE MSL)
- SURFACE WATER RUNOFF FLOW LINE
- 5.5 — GROUND SURFACE ELEVATION CONTOUR (FEET ABOVE MSL)

25 0 25 50
SCALE IN FEET

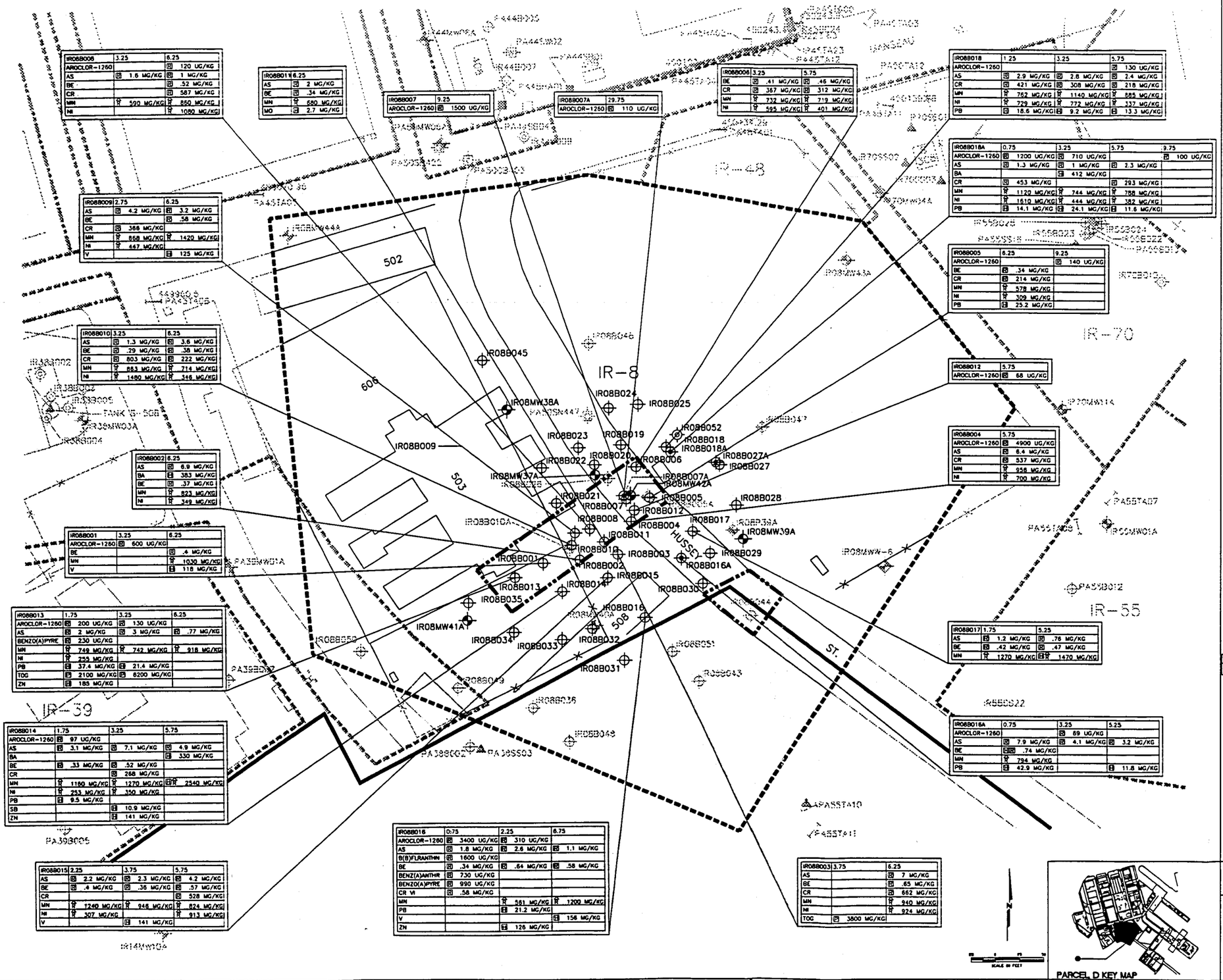
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.2-1B
SURFACE WATER RUNOFF PATTERN AND TOPOGRAPHY AT IR-08
PARCEL D REMEDIAL INVESTIGATION

RB(UA)(200-09)08FIG014.DWG - 10/01/96 - PLOT 1=1 REV.0002



IR08B006	3.25	6.25
AROCLOR-1260		120 UG/KG
AS	1.6 MG/KG	1 MG/KG
BE		.52 MG/KG
CR		587 MG/KG
MN	590 MG/KG	850 MG/KG
NI		1050 MG/KG

IR08B011	6.25
AS	2 MG/KG
BE	.34 MG/KG
MN	580 MG/KG
MO	2.7 MG/KG

IR08B007	9.25
AROCLOR-1260	1500 UG/KG

IR08B007A	29.75
AROCLOR-1260	110 UG/KG

IR08B006	3.25	5.75
BE	.41 MG/KG	.46 MG/KG
CR	367 MG/KG	312 MG/KG
MN	732 MG/KG	719 MG/KG
NI	595 MG/KG	401 MG/KG

IR08B018	1.25	3.25	5.75
AROCLOR-1260			130 UG/KG
AS	2.9 MG/KG	2.8 MG/KG	2.4 MG/KG
CR	421 MG/KG	308 MG/KG	218 MG/KG
MN	762 MG/KG	1140 MG/KG	885 MG/KG
NI	729 MG/KG	772 MG/KG	337 MG/KG
PB	18.6 MG/KG	9.2 MG/KG	13.3 MG/KG

IR08B018A	0.75	3.25	5.75	9.75
AROCLOR-1260	1200 UG/KG	710 UG/KG		100 UG/KG
AS	1.3 MG/KG	1 MG/KG	2.3 MG/KG	
BA		412 MG/KG		
CR	453 MG/KG		293 MG/KG	
MN	1120 MG/KG	744 MG/KG	788 MG/KG	
NI	1610 MG/KG	444 MG/KG	382 MG/KG	
PB	14.1 MG/KG	24.1 MG/KG	11.8 MG/KG	

IR08B009	2.75	6.25
AS	4.2 MG/KG	3.2 MG/KG
BE		.58 MG/KG
CR	366 MG/KG	
MN	868 MG/KG	1420 MG/KG
NI	447 MG/KG	
V		125 MG/KG

IR08B005	6.25	9.25
AROCLOR-1260		140 UG/KG
BE	.34 MG/KG	
CR	214 MG/KG	
MN	578 MG/KG	
NI	309 MG/KG	
PB	25.2 MG/KG	

IR08B010	3.25	6.25
AS	1.3 MG/KG	3.6 MG/KG
BE	.29 MG/KG	.38 MG/KG
CR	803 MG/KG	222 MG/KG
MN	883 MG/KG	714 MG/KG
NI	1480 MG/KG	346 MG/KG

IR08B012	5.75
AROCLOR-1260	68 UG/KG

IR08B004	5.75
AROCLOR-1260	4900 UG/KG
AS	6.4 MG/KG
CR	537 MG/KG
MN	938 MG/KG
NI	700 MG/KG

IR08B002	6.25
AS	6.9 MG/KG
BA	383 MG/KG
BE	.37 MG/KG
MN	823 MG/KG
NI	349 MG/KG

IR08B001	3.25	6.25
AROCLOR-1260	600 UG/KG	
BE		.4 MG/KG
MN		1030 MG/KG
V		118 MG/KG

IR08B013	1.75	3.25	6.25
AROCLOR-1260	200 UG/KG	130 UG/KG	
AS	2 MG/KG	3 MG/KG	.77 MG/KG
BENZO(A)PYRE	230 UG/KG		
MN	749 MG/KG	742 MG/KG	918 MG/KG
NI	255 MG/KG		
PB	37.4 MG/KG	21.4 MG/KG	
TOG	2100 MG/KG	6200 MG/KG	
ZN	185 MG/KG		

IR08B017	1.75	5.25
AS	1.2 MG/KG	.76 MG/KG
BE	.42 MG/KG	.47 MG/KG
MN	1270 MG/KG	1470 MG/KG

IR08B014	1.75	3.25	5.75
AROCLOR-1260	97 UG/KG		
AS	3.1 MG/KG	7.1 MG/KG	4.9 MG/KG
BA			330 MG/KG
BE	.33 MG/KG	.52 MG/KG	
CR		268 MG/KG	
MN	1180 MG/KG	1270 MG/KG	2540 MG/KG
NI	253 MG/KG	350 MG/KG	
PB	9.5 MG/KG		
SB		10.9 MG/KG	
ZN		141 MG/KG	

IR08B016A	0.75	3.25	5.25
AROCLOR-1260		89 UG/KG	
AS	7.9 MG/KG	4.1 MG/KG	3.2 MG/KG
BE	.74 MG/KG		
MN	794 MG/KG		
PB	42.9 MG/KG		11.8 MG/KG

IR08B016	0.75	2.25	6.75
AROCLOR-1260	3400 UG/KG	310 UG/KG	
AS	1.8 MG/KG	2.6 MG/KG	1.1 MG/KG
B(B)FLRANTHN	1600 UG/KG		
BE	.34 MG/KG	.64 MG/KG	.58 MG/KG
BENZ(A)ANTHR	730 UG/KG		
BENZO(A)PYRE	990 UG/KG		
CR VI	.58 MG/KG		
MN		581 MG/KG	1200 MG/KG
PB		21.2 MG/KG	
V			156 MG/KG
ZN		126 MG/KG	

IR08B015	2.25	3.75	5.75
AS	2.2 MG/KG	2.3 MG/KG	4.2 MG/KG
BE	.4 MG/KG	.36 MG/KG	.57 MG/KG
CR			528 MG/KG
MN	1240 MG/KG	946 MG/KG	824 MG/KG
NI	307 MG/KG		913 MG/KG
V		141 MG/KG	

IR08B003	3.75	6.25
AS		7 MG/KG
BE		.65 MG/KG
CR		662 MG/KG
MN		940 MG/KG
NI		924 MG/KG
TOG	3800 MG/KG	

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UST(X)-1260 UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
SOIL SAMPLE DEPTH (feet bgs)

IR07B045	2.75
TCE	.34
As	0.0028

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (µg/kg) FOR OTHER ORGANICS.

ANALYTE

- EXCEEDS CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS HPAL
- EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPALs OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.02-2 SHT 1 of 3

IR-08 SOIL RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-08 4.02-2 SH 1 REV A

1 FILE NAME: 0840221A.DWG

IR08B022	1.25	3.25	5.75	8.75
AROCLOR-1260	690 UG/KG	2700 UG/KG		450 UG/KG
AS	2.9 MG/KG	2.8 MG/KG	3 MG/KG	
CR			261 MG/KG	
CR VI			.68 MG/KG	
MN	743 MG/KG	700 MG/KG	1150 MG/KG	
NI	281 MG/KG	434 MG/KG	299 MG/KG	
PB	87.5 MG/KG	156 MG/KG	9 MG/KG	
TOG	3700 MG/KG	4400 MG/KG		
ZN	137 MG/KG	275 MG/KG		

IR08B023	2.25	3.25
AS	4.6 MG/KG	1.6 MG/KG
BE	.37 MG/KG	
BENZO(A)PYRE	83 UG/KG	
CR	486 MG/KG	1290 MG/KG
CU	134 MG/KG	
MN	1470 MG/KG	888 MG/KG
NI	850 MG/KG	1450 MG/KG
PB	13.5 MG/KG	

IR08B024	1.25	3.25	5.75
AROCLOR-1260		83 UG/KG	
AS	2.8 MG/KG	2.5 MG/KG	.54 MG/KG
BA	318 MG/KG		
BE	.6 MG/KG	.57 MG/KG	
CR			653 MG/KG
MN	1160 MG/KG	1020 MG/KG	525 MG/KG
NI		151 MG/KG	2310 MG/KG

IR08B025	0.75	3.25	6.25
AS	2.4 MG/KG	1 MG/KG	6.4 MG/KG
BE	.34 MG/KG	.26 MG/KG	.45 MG/KG
CR	272 MG/KG		255 MG/KG
MN	959 MG/KG	997 MG/KG	786 MG/KG
NI	514 MG/KG		385 MG/KG
PB	21.4 MG/KG		
SB			9.5 MG/KG
V		134 MG/KG	

IR08B019	1.75	3.75
AS	1.2 MG/KG	1.5 MG/KG
CR		742 MG/KG
MN	1040 MG/KG	660 MG/KG
NI		1220 MG/KG
V	125 MG/KG	

IR08B021	1.25	3.25	5.75
AROCLOR-1260	100 UG/KG		
AS	4.6 MG/KG	12.9 MG/KG	
CR	268 MG/KG		375 MG/KG
MN	824 MG/KG	1510 MG/KG	1050 MG/KG
NI	328 MG/KG		587 MG/KG
PB	24.3 MG/KG	9.2 MG/KG	
TOG	1800 MG/KG		

IR08B020	1.25	3.25	6.25
AS	.68 MG/KG	3.8 MG/KG	
CR	888 MG/KG	573 MG/KG	1340 MG/KG
MN	628 MG/KG	872 MG/KG	555 MG/KG
NI	1450 MG/KG	1000 MG/KG	1880 MG/KG
TOG		1400 MG/KG	

IR08B035	1.75	3.25	5.75
4,4'-DDD		3000 UG/KG	
4,4'-DDE		2400 UG/KG	
AROCLOR-1260	430 UG/KG		
AS	5.8 MG/KG	2.9 MG/KG	3.9 MG/KG
BE	.52 MG/KG	.35 MG/KG	.32 MG/KG
CU			127 MG/KG
MN	932 MG/KG	789 MG/KG	936 MG/KG
NI	235 MG/KG	205 MG/KG	
PB	26 MG/KG	23.9 MG/KG	53.8 MG/KG
TOG		6700 MG/KG	4400 MG/KG
ZN	112 MG/KG		259 MG/KG

IR08B027	1.25	5.75
AS	2.7 MG/KG	
BE	.38 MG/KG	
MN	703 MG/KG	880 MG/KG
PB	34.3 MG/KG	
V		122 MG/KG

IR08B027A	1.25
AROCLOR-1260	450 UG/KG
AS	3.8 MG/KG
CR	212 MG/KG
MN	755 MG/KG
NI	573 MG/KG
PB	47.1 MG/KG
ZN	127 MG/KG

IR08B034	1.25	3.25	5.75
AS	2.6 MG/KG	11.6 MG/KG	3.4 MG/KG
BE	.45 MG/KG	.55 MG/KG	.7 MG/KG
CR		312 MG/KG	
MN	872 MG/KG	1550 MG/KG	763 MG/KG
NI	343 MG/KG	380 MG/KG	
PB	14.7 MG/KG		
TOG	6900 MG/KG		
V		128 MG/KG	
ZN		135 MG/KG	

IR08B026	1.25
AS	7.3 MG/KG
BA	540 MG/KG
BE	.63 MG/KG
MN	1980 MG/KG
PB	12.6 MG/KG

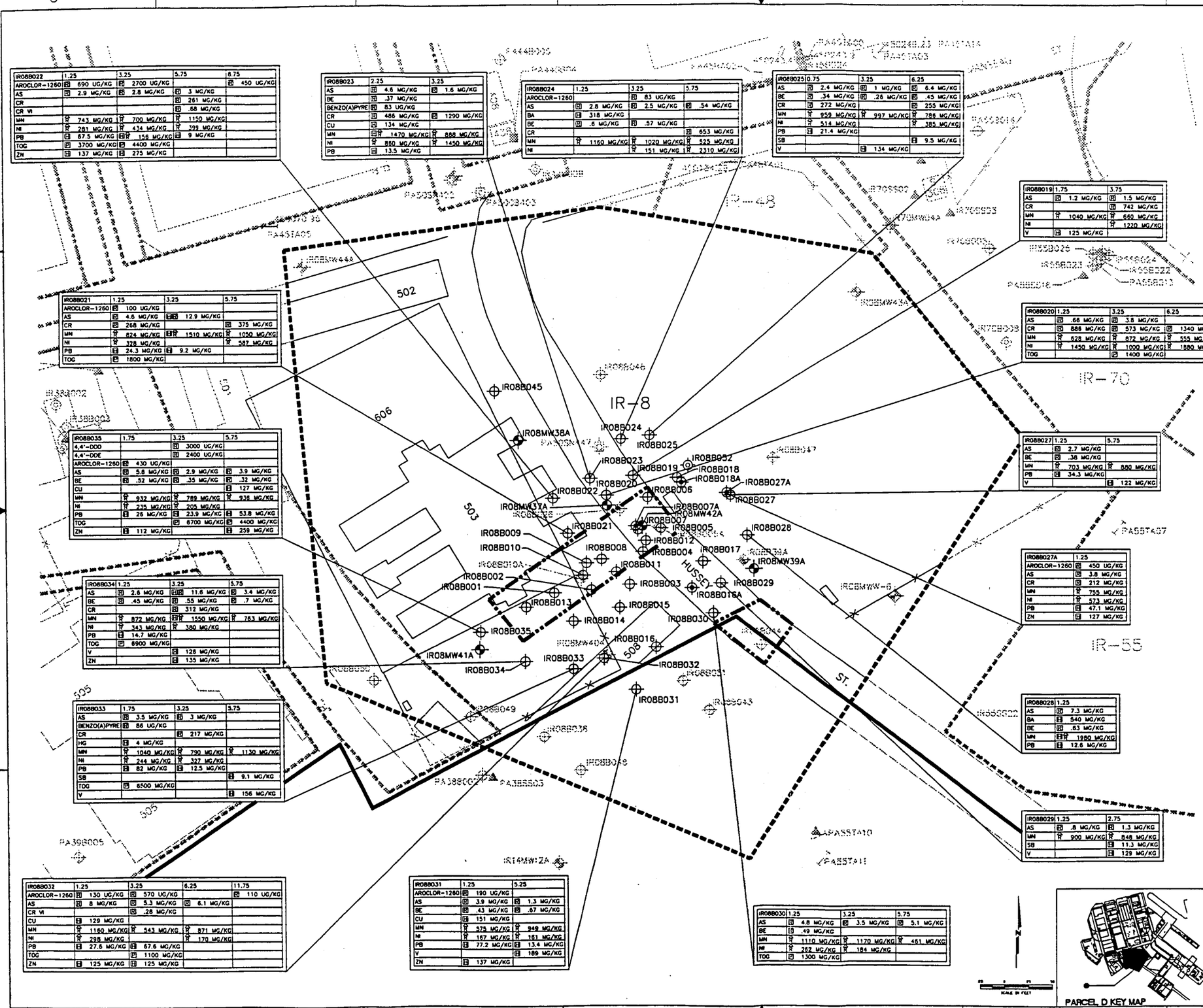
IR08B033	1.75	3.25	5.75
AS	3.5 MG/KG	3 MG/KG	
BENZO(A)PYRE	86 UG/KG		
CR		217 MG/KG	
HG	4 MG/KG		
MN	1040 MG/KG	790 MG/KG	1130 MG/KG
NI	244 MG/KG	327 MG/KG	
PB	82 MG/KG	12.5 MG/KG	
SB			9.1 MG/KG
TOG	6500 MG/KG		
V			156 MG/KG

IR08B029	1.25	2.75
AS	.8 MG/KG	1.3 MG/KG
MN	900 MG/KG	848 MG/KG
SB		11.3 MG/KG
V		129 MG/KG

IR08B032	1.25	3.25	6.25	11.75
AROCLOR-1260	130 UG/KG	570 UG/KG		110 UG/KG
AS	8 MG/KG	5.3 MG/KG	8.1 MG/KG	
CR VI		.28 MG/KG		
CU	129 MG/KG			
MN	1160 MG/KG	543 MG/KG	871 MG/KG	
NI	298 MG/KG		170 MG/KG	
PB	27.6 MG/KG	67.6 MG/KG		
TOG		1100 MG/KG		
ZN	125 MG/KG	125 MG/KG		

IR08B031	1.25	5.25
AROCLOR-1260	190 UG/KG	
AS	3.9 MG/KG	1.3 MG/KG
BE	.43 MG/KG	.67 MG/KG
CU	151 MG/KG	
MN	575 MG/KG	949 MG/KG
NI	167 MG/KG	161 MG/KG
PB	77.2 MG/KG	13.4 MG/KG
V		189 MG/KG
ZN	137 MG/KG	

IR08B030	1.25	3.25	5.75
AS	4.8 MG/KG	3.5 MG/KG	5.1 MG/KG
BE	.49 MG/KG		
MN	1110 MG/KG	1170 MG/KG	461 MG/KG
NI	252 MG/KG	184 MG/KG	
TOG	1300 MG/KG		



LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
SOIL SAMPLE DEPTH (feet bgs)

IR07B049	2.75
TCE	38
As	0.0026

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (µg/kg) FOR OTHER ORGANICS.

ANALYTE

- EXCEEDS CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS HPAL
- EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPAL: OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

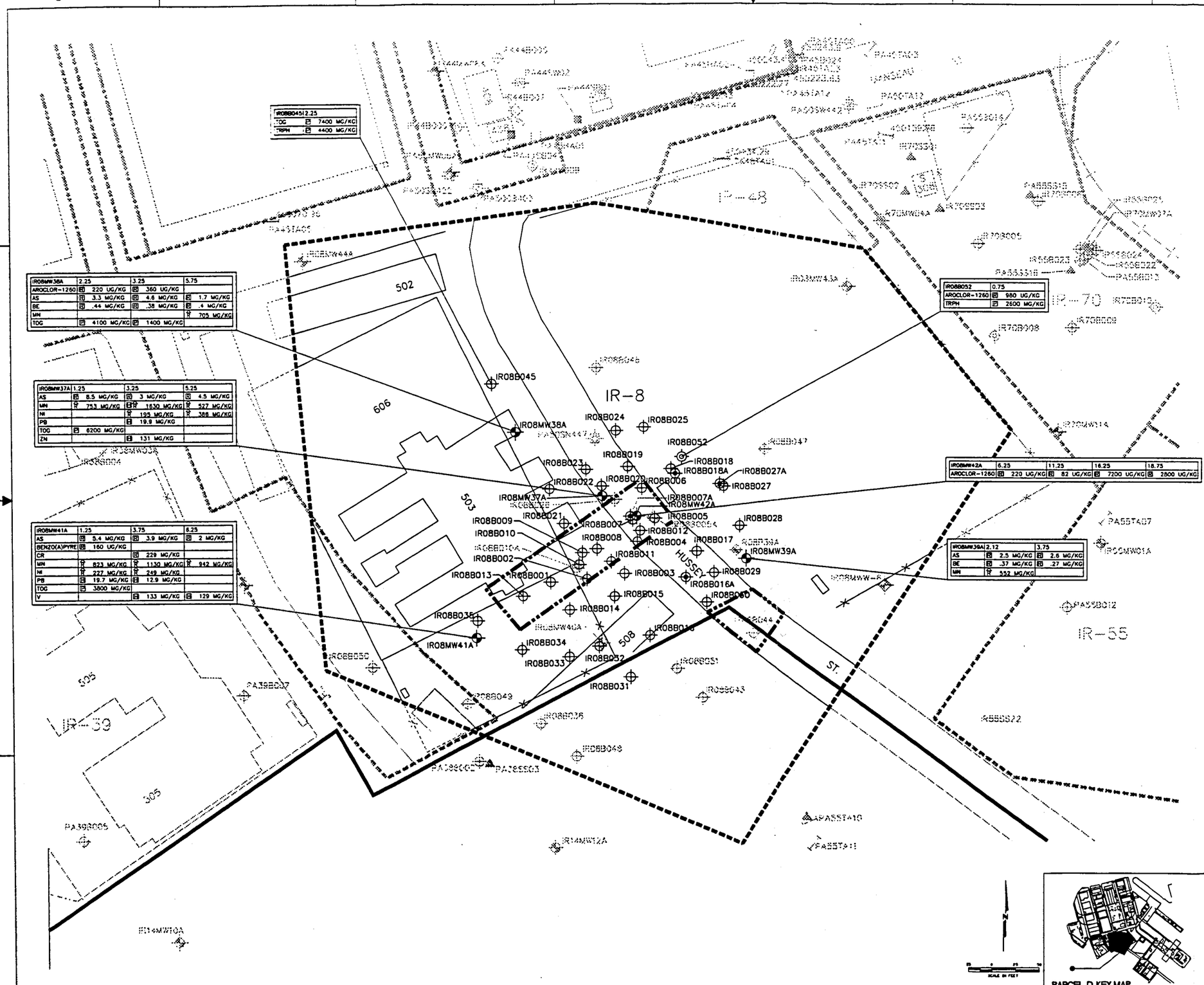
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.02-2 SHT 2 of 3

IR-08 SOIL RESULTS EXCEEDING SCREENING CRITERIA PARCEL D RI REPORT

DWG NO. IR-08 4.02-2 SH 2 REV A

FILE NAME: 0840222A.DWG



LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
SOIL SAMPLE DEPTH (feet bgs)

TCE	38
As	0.0029

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (µg/kg) FOR OTHER ORGANICS.

ANALYTE

- EXCEEDS CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS HPAL
- EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPALs OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

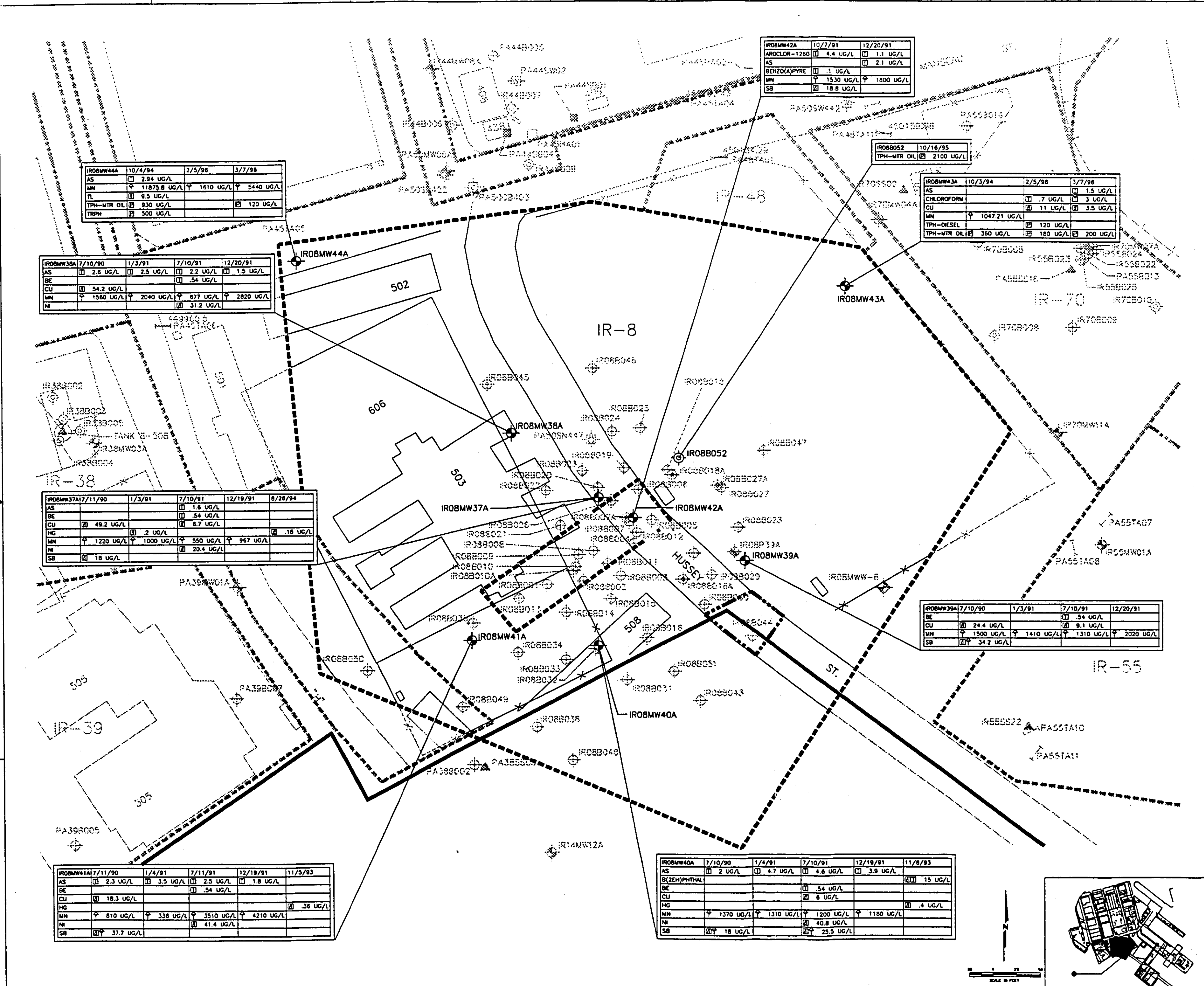
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.02-2 SHT 3 of 3

IR-08 SOIL RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-08 4.02-2 SH 3 REV A

FILE NAME: 0840223A.DWG



IR08MW44A	10/4/94	2/5/96	3/7/96
AS	2.94 UG/L		
MN	11875.8 UG/L	1610 UG/L	5440 UG/L
TL	9.5 UG/L		
TPH-MTR OIL	930 UG/L		120 UG/L
TRPH	500 UG/L		

IR08MW38A	7/10/90	1/3/91	7/10/91	12/20/91
AS	2.6 UG/L	2.5 UG/L	2.2 UG/L	1.5 UG/L
BE			.54 UG/L	
CU	54.2 UG/L			
MN	1560 UG/L	2040 UG/L	677 UG/L	2820 UG/L
NI			31.2 UG/L	

IR08MW37A	7/11/90	1/3/91	7/10/91	12/19/91	8/26/94
AS			1.6 UG/L		
BE			.54 UG/L		
CU	49.2 UG/L		6.7 UG/L		
HG		.2 UG/L			.16 UG/L
MN	1220 UG/L	1000 UG/L	550 UG/L	967 UG/L	
NI			20.4 UG/L		
SB	18 UG/L				

IR08MW42A	10/7/91	12/20/91
AROCLOR-1260	4.4 UG/L	1.1 UG/L
AS		2.1 UG/L
BENZO(A)PYRE	.1 UG/L	
MN	1530 UG/L	1800 UG/L
SB	18.8 UG/L	

IR08B052	10/16/95
TPH-MTR OIL	2100 UG/L

IR08MW43A	10/3/94	2/5/96	3/7/96
AS			1.5 UG/L
CHLOROFORM		.7 UG/L	3 UG/L
CU		11 UG/L	3.5 UG/L
MN	1047.21 UG/L		
TPH-DIESEL		120 UG/L	
TPH-MTR OIL	360 UG/L	180 UG/L	200 UG/L

IR08MW39A	7/10/90	1/3/91	7/10/91	12/20/91
BE			.54 UG/L	
CU	24.4 UG/L		9.1 UG/L	
MN	1500 UG/L	1410 UG/L	1310 UG/L	2020 UG/L
SB	34.2 UG/L			

IR08MW41A	7/11/90	1/4/91	7/11/91	12/19/91	11/5/93
AS	2.3 UG/L	3.5 UG/L	2.5 UG/L	1.8 UG/L	
BE			.54 UG/L		
CU	18.3 UG/L				
HG					.36 UG/L
MN	810 UG/L	336 UG/L	3510 UG/L	4210 UG/L	
NI			41.4 UG/L		
SB	37.7 UG/L				

IR08MW40A	7/10/90	1/4/91	7/10/91	12/19/91	11/8/93
AS	2 UG/L	4.7 UG/L	4.6 UG/L	3.9 UG/L	
B(2EH)PHTHAL					15 UG/L
BE			.54 UG/L		
CU			6 UG/L		
HG					.4 UG/L
MN	1370 UG/L	1310 UG/L	1200 UG/L	1180 UG/L	
NI			40.8 UG/L		
SB	18 UG/L		25.5 UG/L		

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
DATE OF GROUNDWATER SAMPLE, G=GRAB, OR HYDROPUNCH SAMPLE DEPTH.

ANALYTE
CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)
EXCEEDS CARCINOGENIC TAP WATER PRG
EXCEEDS NON-CARCINOGENIC TAP WATER PRG
EXCEEDS NAWQC
EXCEEDS MCL
EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE INORGANICS AND ORGANICS HITS EXCEEDING EITHER MCL, TAP WATER PRG, NAWQC REFERENCE VALUES OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW MCL, TAP WATER PRG, NAWQC REFERENCE VALUES AND PETROLEUM SCREENING CRITERIA.

PARCEL D KEY MAP

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

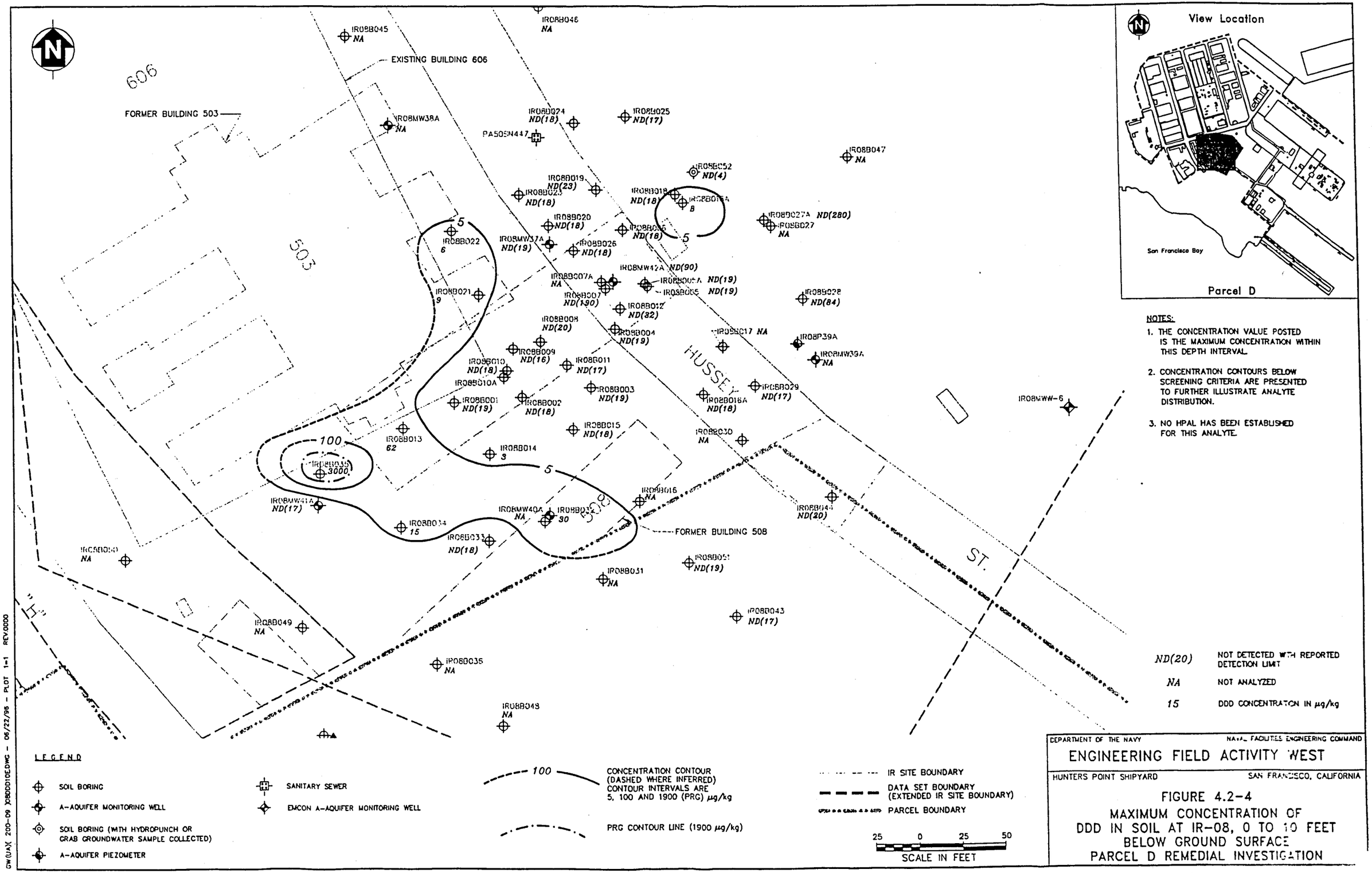
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

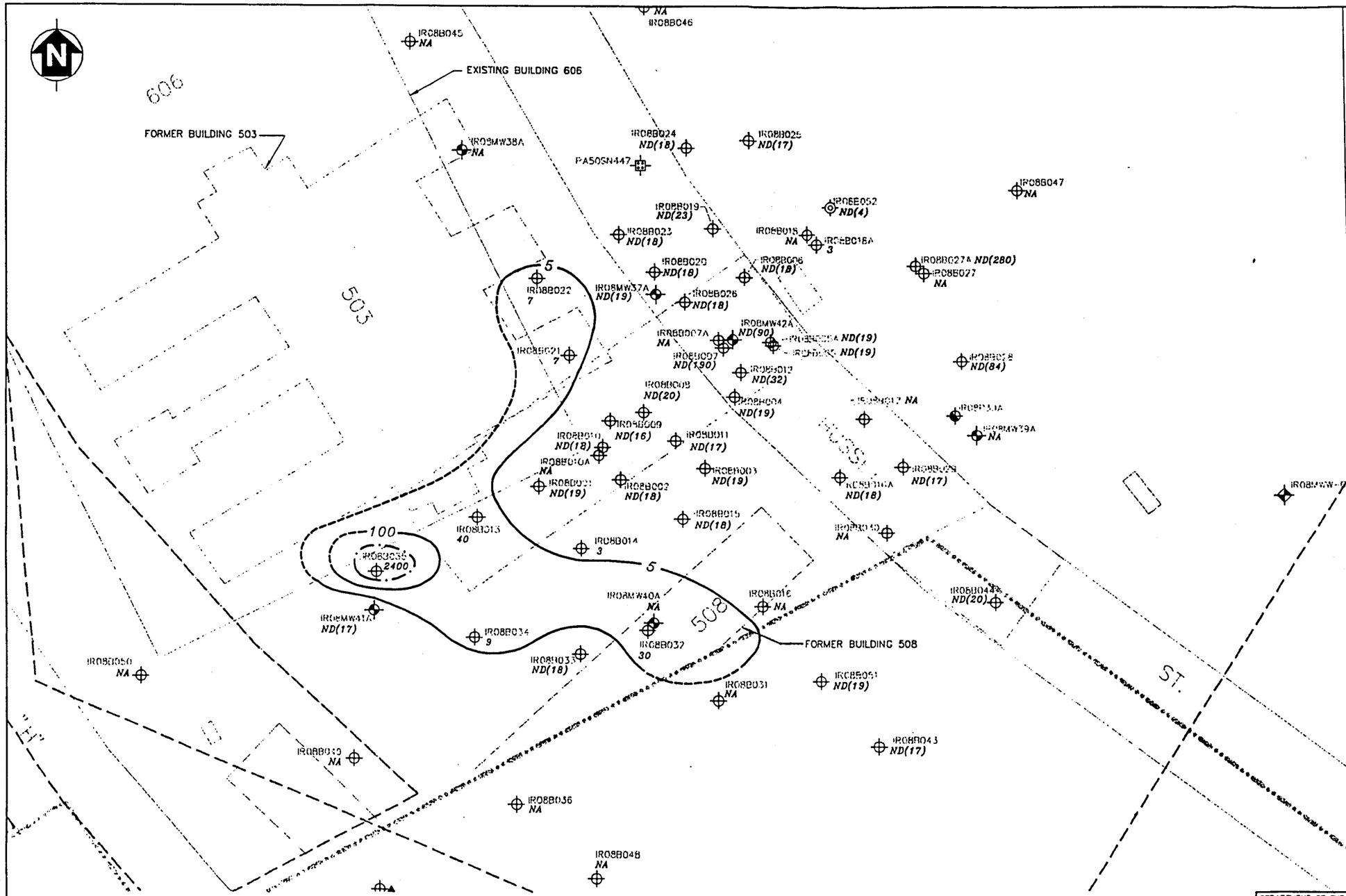
FIGURE 4.02-3 SHT 1 OF 1

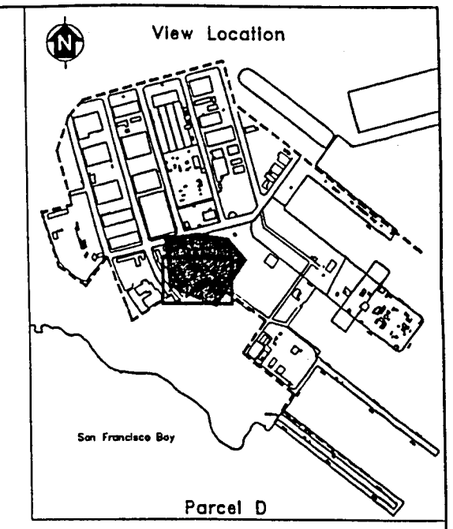
IR-08 GROUNDWATER RESULTS EXCEEDING SCREENING CRITERIA PARCEL D RI REPORT

DWG NO. IR-08 4.02-3 SH 1 REV A

FILE NAME: 0840231A.DWG


View Location
San Francisco Bay
Parcel D
NOTES:
1. THE CONCENTRATION VALUE POSTED IS THE MAXIMUM CONCENTRATION WITHIN THIS DEPTH INTERVAL.
2. CONCENTRATION CONTOURS BELOW SCREENING CRITERIA ARE PRESENTED TO FURTHER ILLUSTRATE ANALYTE DISTRIBUTION.
3. NO HPAL HAS BEEN ESTABLISHED FOR THIS ANALYTE.
EXISTING BUILDING 606
FORMER BUILDING 503
FORMER BUILDING 508
606
503
508
HUSSEY ST.
IR08B045 NA
IR08B046 NA
IR08MW38A NA
PA505N447
IR08B024 ND(18)
IR08B025 ND(17)
IR08B047 NA
IR05B052 ND(4)
IR08B019 ND(23)
IR08B023 ND(18)
IR08B018 ND(18)
IR08B016A B
IR08B027A ND(280)
IR08B027 NA
IR08B020 ND(18)
IR08B026 ND(18)
IR08MW37A ND(19)
IR08B022 6
IR08MW42A ND(90)
IR08B007A NA
IR08B007 ND(190)
IR08B006A ND(19)
IR08B005 ND(19)
IR08B028 ND(84)
IR08B021 9
IR08B012 ND(32)
IR08B008 ND(20)
IR08B004 ND(19)
IR05B017 NA
IR08P39A
IR08MW39A NA
IR08B009 ND(16)
IR08B010 ND(18)
IR08B011 ND(17)
IR08B010A
IR08B003 ND(19)
IR08B029 ND(17)
IR08B001 ND(19)
IR08B002 ND(18)
IR08B016A ND(18)
IR08MW-6
IR08B015 ND(18)
IR08B030 NA
IR08B013 62
IR08B014 3
IR08B031 3000
IR08B041A ND(17)
IR08MW40A NA
IR08B032 30
IR08B016 NA
IR08B044 ND(20)
IR08B034 15
IR08B033 ND(18)
IR08B050 NA
IR08B051 ND(19)
IR08B031 NA
IR08B043 ND(17)
IR08B049 NA
IR08B035 NA
IR08B048 NA
100
5
LEGEND
SOIL BORING
A-AQUIFER MONITORING WELL
SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
A-AQUIFER PIEZOMETER
SANITARY SEWER
EMCON A-AQUIFER MONITORING WELL
CONCENTRATION CONTOUR (DASHED WHERE INFERRED) CONTOUR INTERVALS ARE 5, 100 AND 1900 (PRG) µg/kg
PRG CONTOUR LINE (1900 µg/kg)
IR SITE BOUNDARY
DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)
PARCEL BOUNDARY
25 0 25 50
SCALE IN FEET
ND(20) NOT DETECTED WITH REPORTED DETECTION LIMIT
NA NOT ANALYZED
15 DDD CONCENTRATION IN µg/kg
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA
FIGURE 4.2-4
MAXIMUM CONCENTRATION OF DDD IN SOIL AT IR-08, 0 TO 10 FEET BELOW GROUND SURFACE
PARCEL D REMEDIAL INVESTIGATION
GW(UA)(200-09)08DDD10E.DWG - 06/22/96 - PLOT 1=1 REV0000





NOTES:

1. THE CONCENTRATION VALUE POSTED IS THE MAXIMUM CONCENTRATION WITHIN THIS DEPTH INTERVAL.
2. CONCENTRATION CONTOURS BELOW SCREENING CRITERIA ARE PRESENTED TO FURTHER ILLUSTRATE ANALYTE DISTRIBUTION.
3. NO HPAL HAS BEEN ESTABLISHED FOR THIS ANALYTE.

ND(20)	NOT DETECTED WITH REPORTED DETECTION LIMITS
2400	DDE CONCENTRATION IN µg/kg
NA	NOT ANALYZED

LEGEND

- SOIL BORING
- A-AQUIFER MONITORING WELL
- SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
- A-AQUIFER PIEZOMETER
- SANITARY SEWER
- EMCON A-AQUIFER MONITORING WELL
- IR SITE BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)
- PARCEL BOUNDARY
- 100 — CONCENTRATION CONTOUR (DASHED WHERE INFERRED) CONTOUR INTERVALS ARE 5, 100 AND 1300 (PRG) µg/kg
- PRG CONTOUR LINE (1300 µg/kg)

25 0 25 50
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

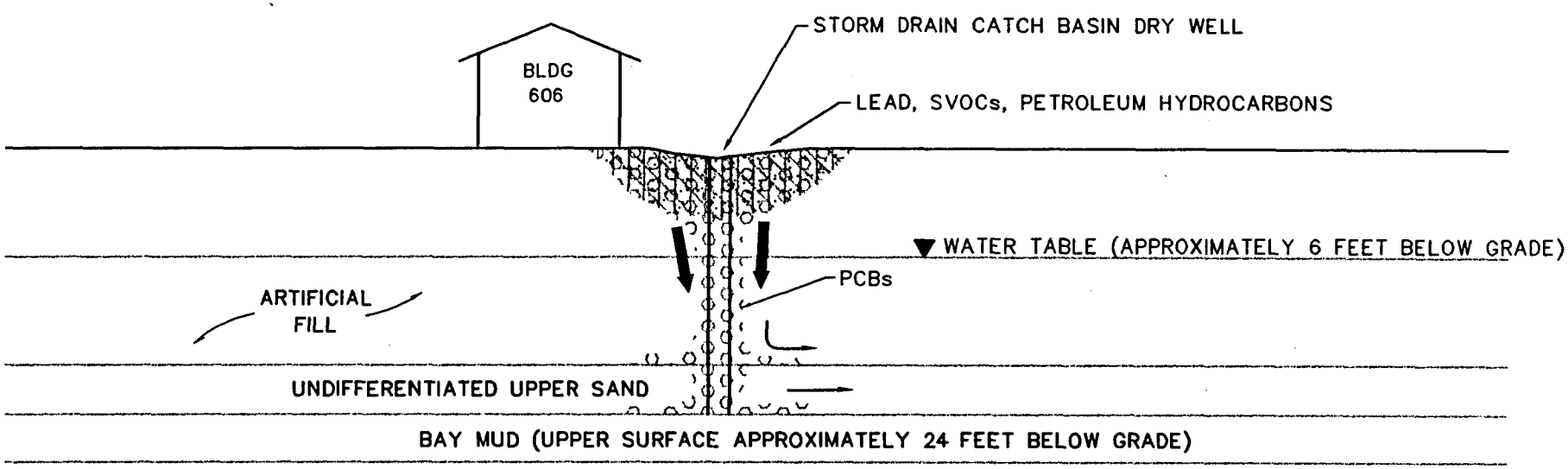
ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.2-5
MAXIMUM CONCENTRATION OF DDE IN SOIL AT IR-08, 0 TO 10 FEET BELOW GROUND SURFACE
PARCEL D REMEDIAL INVESTIGATION

GW(UA)(200-09)08DDE10E.DWG - 06/19/96 - PLOT 1=1 REV.0000

G:\200-09\402FIGS\MIG-08.DWG MDS JTK (10/09/96) PLOT:1.1



LEGEND

- MAJOR MIGRATION ROUTE
- MINOR MIGRATION ROUTE
- SVOC
- METALS
- PCB
- PETROLEUM HYDROCARBONS

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.2.4 AND 4.2.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.2-6

Schematic Cross Section Showing Migration of Main Contaminants at IR-08 Parcel D Remedial Investigation

PLANNING RESEARCH CORPORATION (PRC)
RESPONSE TO SAN FRANCISCO POLICE OFFICERS ASSOCIATION
COMMENTS ON THE PARCEL D
REMEDIAL INVESTIGATION DRAFT REPORT
HUNTERS POINT SHIPYARD

Comment: Sources of contamination at IR-08 are not thoroughly investigated.
The filed investigations described in Section 4.2 do not seem to match the bulleted list of potential contaminant sources listed on page 4-24. Page 4-24 of the draft report bullets six sources of potential contamination at IR-08. A seventh source was identified in the text. As far as we can tell, only two of these sources, related to PCB spillage, were addressed. Why were these five potential sources left out of the investigation?:

- Acidic solutions possibly containing metals, solvents, or other hazardous chemicals discharged into floor drains in former Building 503
- Fuel oil possibly leaked or spilled from the former aboveground storage tank near Building 503
- Pesticides discharged into floor drains in former Buildings 503 and 508
- Waste oil from maintenance in the former pump house
- Two oily grease traps located south and west of former Building 503.

Where were the floor drains in former Building 503 located? Was this area ever sampled? Where was the former above ground storage tank located? Where was the former pump house located? What evidence is there that waste oil from the pump house might have contaminated IR-08? Was the area associated with grease traps for former Building 503 ever sampled (located south and west of former Building 503)?

Response: The concern expressed is in regard to the thoroughness of the investigation of the contaminant sources at IR-08. This concern is a response to the description of seven potential sources in the document whereas only two were addressed. The evaluation of the five potential sources mentioned were addressed but not through sampling. Four of the potential sources sere located within the footprint of former Building 503, the Base Laundry, which was demolished in 1977-79. Building 606 was then built on the site in 1989. During the course of the construction of the building, the foundation excavation would have removed any signs or potential contamination from all of the potential contaminant sources mentioned with the exception of the former pump house. The pump house was located across Hussey Street and was investigated and was not found to have any signs of potential contamination. The steamline with the area of breakage which was mentioned was located along "H" Street, south of Building 606, and investigated under SI-45 with no potential risk found.

The reader should keep in mind that the Parcel D RI report summarizes the results of eight documents for this area. As such, it is not possible to include everything in this RI document. Of these eight documents, three were work plans, and five were reports of the results. All of these documents were thoroughly reviewed by the regulatory agencies and the Navy and available for public comment. The approaches and results were agreed to by all of the parties involved.

Comment: Page 4-23 implies that Figure 4.2-1 shows the location of the storm drain line that traverses the PCB spill area. This figure does not, in fact, show the storm drain line. Please add the storm drain line to the figure.

Where was the steam line located near former Building 503? Please indicate the location of the former steam line, and the area of the break reported to have occurred in the early 1980s, to Figure 4-2-1. Was spillage from this break cleaned up in 1988 as part of the interim remediation action?

Response: The location of the storm drain line that traversed the polychlorinated biphenyls (PCB) spill area has been added to Figure 4.2-1A. The approximate location of the former steam line will be added to Figure 4.2-1. The exact area of the break could not be determined from existing reports. The spillage from the break was cleaned up shortly after the break.

Comment: Page 4-26: Why was source characterization not conducted at IR-08?

Response: Source characterization was conducted at IR-08 by Environmental Resource Management (ERM-West) during their phased investigation of the PCB spill area between 1986 and 1987. Additional discussion of this work has been added to the text of the draft final Remedial Investigation (RI) report.

Comment: The 1988 interim remedial action at IR-08 needs to be better described.

Response: The area excavated during the 1988 interim remedial action has been added to Figure 4.2-1A, and additional text describing the remedial action has been added to the draft final RI report.

Comment: Section 4.2.1 discusses a 1988 interim remedial action at a PCB spill area near former building 503. This remedial action involved excavating and backfilling part of the PCB spill area. Please indicate on a map, perhaps on Figure 4-2-1, the exact location of the excavated and backfilled area. Please a more complete description of this interim remedial action. For example, Where were the 72 soil borings drilled? What did the 157 soil samples reveal? What is meant by the words "spill area?" Does this refer to the area contaminated as a result of the pipe rupture? Where, exactly, were transformers stored? What report gives this information? Please provide the 1986-1987 sampling data in the RI report.

Response: The locations of the 72 soil borings and the 157 soil samples are presented in the ERM-West reports to the Navy (ERM-West 1986 and ERM-West 1987). The results of the soil survey showed that four surface soil samples contained PCB concentrations below the California Administrative Code Title 22 regulatory requirement of 50 mg/kg in 1987. The study confirmed that the PCB contamination was spreading from the old transformer pad toward Hussy Street, and no measurable contamination was detected in the samples collected near the grease traps. The "PCB spill area" refers to the stained area to the south and east of the former transformer pad and is not related to the pipe rupture. The transformers were stored on a pad on the south side of the former Building 503. This information is in the ERM-West reports and the operable unit (OU) II RI Report (Harding Lawson and Associates [HLA] 1992). The location of the transformer pad has been added to Figure 4.2-1. This information has been added to the text of the draft final RI report.

Comment: Contamination plume appears to be poorly defined.
Why does sampling stop at the edge of Building 606, even through soil samples along the edge of the building show PCB contamination?

Response: The Navy believes that the extent of PCB contamination has been well defined through a series of phased investigations. The ERM-West reports (ERM-West 1986 and ERM-West 1987) do show several sampling locations that are within the footprint of Building 606.

Comment: It appears that significant PCB contamination exists along the perimeter of and for deeper soils in the IR-08 spill area. This suggests that the interim removal action was not only incomplete, but that the extent of possible PCB contamination is still unknown. How will the Navy approach developing remediation strategy in the feasibility study if the full extent of contamination is not known? What steps will be taken to ensure that the site is fully characterized?

Response: The Navy believes that the extent of PCB contamination has been defined to the degree required to prepare the human health risk assessment and the feasibility study. Additional investigation may be conducted if required to finalize the action to be taken at IR-08.

Comment: Contamination in the parking area on the south side of Building 606.
It appears that PCB contamination extends into the parking area located on the southern edge of the building. Will this contamination restrict use of this area, now or in the future?

Response: Although PCB contamination does extend under the parking lot, the risk evaluation conducted in the RI indicates no risk under an industrial worker scenario, with some risk under the residential scenario. The asphalt paving of the parking lot prevents any exposure to the low levels of PCB contamination present, particularly since those areas with higher levels were excavated to a depth of 8 feet and backfilled with clean gravel. The only restrictions for use in the present is that all intrusive work would require adequate safe guards. If the site were to be used for residential use in the future, a cleanup would be required.

Comment: Dry well may influence migration of PCBs.
Page 4-49 states that the dry well may have provided a migration pathway for PCBs, yet page 4-52 and 4-53 state that the PCBs are expected to remain in their present locations and not degrade. Please reconcile these statements.

Response: The liquid PCBs and PCBs sorbed to soil may have migrated down the dry well. Once PCBs are sorbed to soil, they are very insoluble in water and therefore immobile unless the material they are attached to is mobilized, such as by wind or water erosion.

Comment: The RI speculates that PCBs and other contaminants may be diffusing through the soil via the dry well associated with the stormwater system. What evidence do you have to support this conclusion? Where is the dry well located with respected to identified contamination? Figure 4.2-1 suggests that the dry well is located upgradient of the soil contamination. If this is the case, it seems likely that water flowing from the dry well will tend to push contamination south/southwest, possibly under Building 606.

Some contaminants at IR-08 appear to be present at depths associated with groundwater. How might groundwater influence migration of contaminants? Can they migrate into the storm drain line that traverses the area?

Response: The migration of contaminants present in the saturated zone and in the groundwater is discussed in Section 4.2.5 of the draft final RI report. The storm drain line present beneath IR-08 are not thought to have water infiltrating into them (Parcel D site inspection report [HLA] 1994) and are not thought to be a conduit for contaminants.

Comment: Past and on-going radiation studies are poorly integrated into the RI report.
The Phase III Radiation Investigation Field Work Plan suggests soil sampling for radiation in the vicinity of former Building 508. Please describe the reasons for this investigation in Section 4.2 of the RI report. How will results of the radiation investigation be integrated into the RI report, and the human health risk assessment? What previous radiation investigations have been conducted in the area?

Response: The Navy is incorporating into the RI report a risk assessment for each IR site that contains elevated radioactivity except in areas were only surface contamination exists. Concrete and asphalt surfaces will be evaluated based on acceptable surface contamination levels documented in 10 CFR 835, Appendix D and Nuclear Regulatory Commission (NRC) Regulation Guide 1.86. The soil surrounding former Building 508 will be evaluated for human health risks associated with possible contamination after the building was demolished. Because of the relative location of building 508 to the other 500 series buildings in Parcel E being evaluated for radiological constituents, the Navy will document the Navy's evaluation of Building 508 related to radiological issues in the Parcel E RI report (boundary of Parcel D and E splits the area where Building 508 previously existed).

Previous investigations or surveys were performed by Naval Radiological Defense Laboratory (NRDL), the Radiological Affairs Support Office (RASO), NRC, or the Atomic Energy Commission personnel prior to termination of the radioactive material licenses issued to HPS. If the building was known by Naval Radiological Defense Laboratory (NRDL) personnel to have used or stored radioactive material, the building was surveyed prior to terminating the radioactive material licenses issued to HPS by the Nuclear Regulatory Commission or the Atomic Energy Commission. The building was formerly used by NRDL as a health physics office. There is no evidence that any radioactive material was stored in Building 508.

After the building was demolished (date unknown), surface soils surrounding the former building was evaluated for radioactive contamination from post survey removal and relocation of radioactive material off site. A surface gamma survey was performed by the Navy in 1991. Results of the surface radiation survey is documented in the Surface Confirmation Radiation Survey (SCRS) Draft Report dated November 3, 1992. No elevated gamma activity was detected in the vicinity of Building 508 or any of the other 500 series buildings currently under investigation.

Comment: Why was radiation contamination at Building 346 not considered in the human health risk assessment?

Wind at Hunters Point may influence migration of contaminants, especially during cleanup.

Please provide a more complete discussion of wind patterns across Parcel D.

Response: Building 364 is expected to only contain surface contamination on asphalt or concrete; therefore, the site will be evaluated by comparing site specific radioactivity levels with acceptable surface radioactivity levels documented in 10 CFR 835, Appendix D and NRC Regulatory Guide 1.86. This comparison will determine the Navy's next course of action.

The climate at Hunters Point is discussed in Section 3.3 of the draft final RI report. Several more detailed reports are cited in this section if more information is required.

PLANNING RESEARCH CORPORATION (PRC) RESPONSE TO ARC ECOLOGY COMMENTS ON THE PARCEL D REMEDIAL INVESTIGATION DRAFT REPORT HUNTERS POINT SHIPYARD

Comment: **Index:** Please provide volume numbers for the figures.

Response: Section 1.2.3, Remedial Investigation, has been revised to include volume numbers for the figures.

Comment: **List of Acronyms:** DNAPL needs to be added to the list.

Response: The acronym, DNAPL, has been added to the List of Acronyms.

SECTION 4.0: PARCEL D REMEDIAL INVESTIGATION

Comment: Page 4-66, and all other parcel-specific recommendations: It may not be appropriate to evaluate TPH at the IR sites under a petroleum corrective action plan since many of the sites also are contaminated with PCBs, heavy metals, and SVOCs. Why was this recommendations made for every IR-site?

Response: Any petroleum constituents that are cancer causing, i.e. benzene, are considered in the human health risk assessment. Specific petroleum hydrocarbons, other than those individual cancer causing constituents, are considered under the Petroleum Corrective Action Plan.

Comment: Figures 4.1-1 throughout 4.1-83: We do not find the 83, large-format, chemical-specific maps (requiring four three-inch binders and 83 plastic covers) to be useful or necessary. It seems that a less resource-intensive and better integrated approach to presenting this information may be possible, especially given congressional and DoD concerns about the cost of these projects. Furthermore, the expense of duplicating these oddly-formatted and bulky reports limits their availability to the public for review and comment.

Response: Figures 4.1-1 through 4.1-83 were in response to Cal EPA's and U.S. EPA's comments on the draft Parcel B RI. These figures show chemical specific concentrations and contours are shown where appropriate.

SECTION 4.2: IR-08

Comment: According to page 4-24, potential sources of contamination associated with former Building 503 include floor drains and exterior storage yards, but sampling was not done in areas outside the PCB spill area. How was sampling strategy for IR-08 developed?

Response: The concern expressed is in regard to the thoroughness of the investigation of the contaminant sources at IR-08. This concern is a response to the description of seven potential sources in the document whereas only two were addressed. The evaluation of the five potential sources mentioned were addressed but not through sampling. Four of the potential sources were located within the footprint of former Building 503, the Base Laundry, which was demolished in 1977-79. Building 606 was then built on the site in 1989. During the course of the construction of the building, the foundation excavation would have removed any signs or potential contamination from all of the potential contaminant sources mentioned with the exception of the former pump house. The pump house was located across Hussey Street and was investigated and was not found to have any signs of potential contamination. The steamline with the area of breakage which was mentioned was located along "H" Street, south of Building 606, and investigated under SI-45 with no potential risk found.

The reader should keep in mind that the Parcel D RI report summarizes the results of eight documents for this area. As such, it is not possible to include everything in this RI document. Of these eight documents, three were work plans, and five were reports of the results. All of these documents were thoroughly reviewed by the regulatory agencies and the Navy and available for public comment. The approaches and results were agreed to by all of the parties involved.

Comment: Page 4-26: Why was source characterization not conducted at IR-08?

Response: Source characterization was conducted at IR-08 by ERM-West during their phased investigation of the PCB spill area between 1986 and 1987. Additional discussion of this work has been added to the text of the draft final RI report.

Comment: The Navy used former Building 503 as a laundry. What is the possibility that dry-cleaning took place within Building 503?

Response: Based upon a records search, there is no evidence that Building 503 was used as a dry-cleaning facility.

Comment: Page 4-44 summarizes soil chemistry of IR-08. It appears that significant PCB contamination exists along the perimeter of IR-08, and for deeper soils in IR-08. This suggests that the extent of possible PCB contamination is still unknown. How will the Navy approach developing remediation strategy in the feasibility study if the full extent of contamination is not known? What steps will be taken to ensure that the site is fully characterized?

Response: The Navy believes that the extent of PCB contamination has been defined to the degree required to prepare the human health risk assessment and the feasibility study. Additional investigation may be required to finalize the action to be taken at IR-08.

Comment: We would like more information about the investigation of the PCB spill area, accomplished between 1986 and 1987. Where were the 72 soil borings drilled? What did the 157 soil samples reveal? What is meant by the words "spill area?" Does this refer to the area contaminated as a result of the pipe rupture? What report lists this data? Please provide the sampling data in the RI report.

Response: The locations of the 72 soil borings and the 157 soil samples are presented in the ERM-West reports to the Navy (ERM-West 1986 and ERM-West 1987). The results of the soil survey showed that four surface soil samples contained PCB concentrations below the California Administrative Code Title 22 regulatory requirement of 50 mg/kg in 1987. The study confirmed that the PCB contamination was spreading from the old transformer pad toward Hussy Street, and no measurable contamination was detected in the samples collected near the grease traps. The "PCB spill area" refers to the stained area to the south and east of the former transformer pad and is not related to the pipe rupture. The transformers were stored on a pad on the south side of the former Building 503. This information is in the ERM-West reports and the operable unit (OU) II RI Report (Harding Lawson and Associates [HLA] 1992). The location of the transformer pad has been added to Figure 4.2-1. This information has been added to the text of the draft final RI report.

Comment: Page 4-49 states that the dry well may have provided a migration pathway for PCBs, yet pages 4-52 and 4-54 state that the PCBs are expected to remain in their present locations and not degrade. Please reconcile these statements. The RI speculates that PCBs and other contaminants may be diffusing through the soil via the dry well associated with the stormwater system. What evidence do you have to support this conclusion? Where is the dry well located with respect to identified contamination? Figure 4.2-1 suggests that the dry well is located upgradient of the soil contamination.

Response: The liquid PCBs and PCBs sorbed to soil may have migrated down the dry well. Once PCBs are sorbed to soil, they are very insoluble in water and therefore immobile unless the material they are attached to is mobilized, such as by wind or water erosion.

SECTION 4.9: IR-33 SOUTH

Comment: We are concerned that potential radiation contamination prevented the Navy from thoroughly sampling the sumps and trenches outside Building 364. Does the Navy plan to sample this site after radiation contamination is removed?

Response: The areas identified above as sumps and trenches can be misleading. The area identified as a sump is actually a subsurface secondary containment vault which formerly housed a low-level radioactive waste (LLRW) storage tank. The areas identified as trenches is more accurately described as utility trenches. Both areas are constructed out of concrete. There is no exposed soil at the site. There were two known areas of surface contamination around the secondary containment vault and utility trenches. One of the

locations was a small peanut shaped area was found to have elevated gamma activity emanating from the surface. The spill area was approximately 15 feet from the vault and was approximately 10 by 20 feet in dimension. The first few inches of asphalt was excavated, contained, and disposed of off site. Confirmation sampling was performed to ensure all radioactive material was excavated and the results are documented in Allied Technology Group, Inc.'s final report that will be discussed in the draft final of the Parcel D RI report.

Additional investigatory work at Building 364 is being performed under phase III of the radiation investigation at HPS. Any area found to contain elevated radioactivity will be delineated, sampled, and characterized and the results will be documented in the final draft of the Parcel D RI. Any site where removal of contamination occurs, confirmation sampling will be performed.

The containment vault and utility trenches were previously surveyed by Naval Radiological Defense Laboratory (NRDL) personnel in response to the Navy's request that the radioactive material licenses issued to HPS be terminated. The survey and wipe sampling found no residual radioactivity above Nuclear Regulatory Commission (NRC) surface contamination levels listed in NRC Regulation Guide 1.86. However, because areas of elevated activity was detected in the utility trench during a surface gamma survey performed in 1991, additional surveys and sampling is proposed in the phase III radiation investigation field work plan.

SECTION 5.0: SUMMARIES AND RECOMMENDATIONS

Comment: Section 5.4.2: The potential data gaps section seems weak. We would like the data gaps section to address whether all sources of contamination within the IR site were explored, including soil testing for radiation.

Response: The RI/FS process involves preliminary assessments, site investigations, and remedial investigations. These activities have been conducted throughout HPS as documented in the previous approved work plan.

Historical documentation at HPS have documented areas where radiological materials have been stored and used. This documentation in conjunction with the Decomissioning Surveys of the National Radiological Commission were used to determine those areas that required further evaluation and screening. Those areas recommended for further evaluation are documented in the "Phase III Radiological Investigation, Draft Field Work Plan" (PRC, September 1996).

APPENDIX B: CALCULATION OF HUNTERS POINT AMBIENT LEVELS

Comment: Was this document ever approved by the regulators and finalized?

Response: The Hunters Point Ambient Levels were agreed upon by the California EPA and the Base Closure Team.

APPENDIX E: RADIOLOGICAL INVESTIGATIONS

Comment: Is Building 506 considered part of Parcel E?

Response: Yes, Building 506 is in Parcel E.

APPENDIX N: HUMAN HEALTH RISK ASSESSMENT

Comment: Petroleum contamination was not directly evaluated in the health risk assessment. Rather, BTEX is evaluated. What percentage of samples were analyzed for both BTEX and TPH? What percentage of samples analyzed for TPH alone, without BTEX? What percentage of samples were analyzed for BTEX alone without TPH? It seems that BTEX can be used as a stand-in for evaluating risk due to petroleum contami8nationonly if BTEX were analyzed for each time petroleum products were detected. In the absence of BTEX (and SVOC) data, we prefer the Navy use a surrogate method of evaluating risk due to TPH, as opposed to ignoring the TPH data altogether. In short, we disagree with the implied assertion that because TPH has not been assigned a toxicity value by EPA or DTSC, it poses no risk to human health.

Response: The following list contains analytical statistics for the 1,342 soil samples collected from 0 to 10 feet below ground surface:
85.0 percent was analyzed for both benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons (TPH)
8.6 percent was analyzed for TPH alone, without BTEX
0.0 percent was for BTEX alone, without TPH
2.4 percent was analyzed for TPH alone, without BTEX and SVOC
6.3 percent was analyzed for TPH, BTEX, or SVOC

The HHRA evaluated TPH data in a manner consistent with current California Environmental Protection Agency (Cal/EPA) and American Society for Testing and Materials (ASTM) approaches for evaluating petroleum hydrocarbon mixtures. Cal/EPA has adopted a constituent based approach that calls for evaluating the most toxic constituents of petroleum such as BTEX (Cal/EPA 1993. Memorandum Regarding Policy for the Evaluation of Risk from TPH at a Hazardous Waste Site. From TPH Task Group, Office of Scientific Affairs, and Department of Toxic Substances Control [DTSC]. To DTSC Toxicologists. April 26). Similarly, ASTM's "Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites" recommends selecting petroleum-related chemicals of concern such as BTEX and PAHs, to evaluate risk associated with TPHs (ASTM 1995. March 1). Data for individual organic chemical concentrations were available for all Parcel D samples on which TPH measurements were made. The HHRA

retained as COPCs and evaluated all individual organic chemicals detected in soil and groundwater at Parcel D, consistent with the Cal/EPA ans ASTM approaches.

As agreed upon by U.S. Environmental Protection Agency (EPA), DTSC, and the Navy for the Parcel B remedial investigation (RI) report (PRC 1996. Draft final Parcel B RI report. June 3), for sites with TPH contamination and no BTEX, an HPS site-specific TPH standard will be developed to evaluate potential risk to the environment and will be used as the TPH standard of clean up. The criteria will be presented in the draft final Parcel D feasibility study (FS). If the criteria are not available at the time the draft final FS is published, the criteria will be presented in the parcel D record of decision (ROD).

Comment: It appears that exposure under the worker scenario is evaluated for a 24 hour work day. Was 24 hours assumed for estimating worker dose, or should the description of assumptions used in the exposure dose equations be modified to account for exposures of shorter duration?

Response: The combination of exposure parameters used to estimate risk and hazards under the current and future industrial scenario take into consideration that workers do not work 24 hours per day. The exposure parameters used to evaluate the worker scenario are default values cited in EPA and Cal/EPA guidance documents to be health protective (EPA 1989. "Risk Assessment Guidance for Superfund [RAGS]: Volume I -- Human Health Evaluation Manual [Part A]." EPA/540/1-89/002. December); EPA 1995. "EPA Region IX Preliminary Remediation Goals [PRGs] -- First Quarter 1995." February 1); DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January. The descriptions of assumptions used in the exposure dose equations should not be modified to account for exposures of shorter duration.

Comment: We are concerned that past and on-going radiation studies are poorly integrated into the RI report. Known radiation contamination at Building 346, 315A, and surrounding grounds are not considered in the human health risk assessment. Why was residual radiation contamination not evaluated in the health risk assessment?

Response: It is anticipated that radiation contamination at Buildings 351A and 364 and surrounding areas consist of surface contamination only and does not involve soil or groundwater contamination. During Phase III of the radiation investigation, surface contamination at these buildings and surrounding areas will be compared to acceptable surface radioactivity levels listed by the Nuclear Regulatory Commission (NRC) Regulatory Guide 1.86 and will be used as acceptable radiation levels. NRC and DoD follow NUREG 1.86 (U.S. Nuclear Regulatory Commission 1974. NRC. RG 1.86. Regulatory Guide 1.86. June), which are the same standards adopted by EPA in 10 CFR Part 835.

We value this opportunity to comment on the Parcel D RI and look forward to working with you to address our concerns.

APPENDIX C

AIR MONITORING REPORT
EXCERPTED FROM DRAFT FINAL PARCEL D RI REPORT

1.0 AIR QUALITY MONITORING

As part of the Navy's commitment to clean up its deactivated shipyard at Hunters Point Shipyard (HPS), it is conducting a remedial investigation and feasibility study (RI/FS) at the site. As part of the RI/FS, the Navy is evaluating air quality at HPS to help assess potential risks to human health and the environment. This appendix presents the results and conclusions for the ambient and indoor air monitoring conducted at Parcel D.

1.1 AMBIENT AIR MONITORING

Ambient air monitoring was conducted to evaluate whether gases are being emitted into the outside air by on-site sources of contamination and whether contaminated soil is becoming suspended in ambient air as particulates.

1.1.1 Background

Three investigations have been conducted at HPS to evaluate ambient air quality and, in particular, to assess whether gases are being emitted into the air by potential sources of contamination or whether particulate contamination from contaminated soil is being carried from the place of origin. The first air quality investigation was a component of a risk assessment performed for a proposed housing area (ATT 1987). The second air quality investigation is referred to as Phase I (HLA 1992a) and was conducted in 1991. The scope of the Phase I investigation consisted of only four monitoring stations (referred to as sites or locations); as a result of Phase I, a basewide air monitoring program, referred to as Phase II, was recommended. The scope of the Phase II investigation consisted of 17 locations throughout HPS and was conducted between June and August 1994 (Brown and Caldwell 1995). Five of these locations (Locations 5, 8, 10, 18, and 19) are in Parcel D.

This report presents the ambient air quality data from the Phase II basewide air monitoring program conducted at Parcel D at HPS. The assessment of air quality at Parcel D is based on samples collected from Locations 5, 8, 10, 18, and 19 (see Figure D-1). Location 5 is in the northwestern portion of Parcel D, near Site IR-36. Location 8 is in the southeastern portion of Parcel D near Site IR-17. Location 10 is

in the northeastern portion of Parcel D near Site IR-22. Location 18 is in the southern portion of Parcel D near Site IR-08. Location 19 is in the northern portion of Parcel D near Site IR-34.

1.1.2 Phase II Parcel D Air Quality Monitoring Results

The Phase II air monitoring program measured concentrations of asbestos, formaldehyde, metals, semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs) at 17 locations at HPS. This report presents results for air quality monitoring conducted at Parcel D. Table D-1 shows air quality monitoring results from the Phase II investigation at Parcel D. Air quality data for Locations 5, 8, 10, 18, and 19 are presented alongside 4-year average concentrations from California Air Resources Board (CARB) sites in the vicinity of HPS (Richmond, Fremont, and San Francisco) and U.S. Environmental Protection Agency (EPA) Region IX preliminary remediation goals (PRGs).

The Parcel D air data are the maximum concentrations noted over the sample period. For nondetect samples, the detection limit is reported only if no data exist. Potential chemicals of concern are addressed in the HPS results. In general, PRGs are used only as the predictor of single-contaminant risk estimates for specific environmental media, in this case, air. A contaminant concentration that exceeds a PRG level does not, in itself, mean that there is an unacceptable risk to human health. However, concentrations that exceed the PRGs should be evaluated further. In this report, the PRGs are used only as a screening measure for human health concerns.

Wind measurements made while collecting ambient air samples at HPS showed that the prevailing wind direction was from the west, as expected. Also, the presence of analytes associated with bedrock and bedrock-derived fill materials and the temporary presence of sandblast grit piles appear to have contributed to the detection of certain analytes during ambient air sampling at HPS.

The ambient air results are summarized below.

Asbestos

Asbestos was not detected in any of the air samples collected at Parcel D. There is no PRG for asbestos, and CARB has not collected asbestos data for bay area air.

Formaldehyde

Formaldehyde was detected at Locations 5, 8, 10, 18, and 19 at concentrations exceeding the PRG, which is equivalent to the average CARB concentration detected from 1989 through 1992. Air ambient levels of formaldehyde at Parcel D appear to be typical for the San Francisco Bay area.

Metals

Barium, cadmium, chromium, copper, lead, mercury, and zinc were detected in air samples collected at Parcel D. CARB data show similar results. Only cadmium and chromium exceeded PRGs. Cadmium exceeded the PRG at Location 8, and chromium exceeded the PRG at all five locations. No PRGs have been established for copper, lead, or zinc. The serpentine bedrock and serpentine fill at HPS may contribute to the overall concentration of metals such as chromium, and nickel in the ambient air at HPS.

Volatile Organic Compounds

The VOCs detected in Parcel D ambient air samples are chloromethane, dichloromethane, acetone, trichlorofluoromethane, 1,1,1-trichloroethane, benzene, toluene, ethylbenzene, m,p-xylene, o-xylene, and styrene. CARB data contain average concentrations for 17 VOCs in HPS ambient air. The CARB data show similar results; however, concentrations detected at HPS are generally lower than the CARB average concentrations. Concentrations of chloromethane at Location 18 and benzene at Locations 5, 8, 10, 18, and 19 exceeded PRGs.

Semivolatile Organic Compounds

SVOCs detected in air samples collected at Parcel D are phenol, 1,4-dichlorobenzene, 2-methylphenol, 4-methylphenol, isophorone, benzoic acid, naphthalene, 2-methylnaphthalene, acenaphthylene,

diethylphthalate, fluorene, phenanthrene, di-n-butylphthalate, bis(2-ethlyhexyl)phthalate, and di-n-octylphthalate. CARB data contain average concentrations for six SVOCs in HPS ambient air; however, none of these SVOCs were detected at Parcel D. This may be because detection limits used at HPS are higher than CARB detection limits. Therefore, a comparison to CARB averages is not possible. The SVOC detected at the highest concentration is bis(2-ethylhexyl)phthalate, which is the only one detected at concentrations exceeding the PRGs. This is a common laboratory contaminant.

1.2 INDOOR AIR MONITORING

An indoor air quality investigation was conducted at HPS in January and February 1996 to obtain data on air quality inside HPS buildings. The investigation focused on buildings where dense nonaqueous-phase liquids (DNAPL) in groundwater have migrated under building foundations. It is possible that VOCs could diffuse into soil gas, be transported through pore spaces within subsurface soil, and enter the buildings through cracks or openings in the walls or floors. Parcel D monitoring was conducted at two locations within Building 406 (406A and 406B), and one location within Building 411. The air quality monitoring effort measured the surface VOC emission rates from the floors of the buildings, and the concentrations of VOCs inside the buildings in the breathing zone.

1.2.1 Surface Emission Rate Monitoring

Surface emission rates, which were measured with isolation head space chambers, were input into a box dispersion model to estimate indoor VOC concentrations resulting specifically from VOC emissions from the building floor. The box dispersion model assumes that emissions are mixed evenly in a user specified volume of air. An air exchange rate of 0.00023 exchanges per second (equivalent to 0.8 exchanges per hour) was assumed for each building modeled (ASTM 1994). This air exchange rate was then used to estimate an associated wind speed for input into the box model. The box dispersion model equation is given by:

$$C = \frac{\Delta x}{z_i} \frac{Q_a}{u}$$

where C = Concentration, grams per cubic meter
Δx = Distance over which emissions exist, meters
z_i = Mixing layer, meters
Q_a = Emission rate, grams per square meter per second
u = Wind speed, meters per second

Results of the box dispersion model VOC concentrations were compared to the PRGs.

1.2.2 Breathing Zone Monitoring

Breathing zone samples were also collected in Buildings 406 and 411. Whole air samples were collected from the breathing zone, approximately 5 to 6 feet above ground, in each building. Results of the VOC samples were compared directly to PRGs.

1.2.3 Indoor Air Monitoring Results

Table D-2 shows the indoor air quality monitoring results in Parcel D. Data collected in Buildings 406 and 411 are presented in Table D-2, and are compared with PRGs.

<u>Box Dispersion Model VOC Concentrations</u>

The results of the box dispersion model indicate that 12 VOCs were present in the air at the sampling location in Building 406A, 17 VOCs were present in the air at the sampling location in Building 406B, and six were in Building 411 air. The concentration of trichloroethene modeled from the isolation head space chamber measurement exceeded the PRG at the sampling location in Building 406A, and modeled concentrations of benzene, trichloroethene and chloroform at the sampling location in Building 406B exceeded PRGs. At the sampling location in Building 411, the modeled concentration of chloroform exceeded its PRG. As seen in Table D-2, box dispersion model chemical concentrations from the head space chambers are significantly lower than indoor whole air breathing zone concentrations. This could be a result of unusually moist soil conditions where isolation head space chambers were placed. The moist soil conditions may have reduced the migration rate of VOCs through the soil.

Breathing Zone VOC Concentrations

The results of indoor air monitoring indicate that 13 VOCs were detected at the sampling location in Building 406A, 18 VOCs were detected at the sampling location in Building 406B, and 11 were detected at the sampling location in Building 411. Concentrations of trichloroethene and benzene exceeded PRGs at both sampling locations in Building 406, and tetrachloroethene also exceeded the PRG at the sampling location in Building 406B. At the sampling location in Building 411, benzene was detected at a level greater than the PRG.

1.3 CONCLUSIONS

The conclusions to the air monitoring conducted at HPS are divided into ambient air monitoring and indoor air monitoring. Indoor air monitoring is further divided by box dispersion model results and breathing zone sample results. The concentrations measured during the air monitoring effort were compared to the air PRGs as a screening measure to initially evaluate human health risks.

1.3.1 Ambient Air Monitoring

The HPS ambient air monitoring concludes that, for Parcel D, the results of the ambient sampling at HPS are similar to the bay area regional air quality monitoring results with only minor differences for possible contaminants such as asbestos, formaldehyde, metals, VOCs, and SVOCs. Resampling may be necessary in areas within HPS near a former sandblast grit pile, because it may have influenced sampling results.

Human health exposure risks for future occupants of the proposed housing sites will be no greater than for occupants of existing off-site residences located upwind of HPS (ATT 1987). With the exception of formaldehyde, cadmium, chromium, chloromethane, benzene, and bis(2-ethylhexyl)phthalate, the PRGs were not exceeded during ambient air quality investigations conducted at Parcel D.

1.3.2 Indoor Air Monitoring

The results of the indoor air quality investigation indicate that, generally, VOCs are present at Parcel D in Buildings 406 and 411 at low levels, below the PRGs. The exceptions are benzene, trichloroethene, chloroform, and tetrachloroethene which exceed the PRGs.

Box Dispersion Model Results

The box dispersion model VOC concentrations, modeled from isolation head space chamber measurements, were consistently lower than the VOC concentrations measured in the breathing zone. This could be a result of unusually moist soil conditions where the head space chambers were placed, resulting in reduced VOC migration through the soil. Although the box modeled concentrations were lower than the breathing zone samples, the elevated VOCs detected in the buildings were consistent between the two measurement techniques. The results show that concentrations of benzene, chloroform, and trichloroethene are slightly above the PRG levels.

Breathing Zone Sample Results

The breathing zone concentrations measure directly the VOC concentrations in the building air. Although the breathing zone samples cannot decipher between the various possible sources of VOC concentrations, they provide a measurement of the actual concentrations inside the buildings. The breathing zone samples in the Parcel D buildings show that the only VOCs with concentrations higher than the PRGs are benzene, trichloroethene, and tetrachloroethene.

TABLE D-1
MAXIMUM CONCENTRATIONS[1] VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGS
PARCEL D LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
Asbestos	ND (8,157)	ND (8,614)	ND (9,180)	ND (8,826)	ND (7,639)	NA	NA	S/Nm^3
Formaldehyde	2.59$^+$	4.08$^+$	3.85$^+$	2.51$^+$	3.10$^+$	2.25$^+$	0.15$^+$	μg/std.m^3
Metals:								
Antimony	ND (0.0361)	ND (0.0313)	ND (0.0388)	ND (0.0350)	ND (0.0325)	NA	NA	μg/std.m^3
Arsenic	ND (0.0010)	ND (0.0009)	ND (0.0011)	ND (0.0010)	ND (0.0009)	0.00076	0.00045	μg/std.m^3
Barium	0.0158	0.0295	0.0377	0.0364	0.0349	NA	0.52	μg/std.m^3
Beryllium	ND (0.0004)	ND (0.0003)	ND (0.0004)	ND (0.0003)	ND (0.0003)	0.000012	0.0008	μg/std.m^3
Cadmium	ND (0.0021)	0.0021$^+$	ND (0.0022)	ND (0.0020)	ND (0.0019)	0.0015	0.0011	μg/std.m^3
Chromium	0.0436$^+$	0.0071$^+$	0.0162$^+$	0.0089$^+$	0.0109$^+$	0.0034	0.00016	μg/std.m^3
Cobalt	ND (0.0155)	ND (0.0134)	ND (0.0166)	ND (0.0150)	ND (0.0139)	NA	1.0	μg/std.m^3
Copper	0.0633	0.0608	0.0354	0.0445	0.0314	NA	NA	μg/std.m^3
Lead	0.0131	0.0169	0.0125	0.0180	0.0126	0.037	NA	μg/std.m^3
Mercury	0.0001	ND (0.00009)	ND (0.0001)	0.0001	ND (0.00009)	NA	0.31	μg/std.m^3
Molybdenum	ND (0.0036)	ND (0.0031)	ND (0.0039)	ND (0.0035)	ND (0.0033)	NA	18.0	μg/std.m^3
Nickel	ND (0.0155)	ND (0.0134)	ND (0.0166)	ND (0.0150)	ND (0.0139)	0.0041	0.008	μg/std.m^3
Selenium	ND (0.0016)	ND (0.0013)	ND (0.0017)	ND (0.0015)	ND (0.0014)	NA	NA	μg/std.m^3
Silver	ND (0.0036)	ND (0.0031)	ND (0.0039)	ND (0.0035)	ND (0.0033)	NA	NA	μg/std.m^3
Thallium	ND (0.0010)	ND (0.0009)	ND (0.0011)	ND (0.0010)	ND (0.0009)	NA	NA	μg/std.m^3
Vanadium	ND (0.0155)	ND (0.0134)	ND (0.0166)	ND (0.0150)	ND (0.0139)	NA	NA	μg/std.m^3
Zinc	0.0392	0.0682	0.574	0.0484	0.0480	NA	NA	μg/std.m^3

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
Volatile Organic Compounds (VOCs):								
Chloromethane	0.821	0.484	0.652	1.641[+]	0.684	NA	1.1	$\mu g/std.m^3$
Bromomethane	ND (0.950)	ND (0.871)	ND (0.950)	ND (0.950)	ND (0.990)	NA	5.2	$\mu g/std.m^3$
Vinyl Chloride	ND (0.625)	ND (0.573)	ND (0.625)	ND (0.625)	ND (0.651)	NA	0.022	$\mu g/std.m^3$
Chloroethane	ND (0.645)	ND (0.591)	ND (0.645)	ND (0.645)	ND (0.672)	NA	NA	$\mu g/std.m^3$
Dichloromethane	0.920	1.786	0.955	2.901	ND (0.884)	4.07	NA	$\mu g/std.m^3$
Acetone	23.240	22.514	48.417	15.251	50.838	NA	370.0	$\mu g/std.m^3$
Carbon Disulfide	ND (7.610)	ND (6.976)	ND (7.610)	ND (7.610)	ND (7.927)	NA	10.0	$\mu g/std.m^3$
Trichlorofluoromethane	1.775	1.660	1.660	1.660	1.832	NA	730.0	$\mu g/std.m^3$
1,1-Dichloroethane	ND (0.990)	ND (0.908)	ND (0.990)	ND (0.990)	ND (1.031)	NA	520.0	$\mu g/std.m^3$
1,1-Dichloroethene	ND (0.969)	ND (0.888)	ND (0.969)	ND (0.969)	ND (1.009)	0.4038	0.038	$\mu g/std.m^3$
trans-1,2-Dichloroethene	ND (0.969)	ND (0.888)	ND (0.969)	ND (0.969)	ND (1.009)	NA	73.0	$\mu g/std.m^3$
Chloroform	ND (1.194)	ND (1.095)	ND (1.194)	ND (1.194)	ND (1.244)	0.1443	0.084	$\mu g/std.m^3$
1,2-Dichloroethane	ND (0.989)	ND (0.907)	ND (0.989)	ND (0.989)	ND (1.030)	NA	0.074	$\mu g/std.m^3$
1,1,1-Trichloroethane	1.779	ND (1.223)	ND (1.334)	ND (1.334)	4.391	11.1167	1000.0	$\mu g/std.m^3$
Carbon Tetrachloride	ND (1.538)	ND (1.410)	ND (1.538)	ND (1.538)	ND (1.602)	0.769	0.13	$\mu g/std.m^3$
2-Butanone	ND (7.210)	ND (6.609)	ND (7.210)	ND (7.210)	ND (7.510)	NA	1000.0	$\mu g/std.m^3$
Vinyl Acetate	ND (8.610)	ND (7.893)	ND (8.610)	ND (8.610)	ND (8.969)	NA	210.0	$\mu g/std.m^3$
Bromodichloromethane	ND (1.638)	ND (1.502)	ND (1.638)	ND (1.638)	ND (1.706)	NA	0.11	$\mu g/std.m^3$
1,2-Dichloropropane	ND (1.130)	ND (1.036)	ND (1.130)	ND (1.130)	ND (1.177)	NA	0.099	$\mu g/std.m^3$
trans-1,3-Dichloropropene	ND (1.110)	ND (1.018)	ND (1.110)	ND (1.110)	ND (1.156)	NA	0.052	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
VOCs (Continued):								
Trichloroethene	ND (1.314)	ND (1.205)	ND (1.314)	ND (1.314)	ND (1.369)	0.7665	1.1	$\mu g/std.m^3$
Benzene	3.580[+]	1.139[+]	1.464[+]	1.953[+]	2.929[+]	6.1829	0.23	$\mu g/std.m^3$
Chlorodibromomethane	ND (2.093)	ND (1.919)	ND (2.093)	ND (2.093)	ND (2.180)	NA	0.08	$\mu g/std.m^3$
1,1,2-Trichloroethane	ND (1.334)	ND (1.223)	ND (1.334)	ND (1.334)	ND (1.390)	NA	0.12	$\mu g/std.m^3$
cis-1,3-Dichloropropene	ND (1.110)	ND (1.018)	ND (1.110)	ND (1.110)	ND (1.156)	NA	0.052	$\mu g/std.m^3$
Toluene	11.129	4.221	7.675	5.373	14.966	13.0475	400.0	$\mu g/std.m^3$
Tetrachloroethene	ND (1.659)	ND (1.521)	ND (1.659)	ND (1.659)	ND (1.728)	1.3825	3.3	$\mu g/std.m^3$
Chlorobenzene	ND (1.126)	ND (1.032)	ND (1.126)	ND (1.126)	ND (1.173)	0.2487	21.0	$\mu g/std.m^3$
Ethylbenzene	2.213	2.257	1.195	1.416	1.372	1.77	1100.0	$\mu g/std.m^3$
m,p-Xylene	7.965	7.080	4.868	4.868	4.425	7.08	730.0	$\mu g/std.m^3$
o-Xylene	2.788	1.947	2.080	1.770	1.682	2.5665	730.0	$\mu g/std.m^3$
Styrene	ND (1.041)	11.278	ND (1.041)	ND (1.041)	ND (1.084)	0.9543	1100.0	$\mu g/std.m^3$
1,1,2,2-Tetrachloroethane	ND (1.679)	ND (1.539)	ND (1.679)	ND (1.679)	ND (1.749)	NA	0.033	$\mu g/std.m^3$
1,3-Dichlorobenzene	ND (1.470)	ND (1.348)	ND (1.470)	ND (1.470)	ND (1.531)	0.6125	NA	$\mu g/std.m^3$
1,4-Dichlorobenzene	ND (1.470)	ND (1.348)	ND (1.470)	ND (1.470)	ND (1.531)	0.9188	0.28	$\mu g/std.m^3$
1,2-Dichlorobenzene	ND (1.470)	ND (1.348)	ND (1.470)	ND (1.470)	ND (1.531)	0.4471	210.0	$\mu g/std.m^3$
Bromoform	ND (2.528)	ND (2.317)	ND (2.528)	ND (2.528)	ND (2.633)	NA	1.7	$\mu g/std.m^3$
2-Hexanone	ND (10.020)	ND (9.185)	ND (10.020)	ND (10.020)	ND (10.438)	NA	NA	$\mu g/std.m^3$
4-Methyl-2-pentanone	ND (10.020)	ND (9.185)	ND (10.020)	ND (10.020)	ND (10.438)	NA	NA	$\mu g/std.m^3$
2-Chloroethyl Vinyl Ether	ND (10.660)	ND (9.772)	ND (10.660)	ND (10.660)	ND (11.104)	NA	NA	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
Semivolatile Organic Compounds (SVOCs):								
Phenol	0.0172	0.0111	0.0118	0.0105	0.0172	NA	2,200.0	$\mu g/std.m^3$
bis(2-Chloroethyl)ether	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0058	$\mu g/std.m^3$
2-Chlorophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	18.0	$\mu g/std.m^3$
1,3-Dichlorobenzene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
1,4-Dichlorobenzene	0.0274	0.0140	0.0094	0.0126	0.0109	NA	0.28	$\mu g/std.m^3$
1,2-Dichlorobenzene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	210.0	$\mu g/std.m^3$
2-Methylphenol	0.0041	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	180.0	$\mu g/std.m^3$
bis(2-Chloroisopropyl)ether	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.19	$\mu g/std.m^3$
N-Nitroso-di-n-Propylamine	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.00096	$\mu g/std.m^3$
4-Methylphenol	0.0061	0.0052	0.0054	0.0040	0.0060	NA	18.0	$\mu g/std.m^3$
Hexachloroethane	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.48	$\mu g/std.m^3$
Nitrobenzene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	2.1	$\mu g/std.m^3$
Isophorone	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	0.0046	NA	7.1	$\mu g/std.m^3$
2-Nitrophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
2,4-Dimethylphenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	73.0	$\mu g/std.m^3$
Benzoic Acid	ND (0.0045)	0.0105	0.0240	0.0115	0.0169	NA	15,000.0	$\mu g/std.m^3$
bis(2-Chloroethoxy)methane	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
2,4-Dichlorophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	11.0	$\mu g/std.m^3$
1,2,4-Trichlorobenzene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	210.0	$\mu g/std.m^3$
Naphthalene	0.1013	0.0719	0.0486	0.0597	0.0604	NA	150.0	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
SVOCs (Continued):								
4-Chloroaniline	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	15.0	$\mu g/std.m^3$
Hexachlorobutadiene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.087	$\mu g/std.m^3$
4-Chloro-3-Methylphenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
2-Methylnaphthalene	0.0341	0.0359	0.0253	0.0220	0.0368	NA	NA	$\mu g/std.m^3$
Hexachlorocyclopentadiene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.073	$\mu g/std.m^3$
2,4,6-Trichlorophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.62	$\mu g/std.m^3$
2,4,5-Trichlorophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	370.0	$\mu g/std.m^3$
2-Chloronaphthalene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	290.0	$\mu g/std.m^3$
2-Nitroaniline	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.21	$\mu g/std.m^3$
Dimethylphthalate	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	37,000.0	$\mu g/std.m^3$
Acenaphthylene	ND (0.0045)	ND (0.0040)	ND (0.0035)	0.0047	ND (0.0038)	NA	NA	$\mu g/std.m^3$
2,6-Dinitrophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	7.3*	$\mu g/std.m^3$
3-Nitroaniline	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
Acenaphthene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	220.0	$\mu g/std.m^3$
2,4-Dinitrophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	7.3	$\mu g/std.m^3$
4-Nitrophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
2,4-Dinitrotoluene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	7.3	$\mu g/std.m^3$
Dibenzofuran	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	15.0	$\mu g/std.m^3$
Diethylphthalate	0.0097	0.0114	ND (0.0035)	0.0067	0.0165	NA	2,900.0	$\mu g/std.m^3$
Fluorene	ND (0.0045)	0.0028	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	150.0	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
SVOCs (Continued):								
4-Chlorophenyl-Phenyl Ether	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
4-Nitroaniline	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
4,6-Dinitro-2-Methylphenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
N-Nitrosodiphenylamine	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	1.4	$\mu g/std.m^3$
4-Bromophenyl-Phenyl Ether	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	NA	$\mu g/std.m^3$
Hexachlorobenzene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0042	$\mu g/std.m^3$
Pentachlorophenol	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.056	$\mu g/std.m^3$
Phenanthrene	0.0063	0.0066	0.0042	0.0091	0.0064	NA	NA	$\mu g/std.m^3$
Anthracene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	1100.0	$\mu g/std.m^3$
di-n-Butylphthalate	0.0543	0.0605	0.0251	0.0373	0.0355	NA	370.0	$\mu g/std.m^3$
Fluoranthene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	150.0	$\mu g/std.m^3$
Pyrene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	110.0	$\mu g/std.m^3$
Butylbenzylphthalate	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	730.0	$\mu g/std.m^3$
3,3'-Dichlorobenzidine	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.015	$\mu g/std.m^3$
Chrysene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.92	$\mu g/std.m^3$
Benzo(a)anthracene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0092	$\mu g/std.m^3$
bis(2-Ethylhexyl)phthalate	3.2107[+]	1.3907[+]	0.1223	1.3424[+]	0.1409	NA	0.48	$\mu g/std.m^3$
Di-n-Octylphthalate	0.0068	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	73.0	$\mu g/std.m^3$
Benzo(b)fluoranthene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.00030	0.0092	$\mu g/std.m^3$
Benzo(k)fluoranthene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.00011	0.092	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
SVOCs (Continued):								
Benzo(a)pyrene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.00024	0.00092	$\mu g/std.m^3$
Indeno(1,2,3-cd)pyrene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.00041	0.0092	$\mu g/std.m^3$
Dibenz(a,h)anthracene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.000058	0.00092	$\mu g/std.m^3$
Benzo(g,h,i)perylene	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	0.00068	NA	$\mu g/std.m^3$
Aldrin	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.00039	$\mu g/std.m^3$
alpha-BHC	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0011	$\mu g/std.m^3$
beta-BHC	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0037	$\mu g/std.m^3$
delta-BHC	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0038	$\mu g/std.m^3$
gamma-BHC	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0052	$\mu g/std.m^3$
Chlordane	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0052	$\mu g/std.m^3$
4,4'-DDD	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.028	$\mu g/std.m^3$
4,4'-DDE	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.02	$\mu g/std.m^3$
4,4'-DDT	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.02	$\mu g/std.m^3$
Dieldrin	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.00042	$\mu g/std.m^3$
Endosulfan I	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.18	$\mu g/std.m^3$
Endosulfan II	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.18	$\mu g/std.m^3$
Endosulfan Sulfate	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.18	$\mu g/std.m^3$
Endrin	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	1.1	$\mu g/std.m^3$
Endrin Ketone	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	1.1	$\mu g/std.m^3$
Heptachlor	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.0015	$\mu g/std.m^3$

TABLE D-1 (Continued)
MAXIMUM CONCENTRATIONS VERSUS
AVERAGE CONCENTRATIONS AT CARB SITES
AND U.S. EPA REGION IX PRGs
PARCEL D SITE LOCATIONS
HUNTERS POINT SHIPYARD

Compound	Location 5[a]	Location 8[a]	Location 10[a]	Location 18[a]	Location 19[a]	Average Concentration at CARB Sites[a]	Region IX PRG[b]	Units
SVOCs (Continued):								
Heptachlor Epoxide	ND (0.0045)	ND (0.0040)	ND (0.0035)	ND (0.0037)	ND (0.0038)	NA	0.00074	$\mu g/std.m^3$
Toxaphene	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.006	$\mu g/std.m^3$
Aroclor 1016	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.26	$\mu g/std.m^3$
Aroclor 1221	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.00087	$\mu g/std.m^3$
Aroclor 1232	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.00087	$\mu g/std.m^3$
Aroclor 1242	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.00087	$\mu g/std.m^3$
Aroclor 1248	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.0087	$\mu g/std.m^3$
Aroclor 1254	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.073	$\mu g/std.m^3$
Aroclor 1260	ND (0.0452)	ND (0.0404)	ND (0.0348)	ND (0.0375)	ND (0.0375)	NA	0.00087	$\mu g/std.m^3$

Notes:

'	Draft data (no data validation completed)
a	(Brown and Caldwell 1995)
b	(U.S. EPA 1995)
ND	Non-detect (detection limit given)
NA	Not available
+	Exceeds U.S. EPA Region IX PRG
*	U.S. EPA Region IX PRG for 2,4-Dinitrophenol. The compound 2,6-Dinitrophenol does not have a U.S. EPA Region IX PRG.
S/Nm^3	Total structures per normal cubic meter
$\mu g/std.m^3$	Micrograms per standard cubic meter

TABLE D-2
INDOOR AIR CONCENTRATIONS,
ISOLATION HEAD SPACE CHAMBER MODELED CONCENTRATIONS,
AND U.S. EPA REGION IX PRGs
PARCEL D BUILDINGS
HUNTERS POINT SHIPYARD

COMPOUND	BUILDING 406A[1]		BUILDING 406B[2]		BUILDING 411		U.S. EPA Region 9 PRG (μg/std.m^3)
	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	
Chloromethane	ND	ND	ND	ND	ND	ND	1.1
Bromomethane	ND	ND	ND	ND	ND	ND	5.2
Vinyl Chloride	ND	ND	ND	ND	ND	ND	0.022
Chloroethane	ND	ND	ND	ND	ND	ND	NA
Dichloromethane	5.306	U4	45.988	0.186	ND	ND	NA
Acetone	13.315	U4	29.05	U4	12.830	U4	370.0
Carbon Disulfide	ND	ND	ND	ND	ND	ND	10.0
Trichlorofluoromethane	3.607	ND	3.664	0.050	4.122	0.068	730.0
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	520.0
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	0.038
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	73.0
Chloroform	ND	0.046	ND	0.131[+]	ND	0.248[+]	0.084
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	0.074
1,1,1-Trichloroethane	ND	ND	3.113	0.043	ND	ND	1000.0
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	0.13

TABLE D-2 (continued)
INDOOR AIR CONCENTRATIONS,
ISOLATION HEAD SPACE CHAMBER MODELED CONCENTRATIONS[1],
AND U.S. EPA REGION IX PRGs
PARCEL D BUILDINGS
HUNTERS POINT SHIPYARD

COMPOUND	BUILDING 406A[1]		BUILDING 406B[2]		BUILDING 411		U.S. EPA Region 9 PRG (μg/std.m^3)
	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	
2-Butanone	U4	U4	57.079	U4	ND	ND	1000.0
Vinyl Acetate	ND	ND	ND	ND	ND	ND	210.0
Bromodichloromethane	ND	ND	ND	ND	ND	ND	0.11
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	0.099
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	0.052
Trichloroethene	2.026[+]	1.186[+]	87.600[+]	33.293[+]	ND	ND	1.1
Benzene	20.176[+]	0.229	16.271[+]	0.310[+]	4.556[+]	0.102	0.23
Chlorodibromomethane	ND	ND	ND	ND	ND	ND	0.08
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	0.12
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	0.052
Toluene	72.913	0.762	222.58	2.712	15.35	0.128	400
Tetrachloroethene	ND	ND	4.908[+]	ND	ND	ND	3.3
Chlorobenzene	ND	ND	ND	ND	ND	ND	21.0
Ethylbenzene	7.965	0.112	17.700	4.145	2.124	ND	1100.0
m,p-Xylene	29.648	0.407	70.800	17.454	7.965	0.066	730.0
o-Xylene	9.293	0.136	19.913	2.618	2.478	ND	730.0
Styrene	ND	ND	2.73	0.257	ND	ND	1100.0
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	0.033

TABLE D-2 (continued)
INDOOR AIR CONCENTRATIONS,
ISOLATION HEAD SPACE CHAMBER MODELED CONCENTRATIONS[1],
AND U.S. EPA REGION IX PRGs
PARCEL D BUILDINGS
HUNTERS POINT SHIPYARD

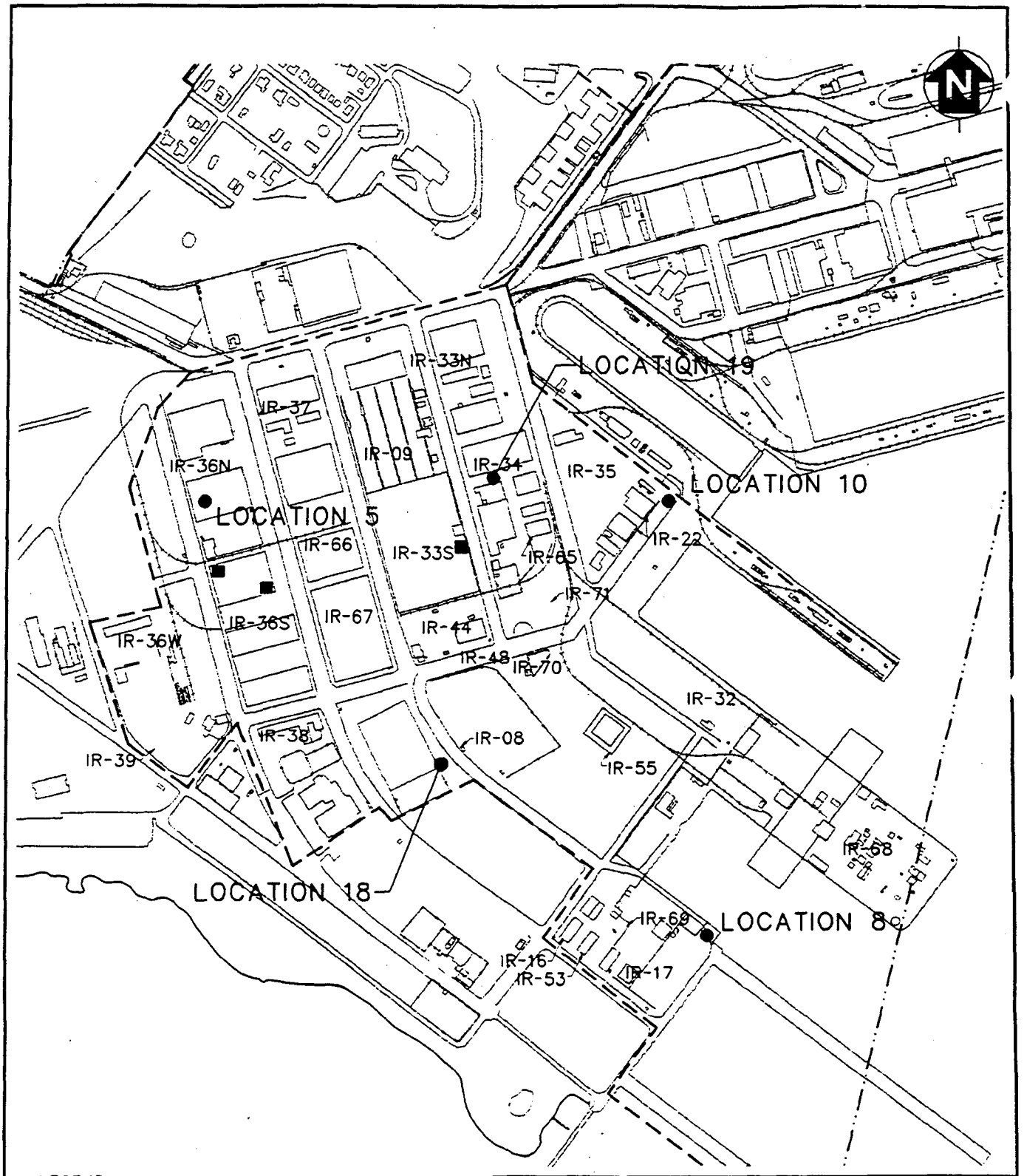
COMPOUND	BUILDING 406A[1]		BUILDING 406B[2]		BUILDING 411		U.S. EPA Region 9 PRG (μg/std.m^3)
	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	Indoor Air Concentration (μg/std.m^3)	Head Space Chamber Modeled Concentration (μg/std.m^3)	
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NA
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	0.28
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	210.0
Bromoform	ND	ND	ND	ND	ND	ND	1.7
2-Hexanone	ND	ND	ND	ND	ND	ND	NA
4-Methyl-2-pentanone	ND	ND	5.01	0.082	4.593	ND	NA
2-Chloroethyl vinyl ether	ND	ND	ND	ND	ND	ND	NA
1,2,4-Trimethylbenzene	10.017	0.226	18.030	0.354	2.755	ND	NA
1,3,5-Trimethylbenzene	3.005	0.075	5.008	0.107	ND	ND	NA
4-Ethyl toluene	10.083	0.173	17.142	0.323	2.874	ND	NA
cis-1,2-Dichloroethene	ND	0.058	ND	0.031	ND	ND	NA
Dichlorodifluoromethane	7.053	0.282	11.083	9.935	3.174	0.060	210

Notes:

NA Not applicable
ND Not detected
U4 Not detected due to compound's existence as a common laboratory contaminant
\+ Exceeds U.S. EPA Region IX PRG
1 406A = northeast quadrant of Building 406
2 406B = southwest quadrant of Building 406

REFERENCES

American Society for Testing and Materials (ASTM). 1994. "Emergency Standard Guide For Risk-Based Corrective Action Applied at Petroleum Release Sites." July.



LEGEND

■ INDOOR AIR SAMPLE LOCATIONS

● AMBIENT AIR MONITORING LOCATIONS

350 0 350 700

SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure D-1
Air Monitoring Locations
Parcel D
Parcel D Remedial Investigation

APPENDIX D

IR-38 SITE FINDINGS
EXCERPTED FROM DRAFT FINAL PARCEL D RI REPORT

4.16 IR-38: BUILDING 500 AND UST S-508

Site IR-38 was initially identified during the 1990 preliminary assessment as PA-38 (HLA 1990a). In 1995 the site was designated IR-38 in compliance with the basewide IR program (PRC 1995).

Site IR-38 is located in the southwest portion of Parcel D, near the intersection of "H" and Manseau Streets. The portion of the site which extends into Parcel E, will be discussed in the Parcel E RI report. The portion of the site the within Parcel D covers approximately 2.2 acres and consists of Building 500 and former UST S-508 (Figure 4.16-1). Building 500 was the former Chief Petty Officer (CPO) Barracks. During an inspection of the building, paint chips were observed in exposed soil surrounding the outside of the building. Reportedly, one electrical transformer associated with this building, was removed from an unknown location near the building and disposed of at an unknown location (HLA 1994b).

A 750-gallon UST (S-508) was located east of the southern extension of Building 500. The tank was installed in the mid-1940s and was used to store heating oil for a boiler in Building 500. The UST was constructed of steel, and the top of the UST was located approximately 3 feet bgs. Three pipes (suction, return, and vent) extended from the UST to Building 500. UST S-508 and its associated product piping were removed on July 25, 1991, during Phase I of the HPS UST program (PRC 1992b).

During removal of UST S-508, numerous holes in the tank were observed. Soil surrounding the UST was discolored, but did not exhibit a hydrocarbon odor. The UST excavation had an average depth of 7.5 feet bgs. Two soil samples were collected at 6.5 feet bgs in the UST excavation, and one soil sample was collected at 2.5 feet bgs in the product pipe trench. The samples were analyzed for VOCs, SVOCs, pesticides and PCBs, TPH, metals, tetraethyl lead, and ethylene dibromide. None of the soil samples contained metals at concentrations exceeding the screening criteria at the time of the UST closure. The SVOCs anthracene (3,700 μg/kg) and fluorene (2,200 μg/kg) were detected in concentrations exceeding the screening criteria at the time of the UST closure, in one soil sample collected at the southern end of the excavation. TPH-d and TPH-g were detected at concentrations of 3,900 and 360 mg/kg, respectively, in one soil sample collected at the southern end of the excavation, and TPH-d and TPH-g were detected at concentrations of 310 and 8.9 mg/kg, respectively, in one soil sample collected from the product pipe trench. VOCs, pesticides and PCBs, were not detected in any of the soil samples (PRC 1992b).

No groundwater was encountered in the excavation. Therefore, groundwater samples were not collected during the UST closure. Following removal of the tank, the excavation was lined with plastic and backfilled with the excavated soils (PRC 1992b).

Field observations and analytical results from soil samples collected during the UST closure indicated a release of petroleum hydrocarbons to surrounding soil. Based on the concentrations of SVOCs and TPH detected in the soil samples, additional investigation was recommended to define the vertical and lateral extent of soil contamination and to evaluate potential impact of contaminants to groundwater.

Potential contaminant sources identified at IR-38 are petroleum hydrocarbons from former UST S-508 and contaminants associated with paint chips.

RI field investigations, geology and hydrogeology, analytical results, the nature and extent of contaminants, contaminant fate and transport, the site specific risk assessment, and conclusions and recommendations for IR-38 are discussed in the following sections.

4.16.1 RI Field Investigations

In March 1993, an SI was conducted at IR-38. Field activities during this investigation consisted of collecting a single composite soil sample from four areas surrounding Building 500. Based on the results of the SI, IR-38 was recommended for additional investigation (HLA 1994).

Additional investigation of IR-38 was conducted between March 1993 and March 1996. The investigation consisted of soil and groundwater sampling to evaluate potential contaminants at the site, and aquifer characterization to evaluate specific hydrogeologic parameters. All field activities conducted between February 1993 and March 1996 are summarized in the table below. Two soil borings (IR08B049 and IR08B050) drilled in September 1991, and one monitoring well (PA39MW01A) installed in February 1993, within the IR-37 site boundaries, are included in the table. The only known removal action at IR-38 involved removal of UST S-508 in 1991 and the possible removal of a transformer.

RI Field Activities Summary					
Task	Number of Borings, Wells, or Samples	Characterization			
		Source	Soil	Groundwater	Aquifer
Soil Borings	2		X		
HydroPunch Borings	6		X	X	
Soil Samples[a]	25		X		
Groundwater Monitoring Wells	3			X	
Groundwater Samples[b]	15			X	
Storm Drain Sediment Samples	1	X			
Additional Activities					
Aquifer Testing (Slug Testing)					
Removal Action (UST S-508)					

Notes:

a Includes samples collected from soil, monitoring well, and HydroPunch borings, and one (composite) surface soil sample

b Includes nine samples collected from monitoring wells, five samples collected from HydroPunch borings, and one sample collected from an uncased boring

Figure 4.16-1 shows the sampling locations within, and near, the boundaries of IR-38. A discussion of the RI sampling procedures and field activities is presented in Appendix I. Boring logs, showing lithology and well construction details, are presented in Appendix J. Results of aquifer testing are presented in Appendix C. RI source, soil, groundwater, and aquifer characterization activities are discussed in the following sections.

Source Characterization

In March 1993, one storm drain sediment sample (PA50FC418) was collected from a flood control structure located near the northwest corner of IR-38 (Figure 4.16-1). This sample was analyzed for the chemical constituents listed in Table 4.16-1.

Soil Characterization

In September 1991, two soil borings (IR08B049 and IR08B050) were drilled to a depth of 7 feet bgs, in the southern corner of IR-38 (Figure 4.16-1). A total of six soil samples were collected between approximately 2 and 7 feet, from these borings, and analyzed for the chemical constituents listed in Table 4.16-4.

In February 1993, one monitoring well (PA39MW01A) was installed to a depth of 27 feet bgs, in the southern portion of IR-38 (Figure 4.16-1). The well was screened from 6 to 27 feet bgs, in the shallow portion of the A-aquifer. Three soil samples were collected between approximately 2 and 9 feet bgs and analyzed for the chemical constituents listed in Table 4.16-4. Groundwater samples were also collected from the completed well.

In March 1993, one composite surface soil sample (PA38SS01), containing paint chips, was collected from four locations at the base of the exterior walls of Building 500 (Figure 4.16-1). This sample was analyzed for the chemical constituents listed in Table 4.16-4.

In April 1994, six HydroPunch borings (IR38B002 through IR38B007) were drilled to depths of 16.5 feet bgs, each, in two areas south of Building 500 (Figure 4.16-1). A total of 15 soil samples were collected between approximately 6 and 16 feet bgs, from these borings, and analyzed for the chemical constituents listed in Table 4.16-4. HydroPunch and grab groundwater samples were also collected from these borings.

Groundwater Characterization

In April 1994, five HydroPunch groundwater samples were collected from borings IR38B003 through IR38B007, and one grab groundwater sample was collected from boring IR38B002. All six groundwater samples were collected between approximately 5 and 12.5 feet bgs. These samples were analyzed for the chemical constituents listed in Tables 4.16-10 and 4.16-13, respectively. A table listing HydroPunch and grab groundwater sample information is included in Appendix C.

Between September and October 1994, two monitoring wells (IR38MW01A and IR38MW03A) were installed at IR-38. Monitoring well IR38MW01A was installed near the northwestern boundary of the site, and well IR38MW03A was installed near the former UST site, south of Building 500 (Figure 4.16-1). These wells were screened between approximately 6 and 34 feet bgs. No soil samples were collected while drilling these monitoring wells.

Between February 1993 and March 1996, nine groundwater samples, including duplicates, were collected from monitoring wells IR38MW01A, IR38MW03A, and PA39MW01A and analyzed for the chemical constituents listed in Table 4.16-7.

Aquifer Characterization

In July 1994 and December 1995, slug testing was performed at monitoring wells IR38MW01A, IR38MW03A, and PA39MW01A. Results for the slug testing are presented in Appendix C and discussed in Section 4.16.2 (Hydrogeology).

4.16.2 Geology and Hydrogeology

This section discusses the surface conditions, geology, and hydrogeology at IR-38. An additional discussion of the surface soils at IR-38, at Parcel D, and at HPS is presented in Appendix H, and additional discussions of the geology and hydrogeology at Parcel D and at HPS are presented in Sections 3.7 and 3.8, respectively.

Surface Conditions

The surface soils at IR-38 consist of Urban Land and Orthents, reclaimed complex, with slopes between 0 and 2 percent (PRC 1994). Approximately 70 percent of the ground surface consists of asphalt or concrete pavement, or is covered by Building 500. The remaining 30 percent of the site is exposed soil (see Figure 4.16-1). A base-wide soil distribution map is shown on Figure 3.6-1.

Geology

The regional geology of the San Francisco Bay area is discussed in Section 3.7.1. Discussions of HPS and Parcel D geology are presented in Sections 3.7.2 and 3.7.3. A topographic and geologic map of HPS is shown on Figure 3.4-1. A geologic cross-section depicting an interpretation of the lithology at IR-38 is shown on Figure 3.7-14. Additional Parcel D cross-sections are shown on Figures 3.7-10 through 3.7-13, and 3.7-15. Locations of geologic cross-sections within Parcel D are shown on Figure 3.7-8.

Every borelog for IR-38 was considered during interpretation of lithology; all borelogs for this site, including geotechnical borelogs, are presented in Appendix J. Specific borelogs used to construct the cross-section for IR-38 include IR38MW02A, IR39B025, and IR39B026. Geotechnical borelogs used during interpretation of lithology at IR-38 include DMB239 and DMB241.

From the surface downward, the geologic units at IR-38 consist of Artificial Fill (Qaf), Bay Mud Deposits (Qbm), Undifferentiated Sedimentary Deposits (Qu), and Franciscan Complex (KJf) bedrock. The Artificial Fill consists predominantly of clay with gravel, and sand/gravel mix with localized coarse gravel and boulder fill, and ranges from 7 to 33 feet thick. Bay Mud Deposits consist of clay with a trace to 15 percent shell fragments. The thickness of the Bay Mud Deposits range from 30 to at least 70 feet. Undifferentiated Sedimentary Deposits were encountered in two soil borings near the boundary of IR-38. These deposits, which range in thickness from 33 to 37 feet, consist of sand and clay with some decayed vegetation, and are considered to be old Bay Mud Deposits. Bedrock was not encountered in a geotechnical boring drilled to a depth of 126 feet bgs, near the southern boundary of IR-38; therefore, the depth to bedrock at the site is unknown.

Based on the subsurface bedrock topography at nearby sites, the bedrock surface at IR-38 apparently slopes west-northwest, from a low saddle between two bedrock highs, into a major west-trending trough, which is a dominant feature of the bedrock surface in the western portion of Parcel D. The nature of this surface is extrapolated from deep boreholes at neighboring sites (Figure 3.7-1). Undifferentiated Sedimentary Deposits may be present beneath Bay Mud Deposits, but their presence is not verified because no boreholes penetrated the entire thickness of the Bay Mud Deposits beneath the site. The nature of the Bay Mud Deposits surface is not well defined due to the scarcity of data (Figures 3.7-2 and 3.7-3).

Hydrogeology

A conceptual groundwater flow model of HPS is shown on Figure 3.8-2. Groundwater elevation contouring of the A-aquifer for May and November 1995, and April 1996, is shown on Figures 3.8-4 through 3.8-6, respectively. Groundwater elevation contouring for February 1994 (wet season) is shown on Figure 3.8-3, and is included for comparison with April 1996. The hydrogeologic units, groundwater occurrence, magnitude and direction of groundwater flow, aquifer hydraulic properties, groundwater flow rates, and TDS in groundwater at IR-38 are discussed in the following sections.

Hydrogeologic Units

From the surface downward, the hydrogeologic units at IR-38 consist of the A-aquifer, the Bay Mud Aquitard, the B-aquifer, and the bedrock water-bearing zone. The A-aquifer at IR-38 consists of Artificial Fill. Based on groundwater elevation data, the saturated thickness of the A-aquifer is about 19 to 30 feet. The Bay Mud Aquitard appears to be laterally continuous beneath IR-38 (see Figure 3.7-3). Because no monitoring wells were installed in the B-aquifer, the saturated thickness of this aquifer at IR-38 is unknown. Because bedrock was not encountered during drilling activities, the depth to the bedrock water-bearing zone at IR-38 is unknown.

Groundwater Occurrence

Groundwater elevations were measured during the wet and dry seasons, and during the transition periods. Based on historical rainfall data for San Francisco, these periods were determined to be December to April (wet season), August to November (dry season) and May (transition period). Groundwater in the A-aquifer at IR-38 occurs at about 8 feet bgs during the wet season, at about 5 to 6 feet bgs during the dry season, and at about 5 feet bgs during the transition period. The A-aquifer is under unconfined water table conditions. Data are not available for the B-aquifer and the bedrock water-bearing zone at IR-38 because no monitoring wells were installed in these hydrogeologic units. Groundwater elevation measurement data are shown on Tables 3.8-3 through 3.8-6 (see Section 3).

Magnitude and Direction of Groundwater Flow

Hydraulic gradients for IR-38 were estimated from groundwater elevation contour maps for May and November 1995, and April 1996, and from groundwater elevation data collected during these same time periods. Groundwater in the A-aquifer at IR-38 generally flows southwest with an hydraulic gradient of 0.003, toward a shallow groundwater depression located at the southwest corner of the site, during the wet season; generally flows southwest with an hydraulic gradient of 0.001 during the dry season; and generally flows southwest with an hydraulic gradient of 0.002 during the transition period.

Aquifer Hydraulic Properties

The hydraulic properties of the A-aquifer at IR-38 were estimated from data collected during three slug tests conducted at monitoring wells screened in the A-aquifer. Hydraulic properties were evaluated using the Bouwer and Rice analysis method, as discussed in Appendix C. The hydraulic conductivity ranges from 0.59 to 390 feet per day (see Table 3.8-7). The average hydraulic conductivity is typical for silty to clean sand (Heath 1987). The aquifer transmissivity ranges from 11 to 7,300 square feet per day (see Table 3.8-7). Pumping tests were not conducted at IR-38; therefore, the A-aquifer storativity was not evaluated.

The hydraulic properties of the B-aquifer and the bedrock water-bearing zone at IR-38 are unknown because no monitoring wells were installed in these hydrogeologic units.

Groundwater Flow Rates

The average linear velocity represents an estimated rate at which contaminants, in groundwater, may move horizontally through the pore spaces in an aquifer. The average linear velocity of groundwater in the A-aquifer at IR-38 was calculated using the equation for groundwater flow presented in Section 3.8. A summary of average linear velocity calculations (May and November 1995, and April 1996) for the A-aquifer at Parcel D is presented in Table 3.8-9. A summary of average linear velocity calculations for February 1994 is included, in Table 3.8-19, for comparison with April 1996.

Using the hydraulic conductivities and the gradients given above, and porosities of 28 and 40 percent (the low and high values in the range of laboratory-tested porosities), the calculated average linear velocity ranges from 4.43×10^{-3} to 4.18 feet per day toward the southwest during the wet seasons; from 1.48×10^{-3} to 1.39 feet per day toward the southwest during the dry season; and from 2.95×10^{-4} to 2.79 feet per day toward the southwest during the transition period. The range of velocities reflects the heterogenous hydrogeologic conditions of the Artificial Fill at IR-38.

Other predominant transport or attenuation mechanisms, such as retardation, dispersion, and partitioning characteristics, should be taken into account during the estimation of transport for solute and nonaqueous phase liquids (NAPLs) in groundwater.

Total Dissolved Solids in Groundwater

Groundwater in the A-aquifer at IR-38 exhibits a salinity concentration of 3,100 mg/L and a TDS concentration of 3,200 mg/L (see Table 3.8-11). The secondary drinking water MCL for TDS is 500 mg/L. The RWQCB criteria for a drinking water source in California is 3,000 mg/L, and the U.S. EPA criteria for a drinking water source is 10,000 mg/L.

4.16.3 RI Analytical Results

This section presents the results of source (storm drain sediment), soil, and groundwater sampling conducted during the RI investigation of IR-38. The data presented in this section were evaluated using the screening criteria presented in Section 4.0. Figures 4.16-2 and 4.16-3 presents analytical results for analytes detected at concentrations exceeding screening criteria at each sampling location in soil and groundwater, respectively.

Nondetected analytes, discussed in this section, do not appear in statistical summary tables and sampling locations where all analytes were "nondetect" do not appear in analytical results tables. All analytical results, including "nondetects", for the IR-38 RI are presented in Appendix M. Analytical results for only filtered (dissolved) metals are discussed under the "Metals" heading(s) in this section.

4.16.3.1 Source Analytical Results

This section presents the source sample analytical results for analytes detected in the single storm drain sediment sample at concentrations exceeding screening criteria at IR-38. The screening criteria used for evaluation of analytical results for this sample were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0. HPALs screening criteria is not applicable to sediment samples because they represent ambient concentrations relevant to soil only. HPALs are presented for reference only. Analyses for the storm drain sediment sample are summarized in Table 4.16-1 (Summary of Storm Drain Sediment Analytical Tests). A statistical summary of source sample analytical results for detected metals and organic constituents in the storm drain sediment sample is presented in Table 4.16-2. Analytes detected in source samples are listed in Table 4.16-3. Analytical results for the IR-22 RI are presented in Appendix M.

Metals

Metals detected in the storm drain sediment sample, at concentrations exceeding screening criteria, were arsenic, cobalt, copper, lead, manganese, molybdenum, silver, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	1/1	6.9	0.32	1	11.10	0
Cobalt	1/1	53.5	NA	–	a	1
Copper	1/1	270	2,850	0	124.31	1
Lead	1/1	196	130	1	8.99	1
Manganese	1/1	7,390	382	1	1,431.18	1
Molybdenum	1/1	10.3	383	0	2.68	1

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Silver	1/1	5.1	383	0	1.43	1
Zinc	1/1	773	23,000	0	109.86	1

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples

Cyanide

Cyanide was not detected in the storm drain sediment sample at a concentration exceeding screening criteria.

Volatile Organic Compounds

VOCs were not detected in the storm drain sediment sample at concentrations exceeding screening criteria.

Semivolatile Organic Compounds

SVOCs were not detected in the storm drain sediment sample at concentrations exceeding screening criteria.

Pesticides and PCBs

Pesticides were not detected in the storm drain sediment sample and, as a result, do not appear in the storm drain sediment statistical summary table 4.16-2.

Aroclor-1260 was the only PCB detected in the storm drain sediment sample at a concentration exceeding the screening criteria. This compound exceeded the PRG (66 μg/kg), with a concentration of 1,000 μg/kg.

Petroleum Hydrocarbons

Petroleum hydrocarbons were not detected in the storm drain sediment sample at concentrations exceeding screening criteria.

4.16.3.2 Soil Analytical Results

This section presents the soil analytical results for analytes detected at concentrations exceeding screening criteria at IR-38. The screening criteria used for evaluation of soil analytical results were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for soil samples are summarized in Table 4.16-4 (Summary of Soil Analytical Tests). A statistical summary of soil analytical results for detected metals and organic constituents is presented in Table 4.16-5. Analytes detected in soil samples are listed in Table 4.16-6. Analytical results for the IR-38 RI are presented in Appendix M.

Metals

Metals detected in soil samples, at concentrations exceeding screening criteria, were arsenic, beryllium, chromium, copper, lead, manganese, molybdenum, nickel, and zinc, as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	16/19	12.3	0.32	16	11.10	1
Beryllium	12/19	0.57	0.14	12	0.71	0
Chromium	19/19	505	211	11	a	0
Copper	19/19	1,020	2,850	0	124.31	1
Lead	16/19	590	130	1	8.99	1
Manganese	19/19	1,330	382	18	1,431.18	0

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Molybdenum	3/19	19.5	383	0	2.68	1
Nickel	19/19	979	150	13	a	0
Zinc	19/19	1,540	23,000	0	109.86	1

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples

Asbestos

Asbestos was not detected in soil samples and, as a result, does not appear in the soil statistical summary in Table 4.16-5.

Cyanide

Cyanide was not detected in soil samples and, as a result, does not appear in the soil statistical summary in Table 4.16-5.

Volatile Organic Compounds

VOCs were not detected in soil samples at concentrations exceeding screening criteria.

Semivolatile Organic Compounds

Benzo(a)pyrene was the only SVOC detected at a concentration exceeding the screening criteria. This compound exceeded the PRG (61 μg/kg) in one out of 18 soil samples, with a concentration of 200 μg/kg.

Pesticides and PCBs

Pesticides were not detected in soil samples at concentrations exceeding screening criteria. PCBs were not detected in soil samples and, as a result, do not appear in the soil statistical summary in Table 4.16-5.

Petroleum Hydrocarbons

TOG was the only petroleum hydrocarbon detected at a concentration exceeding the screening criteria. This compound exceeded the criterion (1,000 mg/kg) in one out of nine soil samples, with a concentration of 17,000 mg/kg.

4.16.3.3 Groundwater Analytical Results

This section presents the groundwater analytical results for analytes detected at concentrations exceeding screening criteria at IR-38. The screening criteria used for evaluation of groundwater analytical results were tap water PRGs, drinking water MCLs, NAWQC for saltwater aquatic life, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for monitoring well, HydroPunch, and open borehole (grab) groundwater samples are summarized in Tables 4.16-7, 4.16-10, and 4.16-13, respectively (Summary of Monitoring Well Groundwater Analytical Tests, Summary of HydroPunch Groundwater Analytical Tests, and Summary of Grab Groundwater Analytical Tests). Statistical summaries of groundwater analytical results for detected metals and organic constituents in monitoring well, HydroPunch, and open borehole (grab) groundwater samples are presented in Tables 4.16-8, 4.16-11, and 4.16-14, respectively. Analytes detected in monitoring well, HydroPunch, and open borehole (grab) groundwater samples are listed in Tables 4.16-9, 4.16-12, and 4.16-15, respectively. Analytical results for the IR-38 RI are presented in Appendix M.

Metals

Metals detected in monitoring well groundwater samples, at concentrations exceeding screening criteria, were arsenic, manganese, molybdenum, nickel, and thallium as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Arsenic	5/9	5.4	0.04	5	50.0	0	36.0	0
Manganese	9/9	11,800	180	9	NA	–	NA	–
Molybdenum	6/9	300	180	3	NA	–	NA	–
Nickel	2/9	12.9	730	0	100	0	8.2	2
Thallium	3/9	10.5	NA	–	2.0	2	NA	–

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRG for tap water

HydroPunch and open borehole (grab) groundwater samples were not analyzed for metals.

Cyanide

Cyanide was not detected in monitoring well groundwater samples and, as a result, does not appear in the monitoring well groundwater statistical summary in Table 4.16-8. HydroPunch and open borehole (grab) groundwater samples were not analyzed for cyanide.

Volatile Organic Compounds

VOCs were not detected in monitoring well groundwater samples and, as a result, do not appear in the groundwater statistical summary in Table 4.16-8. VOCs were not detected in HydroPunch groundwater samples at concentrations exceeding screening criteria. Benzene was the only VOC detected in the single grab groundwater sample at concentrations exceeding screening criteria. Benzene exceeded the PRG (0.4 μg/L) and the MCL (1 μg/L) in the single sample, with a concentration of 3 μg/L.

Semivolatile Organic Compounds

SVOCs were not detected in any groundwater samples and, as a result, do not appear in groundwater statistical summaries in Tables 4.16-8, 4.16-11, and 4.16-14.

Pesticides and PCBs

Pesticides and PCBs were not detected in monitoring well groundwater samples and, as a result, do not appear in the monitoring well groundwater statistical summary Table 4.16-8. HydroPunch and open borehole (grab) groundwater samples were not analyzed for pesticides and PCBs.

Petroleum Hydrocarbons

TPH-mo was detected in monitoring well groundwater samples at concentrations exceeding screening criteria. This compound exceeded the criteria (100 μg/L) in three out of eight samples, with a maximum concentration of 970 μg/L.

TPH-mo and TPH-d were detected in HydroPunch groundwater samples at concentrations exceeding screening criteria. TPH-mo exceeded the criteria (100 μg/L) in two out of five samples, and TPH-d exceeded the criteria (100 μg/L) in one out of five samples, with a maximum concentration of 210 μg/L for both compounds.

TPH-mo was detected in the single open borehole (grab) groundwater sample at a concentration exceeding screening criteria. This compound exceeded the criteria (100 μg/L), with a concentration of 550 μg/L.

4.16.4 Nature and Extent of Contaminants

The following section describes the nature and extent of the constituents discussed in Section 4.16.3 that exceeded the screening criteria for soil and groundwater.

4.16.4.1 Nature and Extent of Contaminants in Soil

Analytical results indicate the following constituents are present in soil at IR-38, at concentrations exceeding their screening criteria:

- Metals
- SVOCs
- Petroleum Hydrocarbons

The distribution of these constituents is shown on Figure 4.16-2 and discussed below. For the purposes of this discussion, soil samples collected between 0 and 2 feet bgs will be referred to as surface samples and those collected at depths of 2 feet or more will be referred to as subsurface samples.

Metals

As discussed in Section 4.16.3, the metals arsenic, beryllium, chromium, copper, lead, manganese, molybdenum, nickel, and zinc are present in soil at IR-38 at concentrations exceeding the screening criteria. The nature and extent of these metals are summarized in the following paragraphs.

Arsenic was detected at concentrations exceeding the PRG (0.32 mg/kg) in one surface soil and 15 subsurface soil samples. The HPAL (11.10 mg/kg) was also exceeded in one surface soil sample. Depths for these samples ranged from 0 to 16.25 feet bgs and concentrations ranged from 1.9 to 12.3 mg/kg. The maximum concentration of arsenic was detected in surface soil at (0.0 feet bgs) in composite sample PA38SS01.

Beryllium was detected at concentrations exceeding the PRG (0.14 mg/kg), but not the HPAL (0.71 mg/kg) in 14 subsurface soil samples. Depths for these samples ranged from 2.25 to 16.25 feet bgs and concentrations ranged from 0.16 to 0.57 mg/kg. The maximum concentration of beryllium was detected in subsurface soil at 10.25 feet bgs from boring IR38B002.

Chromium was detected at concentrations exceeding the PRG (211 mg/kg), but not the HPAL (which varies per sample), in 11 subsurface soil samples. Depths for these samples ranged from 6.25 to 16.25 feet bgs, and concentrations ranged from 251 to 505 mg/kg. The maximum concentration of chromium was detected in subsurface soil collected at 16.25 feet bgs from boring IR38B003.

Copper was detected at a concentration exceeding the HPAL (124.31 mg/kg), but not the PRG (2,850 mg/kg) in one surface soil sample. Copper was detected at a concentration of 1,020 mg/kg in the composite soil sample collected at PA38SS01.

Lead was detected at a concentration exceeding both the PRG (130 mg/kg) and the HPAL (8.99 mg/kg) in one surface soil sample. Lead was detected at a concentration of 590 mg/kg in the composite soil sample PA38SS01.

Manganese was detected at concentrations exceeding the PRG (382 mg/kg), but not the HPAL (1431.18 mg/kg) in one surface soil sample and 17 subsurface soil samples. Depths for the samples ranged from 0.0 to 16.25 feet bgs, and concentrations ranged from 415 to 1,330 mg/kg. The maximum concentration of manganese was detected in subsurface soil at a depth of 6.25 feet bgs from boring IR38B004.

Molybdenum was detected at a concentration exceeding the HPAL (2.68 mg/kg), but not the PRG (383 mg/kg), in one surface soil sample. The concentration of molybdenum detected was 19.5 mg/kg at 0.0 feet bgs from composite soil sample PA38SS01.

Nickel was detected at concentrations exceeding the PRG (150 mg/kg), but not the HPAL (which varies per sample), in 13 subsurface soil samples. The depths for the samples ranged from 6.25 to 16.25 feet bgs and concentrations ranged from 175 to 979 mg/kg. The maximum concentration of nickel was detected at 16.25 feet bgs from boring IR38B005.

Zinc was detected at a concentration exceeding the HPAL (109.86 mg/kg), but not the PRG (23,000 mg/kg), in one surface soil sample. The concentration of zinc detected was 1,540 mg/kg at a depth of 0.0 feet bgs from composite soil sample PA38SS01.

Semivolatile Organic Compounds

Benzo(a)pyrene was detected at a concentration exceeding the PRG (61 mg/kg) in one subsurface soil sample. The concentration detected was 200 mg/kg at a depth of 11.25 feet bgs from boring IR38B006.

Petroleum Hydrocarbons

TOG was detected at a concentration exceeding the PRG (1,000 mg/kg) in one subsurface soil sample. The concentration of TOG detected was 17,000 mg/kg at a depth of 2.25 feet bgs from boring PA39MW01A.

Summary of Soil Chemistry

Of the nine metals detected, four metals (beryllium, chromium, manganese, and nickel) had their maximum detected concentrations distributed among four borings at a range of depths. The distribution of these metals do not appear to be related to organic contaminants or to each other. Based on the parcel-wide assessment of metals in soil (see Section 4.1), none of the metal concentrations detected indicate a release of metals.

The maximum concentrations of arsenic, copper, lead, molybdenum, and zinc were detected in the composite surface soil sample PA38SS01 collected around Building 500. Surface soils near Building 500 apparently contain lead-based paint chips which are believed to be limited to the upper 1 foot of soil at IR-38.

The detection of benzo(a)pyrene in one soil sample at a concentration exceeding screening criteria appears to be an isolated occurrence.

TOG was detected in one soil sample at 2.25 feet bgs, but was not detected at concentrations exceeding the screening criteria in deeper soil samples indicating a localized occurrence of TOG. The boring PA39MW01A is located in the street.

4.16.4.2 Nature and Extent of Contaminants in Groundwater

Analytical results indicate the following constituents are present in groundwater at IR-38, at concentrations exceeding their screening criteria:

- Metals
- Petroleum Hydrocarbons

The distribution of these constituents is shown on Figure 4.13-3 and discussed below.

Metals

As discussed in Section 4.16.3.2, the metals arsenic, lead, manganese, molybdenum, nickel, and thallium were detected in monitoring well groundwater samples at concentrations exceeding their screening criteria.

Arsenic was detected at concentrations exceeding the PRG (0.04 μg/L) in five groundwater samples collected from two monitoring wells (PA38MW01A and IR38MW03A). The concentrations ranged from 1.4 to 5.4 μg/L, with the maximum concentration detected in monitoring well IR38MW03A.

Lead was detected in a concentration exceeding the PRG (4.0 μg/L), but not the MCL (50.0 μg/L) nor the NAWQC (8.1 μg/L), in one groundwater sample collected from two monitoring wells. The concentration of lead detected was 4.2 μg/L from well PA39MW01A.

Manganese was detected at concentrations exceeding the PRG (180 μg/L) in ten groundwater samples collected from two monitoring wells. The concentrations of manganese ranged from 294 to 11,800 μg/L, with the maximum concentration detected in well PA39MW01A.

Molybdenum was detected at concentrations exceeding the PRG (180 μg/L) in three groundwater samples collected from one monitoring well (IR38MW03A). The concentrations ranged from 216 to 300 μg/L in groundwater sample collected from well IR38MW03A.

Nickel was detected at concentrations exceeding the NAWQC (8.2 μg/L) in three groundwater samples collected from two monitoring wells. The concentrations of nickel ranged from 12.4 to 13.4 μg/L, with the maximum concentration detected in well PA39MW01A.

Thallium was detected at concentrations exceeding the MCL (2.0 μg/L) in two groundwater samples collected from one monitoring well (PA39MW01A). The concentrations of thallium ranged from 5.1 to 10.5 μg/L from well PA39MW01A.

Petroleum Hydrocarbons

The petroleum hydrocarbon TPH-mo was detected at concentrations exceeding the PRG (100 μg/L) in three groundwater samples collected from two monitoring wells, in one grab groundwater sample, and in two HydroPunch groundwater samples. The concentrations of TPH-mo in the monitoring well samples ranged from 120 to 970 μg/L, with the maximum concentration detected in well IR38MW03A. The concentration of TPH-mo detected in the grab groundwater sample from IR38B002 was 550 μg/L. The concentration of TPH-mo detected in HydroPunch groundwater samples ranged from 120 to 210 μg/L, with the maximum concentration detected in the sample from IR38B005.

The petroleum hydrocarbon TPH-d was detected at concentration exceeding the PRG (100 μg/L) in two HydroPunch groundwater samples. The concentrations detected were 100 and 210 μg/L in borings IR38B003 and IR38B004, respectively.

Summary of Groundwater Chemistry

The maximum concentrations of the six metals detected at concentrations exceeding screening criteria were distributed among two well samples for IR-38. However, the concentrations of these metals are within the range of concentrations for the same metals parcel-wide (see Section 4.1). No apparent source was identified for metals in groundwater.

The petroleum hydrocarbons found in groundwater at IR-38 indicate a potential release of contaminants to groundwater. The possible source for the detection of petroleum hydrocarbons is a 750-gallon UST (Tank S-508), which had been located near the southern extension of Building 500, and was used to store heating oil for a boiler in Building 500. The UST was removed in July 1991.

4.16.5 Contaminant Fate and Transport

This section discusses contaminant fate and transport at IR-38 in relation to the geology and hydrogeology at IR-38 and nature and extent of contaminants at IR-38. Potential migration routes, persistence in the environment, and a migration evaluation are discussed below.

The purpose of this section is to identify the media and locations at which the metals, SVOCs, and petroleum hydrocarbons detected at concentrations exceeding their respective screening criteria may be present in the future. This evaluation is divided into discussions on potential migration routes, persistence in the environment, and a migration evaluation for the chemicals detected at concentrations exceeding screening criteria at IR-38. Detailed descriptions of the physical, chemical, and biological processes influencing the fate and transport of the metals and organic compounds at IR-38 are presented in Section 3.0 of Appendix O. Section 4.0 of Appendix O summarizes the physical and chemical characteristics of the metals and organic compounds detected at concentrations exceeding screening criteria in soil or groundwater at IR-38. Finally, Table O-4 summarizes the fate and transport of these chemicals. This table can be used as a quick reference for the fate and transport of metals, SVOCs, and petroleum hydrocarbons at IR-38.

4.16.5.1 Potential Migration Routes

Figure 4.16.5-1 shows a conceptual model for contaminant migration at IR-38. In addition, migration routes are summarized in Table 4.16-16.

The dominant migration route for metals in soil at IR-38 will be slow leaching by precipitation from shallow soil to deeper soil and potentially groundwater. Metals in groundwater will equilibrate with the soil matrix through which the groundwater is moving. Metal solubility depends on a complex series of reactions between groundwater and soil influenced by several factors, including pH and oxidation potential. The potential for metal migration in groundwater is expected to be low.

The potential migration route for the benzo(a)pyrene in soil at IR-38 is leaching from soil to surrounding groundwater. However, PAHs are nearly insoluble in water and sorb strongly to soil. Therefore, benzo(a)pyrene is not expected to migrate.

The petroleum hydrocarbons sorbed to soil should remain in place and not migrate. The petroleum hydrocarbons present in groundwater should continue to spread laterally until sorbed by soil. Because of their high affinity for soil, they are not expected to migrate much beyond their present extent.

4.16.5.2 Persistence in the Environment

Metals do not degrade in soil and groundwater and are therefore expected to persist in soil and groundwater at IR-38.

The only organic contaminants present at IR-38 are the PAH benzo(a)pyrene and petroleum hydrocarbons, detected as TOG. The only organic compounds present in groundwater are petroleum hydrocarbons detected as TPH-mo and TPH-d. Persistence of the organic contaminants at IR-38 is summarized in Table 4.16-16 and described in detail in Appendix O.

4.16.5.3 Migration Evaluation

This section evaluates the migration potential for metals, the SVOC benzo(a)pyrene, and petroleum hydrocarbons detected at concentrations exceeding screening criteria in soil and groundwater at IR-38. This evaluation considers the mobility of a compound, its chemical characteristics, and its persistence in the environment to estimate its potential for migrating from IR-38.

Migration in Soil

The migration of metals, the SVOC benzo(a)pyrene, and petroleum hydrocarbons in soil at IR-38 are discussed below.

Metals

Arsenic, beryllium, chromium, copper, lead, manganese, molybdenum, nickel, and zinc were detected at concentrations exceeding screening criteria in soil at IR-38. As discussed in Section 4.16.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the soil matrix and subsurface conditions. In general, with the exception of manganese, the migration of these metals is very limited because of their sorption onto soil under the environmental conditions present at IR-38 (Table O-4). Therefore, the potential for these metals to be leached from soil to groundwater is low. The other metals that are leachable will slowly be transported to groundwater by infiltrating precipitation.

SVOCs

Benzo(a)pyrene is a PAH with a very low solubility in water, low vapor pressure, and high organic carbon partition coefficient (Table O-3). In addition, benzo(a)pyrene is resistant to degradation. It is therefore assumed that benzo(a)pyrene will remain at its present location and not degrade.

Petroleum Hydrocarbons

Petroleum hydrocarbons measured as TOG were detected at concentrations exceeding criteria for soil. TOG is expected to sorb to clay particles and to degrade at various rates depending on the size of the hydrocarbon molecule and site-specific conditions. The petroleum hydrocarbons are therefore, expected to remain at their present locations where they may degrade.

Migration in Groundwater

The following sections evaluate the migration of metals and petroleum hydrocarbons in groundwater at IR-38.

Metals

Arsenic, lead, manganese, molybdenum, nickel, and thallium were detected at concentrations exceeding screening criteria in groundwater at IR-38. As discussed in Section 4.16.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the groundwater it is dissolved in, the soil matrix saturated by the groundwater, and subsurface conditions, such as pH and oxidation potential. In general, these metals form compounds that are relatively insoluble in groundwater under the environmental conditions present at IR-38. In addition, the migration of these metals is further limited because of their sorption onto soil under the environmental conditions present at IR-38. Therefore, a low potential exists for these metals to migrate in groundwater from IR-38 (Table O-4).

Petroleum Hydrocarbons

Petroleum hydrocarbons as TPH-mo and TPH-d were detected in groundwater samples at concentrations exceeding their screening criteria. Petroleum may not be degraded very rapidly at IR-38 because of the lack of oxygen. However, petroleum hydrocarbons are nearly insoluble in water and are expected to be sorbed by the soil matrix. Therefore, the petroleum present at IR-38 is expected to be sorbed to soil near its source but not be rapidly degraded. If there is excess petroleum in soil above that which can be absorbed by soil, it will continue to migrate downgradient until it is sorbed.

4.16.6 Risk Assessment

The following sections present the HHRA and a summary of the environmental and ecological risks.

4.16.6.1 Human Health Risk Assessment

This section summarizes the HHRA presented in Appendix N of this RI report conducted under the current industrial, future residential, and future industrial land-use scenarios at IR-38 in accordance with the methodology summarized in Section 4.0.

Current Industrial Land Use Risk and Hazard Characterization

Fifteen 0.5-acre exposure areas are within or contact IR-38 (Table 4.0-2 and Figure 4.0-4). Currently, IR-38 may be used for industrial purposes. Soil samples were collected from 0 to 2 feet bgs in unpaved areas at one exposure area (AW31) (Table 4.0-2); therefore, an HHRA was conducted for soil. A-aquifer groundwater samples containing VOCs were collected at exposure area AV32. Therefore, an HHRA was conducted for A-aquifer groundwater. Both the B-aquifer and bedrock water-bearing zone are not currently used as sources of potable drinking water or for industrial purposes; therefore, an HHRA was not conducted for either the B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and for A-aquifer groundwater under the RME and average exposure cases are summarized below.

In addition, an evaluation of the potential for current workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

<u>RME Case - Soil</u>

The total ELCR equals 5×10^{-6} for the only exposure area (AW31) with available soil data. This exposure area and the total ELCR can be identified in Table 4.1-26 and are shown graphically in Figure 4.1-84.

This total ELCR is largely the result of potential exposure to arsenic. The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Ingestion of soil is the dominant exposure pathway.

The total segregated HI for the only exposure area with available soil dat (AW31) is less than 1 (Table 4.1-31).

The U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPCs for lead in exposure area AW31 is less than 1,000 mg/kg under the RME case; therefore, potential exposure of industrial workers to lead in soil at IR-38 is not expected to result in adverse health effects under the current industrial scenario.

Average Exposure Case - Soil

The total ELCR for exposure area AW31, the only exposure area with available data, is 8×10^{-7} (Table 4.1-26). Relative contributions of COPCs and pathways contributing to the total ELCRs are similar to those under the RME case.

The total segregated HI for exposure area AW31 is less than 1 (Table 4.1-26).

EPCs for lead on exposure area AW31 is less than 1,000 mg/kg, the level of concern for industrial workers potentially exposed to lead in soil; therefore, potential exposure is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

For the one industrial exposure area with VOCs in the A-aquifer groundwater, modeled indoor air concentrations are less than the U.S. EPA Region IX ambient air PRGs (see Attachment N-E of Appendix N). Therefore, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-38 is expected to be insignificant.

Future Residential Land Use Risk and Hazard Characterization

Seventy-eight 2,500-ft^2 exposure areas are within or contact IR-38 (Table 4.0-3 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the residential land-use scenario, soil data are available for 8 exposure areas (Table 4.0-3). In addition, groundwater data for groundwater are available for 1 exposure area (Table 4.0-3). Groundwater data are not available for A-aquifer, B-aquifer, or bedrock water-bearing zone groundwater; therefore, an

HHRA was not prepared for A-aquifer, B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future residents to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 5 exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 2×10^{-7} in exposure areas 082090 and 083090 to 7×10^{-5} in exposure area 083087. Of the 8 exposure areas with available soil data, 2 exposure areas have total ELCRs that exceed 1×10^{-6} and 6 exposure areas have ELCRs of less than 1×10^{-6}. To facilitate the presentation and discussion of ELCRs, each total ELCR range was assigned a group number. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$>1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	0
4	1×10^{-5} to $< 1 \times 10^{-4}$	2
5	1×10^{-6} to $< 1 \times 10^{-5}$	0
6	$<1 \times 10^{-6}$	6[a]

Note:

a Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-27 and are shown graphically in Figure 4.1-85. The distribution of total ELCRs and the COPCs contributing to them are summarized below.

- In Group 4, total ELCRs in exposure areas 080090 and 083087 are largely the result of potential exposure to one or more of the following COPCs: Aroclor-1260, arsenic, and PAHs.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, in exposure areas in which PCBs and PAHs contribute most significantly to the total ELCRs, ingestion of

homegrown produce is the dominant exposure pathway. For exposure areas in which metals contribute significantly to the total ELCRs, ingestion of soil and ingestion of homegrown produce are the dominant exposure pathways.

Of the 8 exposure areas for which soil data are available, total segregated HIs equal or exceed 1 in 2 exposure areas under the child residential scenario and 1 exposure area under the adult residential scenario. To facilitate the presentation and discussion of HIs, each total segregated HI range that equals or exceeds 1 was assigned a group number. The following breakdown of total segregated HIs that equal or exceed 1 under the child residential scenario was observed:

Group Number	Highest Total Segregated HI Range	Number of Exposure Areas
1	HI ≥ 7	0
2	3 ≤ HI < 7	1
3	1≤ HI< 3	1

The specific exposure areas in the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child resident scenario in Figure 4.1-86.

In Group 2, the total segregated HI in exposure area 080090 is largely the result of potential exposure to copper and zinc. In Group 3, the total segregated HI in exposure area 083087 is largely the result of exposure to copper. Ingestion of homegrown produce is the dominant exposure pathway.

Lastly, using the U.S. EPA's Integrated Exposure Uptake Biokinetic Model for lead (U.S. EPA 1994), a lead concentration of 221 mg/kg was determined to be a level of concern for children exposed to lead in soil. The EPC for lead exceeds 221 mg/kg only in exposure area 080090. Information regarding the sampling location at which lead was detected at concentrations that equal or exceed 221 mg/kg is presented in Table 4.1-28.

<u>Average Exposure Case - Soil</u>

Among the exposure areas in which carcinogenic COPCs were detected, total ELCRs range from 3×10^{-8} in exposure areas 082090 and 083090 to 1×10^{-5} in exposure area 083087. Of the 8 exposure areas with available soil data, 2 exposure areas have total ELCRs that exceed 1×10^{-6} and 6 exposure areas have

total ELCRs of less than 1×10^{-6} (Table 4.1-27). The exposure areas with total ELCRs that exceed 1×10^{-6} are shown in Figure 4.1-85. Relative contributions of COPCs and pathways contributing to the total ELCRs are similar to those under the RME case.

Of the 8 exposure areas with available soil data, total segregated HIs equal or exceed 1 in 2 exposure areas under the child residential scenario and 1 exposure area under the adult residential scenario. The specific exposure areas that exceed 1 in each of the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child resident scenario in Figure 4.1-86. Relative contributions of COPCs and pathways contributing to the total segregated HIs are similar to those under the RME case.

The EPC for lead exceeds 221 mg/kg, the level of concern for resident children, only in exposure area 080090. Information regarding the sampling location at which lead was detected at a concentration that equals or exceeds 221 mg/kg is presented in Table 4.1-28.

Future Industrial Land Use Risk and Hazard Characterization

Fifteen 0.5-acre exposure areas are within or contact IR-38 (Table 4.0-2 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the industrial land-use scenario, soil data are available for 6 exposure areas (Table 4.0-2). In addition, groundwater data for VOCs in A-aquifer groundwater are available for only exposure areas AV32 (Table 4.0-2). Groundwater data are not available for either the B-aquifer or the bedrock water-bearing zone; therefore, an HHRA was not prepared for either B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and groundwater from the A-aquifer under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 4 exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 7×10^{-9} in exposure area AX31 to 7×10^{-6} in exposure area AV32. Of the 6 exposure areas with available soil data, 3 exposure areas have total ELCRs that equal or exceed 1×10^{-6} and 3 exposure areas have total ELCRs of less than 1×10^{-6}. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$>1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	0
4	1×10^{-5} to $< 1 \times 10^{-4}$	0
5	1×10^{-6} to $< 1 \times 10^{-5}$	3
6	$<1 \times 10^{-6}$	3[a]

Note:

a Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-33 and are shown graphically in Figure 4.1-91. In Group 5, COPCs contributing to the total ELCRs in exposure areas AV32, AW31, and AX30 are largely the result of potential exposure to one or more of the following COPCs: Aroclor-1260, arsenic, and PAHs.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, ingestion of and dermal contact with soil are the dominant exposure pathways.

Of the 6 exposure areas with available soil data, total segregated HIs are all less than 1 (Table 4.1-33).

Lastly, the U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPC, for lead in all 6 exposure areas with available soil data are less than 1,000 mg/kg; therefore, potential exposure of industrial workers to lead in soil is not expected to resulted in adverse health effects.

Average Exposure Case - Soil

Among the exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 6×10^{-10} in exposure area AX31 to 7×10^{-7} in exposure area AW31. Of the 6 exposure areas with available soil data, total ELCRs for all 6 exposure areas are less than 1×10^{-6} (Table 4.1-33).

Of the 6 exposure areas with available soil data, total segregated HIs for all exposure areas are less than 1 (Table 4.1-33).

As discussed under the RME case, the EPCs for lead are less than 1,000 mg/kg in all 6 exposure areas with available soil data; therefore, potential exposure of industrial workers to lead in soil is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

As discussed under the current industrial scenario, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs in A-aquifer groundwater in future industrial buildings at IR-38 is expected to be insignificant.

4.16.6.2 Environmental/Ecological Risk

Approximately 70 percent of IR-38 is covered by pavement, and the other 30 percent consists of ruderal habitat. No wetlands are located at IR-38. Few ecological receptors are expected to use the site because of the limited area and poor quality of available habitat. Potential terrestrial exposure pathways for IR-38 include dermal contact with and ingestion of contaminated soils and in the unpaved areas. These pathways, although complete, do not pose a significant risk because of the lack of ecological receptors at the site.

Metals in groundwater potentially migrating to San Francisco Bay may be an ecological concern at IR-38. Concentrations of nickel and zinc exceeded the NAWQC for saltwater aquatic life (Tables 4.16-8, 4.16-11, and 4.16-14). Using the NAWQC as screening criteria for IR-38 is a conservative screening approach because the NAWQC are designed to protect ecological receptors in surface waters and to

evaluate direct discharges to surface water. Groundwater at IR-38 does not discharge directly into the Bay but rather filters indirectly through soil and sediment before reaching the Bay. When comparing groundwater concentrations of chemicals at IR-38 to the NAWQC, factors influencing the fate and transport of chemicals in groundwater, such as dilution and attenuation, are not considered. Affected groundwater at this site is about 600 feet inland from the Bay. These factors influence the concentrations of contaminants in groundwater reaching the Bay and will be evaluated when determining remedial options for groundwater in the Parcel D FS. Potential ecological risk from these chemicals to aquatic receptors will be addressed during the Phase 1B ERA.

4.16.7 Conclusions and Recommendations

Based on the results of the RI and HHRA, conclusions and recommendations are summarized below.

4.16.7.1 Conclusions

Site characteristics and potential sources, the nature and extent of contamination, and the HHRA are summarized below.

Site Characteristics and Potential Sources

IR-38 covers approximately 2.2 acres and consists of Building 500 and former UST S-508.

Artificial fill in the area is approximately 7 to 33 feet thick. Groundwater occurs at about 5 to 6 feet bgs and flows with a gradient at 0.001 to the southwest.

Following investigation of soil and groundwater at IR-38, the source for metals in surface soil around Building 500 appears to be flaking paint from the building's exterior. In addition, the petroleum hydrocarbons detected in groundwater at concentrations exceeding screening criteria may have their source in the soil beneath the removed UST (S-508).

Nature and Extent of Contaminants

Several metals were detected at concentrations exceeding screening criteria in the composite surface soil sample collected from four locations around Building 500. The extent of soil containing paint chips peeling from the exterior walls of Building 500 is believed to be limited to the upper 1 foot of soil at IR-38.

Based on the parcel-wide assessment of metals in soil and groundwater, the detection of metals at concentrations exceeding screening criteria at IR-38 is not considered to indicate a release of metals to subsurface soils or groundwater.

The detection of benzo(a)pyrene at concentrations exceeding screening criteria in the soil sample collected at 11.5 feet bgs in HydroPunch borehole IR38B006 is an isolated occurrence and not associated with any known source.

Petroleum hydrocarbons found in groundwater indicate a potential release of contaminants to groundwater at IR-38; probably from the removed UST.

Human Health Risk Assessment

HHRA findings under the current industrial, future residential, and future industrial land use scenarios at IR-38 are summarized below.

Current Industrial Land Use Risk and Hazard Characterization

<u>RME Case: Soil</u>

- The total ELCR exceeds 1×10^{-6} in exposure area AW31, the only exposure area with available soil data (Figure 4.1-84 and Table 4.1-26).
- The total segregated HI is less than 1 in exposure area AW31, the only exposure area with available soil data (Table 4.1-26).

- The EPC for lead is less than 1,000 mg/kg in exposure area AW31, the only exposure area with available soil data.

Average Exposure Case: Soil

- The total ELCR is less than 1×10^{-6} in exposure area AW31, the only exposure area with available soil data (Figure 4.1-84 and Table 4.1-26).
- The total segregated HI is less than 1 in exposure area AW31, the only exposure area with available soil data (Table 4.1-26).
- The EPC for lead is less than 1,000 mg/kg in exposure area AW31, the only exposure area with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- Drinking water or for industrial purposes, and data are not available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from the A-aquifer groundwater are not expected to result in adverse health effects.

Future Residential Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 2 of the 8 exposure areas with available soil data. Total ELCRs for these 2 exposure areas are less than 1×10^{-4} (Figure 4.1-85 and Table 4.1-27).
- Total segregated HIs equal or exceed 1 in 2 exposure areas for children and 1 exposure area for adults in the 8 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).
- The EPC for lead exceeds 221 mg/kg only in exposure area 080090.

Average Exposure Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 2 of the 8 exposure areas with available soil data. Total ELCRs for these 2 exposure areas are less than 1×10^{-4} (Figure 4.1-85 and Table 4.1-27).

- Total segregated HIs equal or exceed 1 in 2 exposure areas for children and 1 exposure area for adults in the 8 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).

- The EPC for lead exceeds 221 mg/kg only in exposure area 080090.

RME and Average Exposure Cases: A-aquifer, B-aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for A-aquifer, B-aquifer or bedrock water-bearing zone groundwater.

Future Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 3 of the 6 exposure areas with available soil data. Total ELCRs for these 3 exposure areas are less than 1×10^{-4} (Figure 4.1-91 and Table 4.1-33).

- Total segregated HIs for workers are less than 1 in all 6 exposure areas with available soil data (Table 4.1-33).

- EPCs for lead are less than 1,000 mg/kg in all 6 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs are less than 1×10^{-6} in all 6 exposure areas with available soil data (Figure 4.1-91 and Table 4.1-33).

- Total segregated HIs for workers are less than 1 in all 6 exposure areas with available soil data (Table 4.1-33).

- EPCs for lead are less than 1,000 mg/kg in all 6 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- As discussed under the current industrial scenario, the potential for adverse health effects associated with potential exposures to VOCs through inhalation in future industrial buildings is expected to be insignificant at IR-38.

4.16.7.2 Recommendations

IR-38 is recommended for evaluation in the Parcel D FS report for remedial action because results of the HHRA indicate that under the residential scenario, RME case, a potential risk to human health in one or more exposure areas exist at IR-38 based on : (1) ECLRs exceeding 1 x 10-6, (2) total HIs exceeding 1, and (3) lead concentrations in soil exceeding 221 mg/kg. In addition, possible risks posed to ecological receptors from analytes detected at IR-38 based on exceedances of the NAWQC are recommended for further evaluation during the Parcel D FS. TPH detected in soil and groundwater at concentrations exceeding the screening criteria are recommended for further evaluation during the petroleum corrective action plan.

TABLE 4.16-1

SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
PA50FC418	9309X922			✓	✓		✓			✓	✓	✓				✓			✓	✓	✓	✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.16-2

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
METAL	ALUMINUM	7,620	7,620	7,620	MG/KG	7.3	1	1	76,700	0	100,000	0		
	ARSENIC	6.9	6.9	6.9	MG/KG	0.63	1	1	0.32	1	2.0	1	11.10	0
	BARIUM	161	161	161	MG/KG	1.3	1	1	5,340	0	100,000	0	314.36	0
	CALCIUM	10,300	10,300	10,300	MG/KG	26.3	1	1						
	CHROMIUM	75.6	75.6	75.6	MG/KG	0.82	1	1	211	0	1,580	0	h	0
	COBALT	53.5	53.5	53.5	MG/KG	1.4	1	1					h	1
	COPPER	270	270	270	MG/KG	0.09	1	1	2,850	0	63,300	0	124.31	1
	IRON	239,000	239,000	239,000	MG/KG	7.7	1	1						
	LEAD	196	196	196	MG/KG	5.4	1	1	130	1	1,000	0	8.99	1
	MAGNESIUM	10,800	10,800	10,800	MG/KG	41.7	1	1						
	MANGANESE	7,390	7,390	7,390	MG/KG	0.36	1	1	382	1	8,300	0	1431.18	1
	MERCURY	0.76	0.76	0.76	MG/KG	0.11	1	1	23.0	0	511	0	2.28	0
	MOLYBDENUM	10.3	10.3	10.3	MG/KG	1.1	1	1	383	0	8,520	0	2.68	1
	NICKEL	118	118	118	MG/KG	2.0	1	1	150	0	34,100	0	h	0
	POTASSIUM	1,370	1,370	1,370	MG/KG	240	1	1						
	SILVER	5.1	5.1	5.1	MG/KG	0.86	1	1	383	0	8,520	0	1.43	1
	SODIUM	5,750	5,750	5,750	MG/KG	52.2	1	1						
	VANADIUM	6.8	6.8	6.8	MG/KG	1.4	1	1	537	0	11,900	0	117.17	0
	ZINC	773	773	773	MG/KG	0.59	1	1	23,000	0	100,000	0	109.86	1
CYAN	CYANIDE	480	480	480	UG/KG	200	1	1	1,300,000	0	13,600,000	0		
VOC	ACETONE	180	180	180	UG/KG	23	1	1	2,000,000	0	8,400,000	0		
	CARBON DISULFIDE	11	11	11	UG/KG	23	1	1	16,000	0	52,000	0		

TABLE 4.16-2 (Continued)

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	ETHYLBENZENE	18	18	18	UG/KG	23	1	1	2,900,000	0	3,100,000	0		
	XYLENE (TOTAL)	140	140	140	UG/KG	23	1	1	980,000	0	980,000	0		
SVOC	BIS(2-ETHYLHEXYL)PHTHALATE	8,900	8,900	8,900	UG/KG	1,500	1	1	32,000	0	140,000	0		
PEST	AROCLOR-1260	1,000	1,000	1,000	UG/KG	75	1	1	66	1	340	1		
TPHEXT	TPH-DIESEL	410	410	410	MG/KG	230	1	1	1,000	0i				
TRPH	TRPH	42	42	42	MG/KG	11	1	1	1,000	0i				

TABLE 4.16-2 (Continued)

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 203.607 to 203.607, 32.639 to 32.639, and 251.834 to 251.834 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.16-3

STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA50FC418
Sampling Depth (feet bgs)	2.10
Sample Number	9309X922
Sample Date	03/05/93
Metal (mg/kg)	
ALUMINUM	7,620
ARSENIC	6.9 *a
BARIUM	161
CALCIUM	10,300
CHROMIUM	75.6
COBALT	53.5 a
COPPER	270 a
IRON	239,000
LEAD	196 *a
MAGNESIUM	10,800
MANGANESE	7,390 *a
MERCURY	0.76
MOLYBDENUM	10.3 a
NICKEL	118
POTASSIUM	1,370
SILVER	5.1 a
SODIUM	5,750
VANADIUM	6.8
ZINC	773 a
Cyanide (ug/kg)	
CYANIDE	480
Volatile Organic Compound (ug/kg)	
ACETONE	180
CARBON DISULFIDE	11
ETHYLBENZENE	18
XYLENE (TOTAL)	140
Semivolatile Organic Compound (ug/kg)	
BIS(2-ETHYLHEXYL)PHTHALATE	8,900
Pesticide/Polychlorinated Biphenyl (ug/kg)	
AROCLOR-1260	1,000 *a

TABLE 4.16-3 (Continued)

STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA50FC418
Sampling Depth (feet bgs)	2.10
Sample Number	9309X922
Sample Date	03/05/93
TPH-Extractable (mg/kg)	
TPH-DIESEL	410
Total Recoverable Petroleum Hydrocarbons (mg/kg)	
TRPH	42
Percent Moisture (%)	
% SOLIDS	44.1
pH (pH units)	
PH	7.9

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.16-4

SUMMARY OF SOIL ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR08B049	9137H864							✓				✓							✓		✓	
IR08B049	9137H865							✓				✓							✓		✓	
IR08B049	9137H866							✓				✓							✓		✓	
IR08B050	9137M157							✓				✓							✓		✓	
IR08B050	9137M158							✓				✓							✓		✓	
IR08B050	9137M159							✓				✓							✓		✓	
IR38B002	9414A766						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B002	9414A767						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B003	9414A768						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B003	9414A771						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B004	9414A773						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B004	9414A775						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B004	9414A776						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B005	9414A778						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B005	9414A779						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B006	9415R001						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B006	9415R003						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B006	9415R004						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B007	9415R005						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B007	9415R006						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR38B007	9415R008						✓			✓	✓	✓				✓			✓	✓	✓	✓
PA38SS01	9309J354			✓			✓					✓										
PA39MW01A	9307J270		✓	✓	✓		✓	✓		✓	✓	✓				✓			✓	✓		✓
PA39MW01A	9307J271		✓	✓	✓		✓	✓		✓	✓	✓				✓			✓	✓		✓
PA39MW01A	9307J272			✓	✓		✓	✓		✓	✓	✓				✓			✓	✓		✓

TABLE 4.16-4 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.16-5

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
METAL	ALUMINUM	12,300	33,400	24,000	MG/KG	5.3	19	19	76,700	0	100,000	0		
	ANTIMONY	1.1	4.5	2.7	MG/KG	0.29	19	14	30.7	0	681	0	9.05	0
	ARSENIC	1.9	12.3	5.1	MG/KG	0.33	19	16	0.32	16	2.0	14	11.10	1
	BARIUM	27.0	264	156	MG/KG	1.0	19	19	5,340	0	100,000	0	314.36	0
	BERYLLIUM	0.16	0.57	0.31	MG/KG	0.04	19	12	0.14	12	1.1	0	0.71	0
	CADMIUM	0.43	2.5	1.2	MG/KG	0.15	19	12	9.0	0	852	0	3.14	0
	CALCIUM	6,340	21,800	13,900	MG/KG	14.7	19	19						
	CHROMIUM	10.9	505	230	MG/KG	0.24	19	19	211	11	1,580	0	h	0
	COBALT	14.3	52.8	31.8	MG/KG	0.37	19	19					h	0
	COPPER	12.4	1,020	96.9	MG/KG	0.13	19	19	2,850	0	63,300	0	124.31	1
	IRON	19,100	46,400	36,400	MG/KG	5.8	19	19						
	LEAD	1.9	590	42.1	MG/KG	0.54	19	16	130	1	1,000	0	8.99	1
	MAGNESIUM	10,600	134,000	52,000	MG/KG	17.8	19	19						
	MANGANESE	323	1,330	761	MG/KG	0.13	19	19	382	18	8,300	0	1431.18	0
	MERCURY	0.05	1.8	0.22	MG/KG	0.05	19	13	23.0	0	511	0	2.28	0
	MOLYBDENUM	0.65	19.5	7.2	MG/KG	0.36	19	3	383	0	8,520	0	2.68	1
	NICKEL	6.9	979	362	MG/KG	0.88	19	19	150	13	34,100	0	h	0
	POTASSIUM	615	1,570	1,020	MG/KG	22.3	19	17						
	SELENIUM	0.62	0.76	0.69	MG/KG	0.25	19	2	383	0	8,520	0	1.95	0
	SILVER	0.74	0.74	0.74	MG/KG	0.49	19	1	383	0	8,520	0	1.43	0
	SODIUM	145	4,040	1,080	MG/KG	37.3	19	15						
	VANADIUM	28.8	107	74.7	MG/KG	0.35	19	19	537	0	11,900	0	117.17	0

TABLE 4.16-5 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	ZINC	31.8	1,540	140	MG/KG	0.76	19	19	23,000	0	100,000	0	109.86	1
VOC	BENZENE	5	64	17	UG/KG	10	18	6	1,400	0	3,200	0		
	CARBON DISULFIDE	1	1	1	UG/KG	12	17	1	16,000	0	52,000	0		
	TOLUENE	4	4	4	UG/KG	10	16	1	1,900,000	0	2,700,000	0		
SVOC	2-METHYLNAPHTHALENE	36	620	290	UG/KG	390	18	3	800,000	0	800,000	0		
	ACENAPHTHENE	1,100	1,100	1,100	UG/KG	390	18	1	360,000	0	360,000	0		
	ANTHRACENE	1,100	1,100	1,100	UG/KG	390	18	1	19,000	0	19,000	0		
	BENZO(A)ANTHRACENE	500	500	500	UG/KG	390	18	1	610	0	2,600	0		
	BENZO(A)PYRENE	200	200	200	UG/KG	390	18	1	61	1	260	0		
	BENZO(B)FLUORANTHENE	220	220	220	UG/KG	390	18	1	610	0	2,600	0		
	BENZO(G,H,I)PERYLENE	64	64	64	UG/KG	390	18	1	800,000	0	800,000	0		
	BENZO(K)FLUORANTHENE	230	230	230	UG/KG	390	18	1	610	0	26,000	0		
	CARBAZOLE	680	680	680	UG/KG	390	18	1	22,000	0	95,000	0		
	CHRYSENE	420	420	420	UG/KG	390	18	1	6,100	0	24,000	0		
	DIBENZ(A,H)ANTHRACENE	38	38	38	UG/KG	390	18	1	61	0	260	0		
	DIBENZOFURAN	62	2,300	820	UG/KG	380	18	3	260,000	0	2,700,000	0		
	FLUORANTHENE	3,200	3,200	3,200	UG/KG	390	18	1	2,600,000	0	27,000,000	0		
	FLUORENE	54	1,000	530	UG/KG	380	18	2	300,000	0	300,000	0		
	INDENO(1,2,3-CD)PYRENE	71	71	71	UG/KG	390	18	1	610	0	2,600	0		
	NAPHTHALENE	180	380	280	UG/KG	380	18	2	800,000	0	800,000	0		
	PHENANTHRENE	26	6,500	1,400	UG/KG	380	18	5	800,000	0	800,000	0		
	PYRENE	30	2,000	1,000	UG/KG	380	18	2	2,000,000	0	20,000,000	0		

TABLE 4.16-5 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
PEST	4,4'-DDD	6	6	6	UG/KG	4	18	1	1,900	0	7,900	0		
	4,4'-DDE	4	4	4	UG/KG	4	18	1	1,300	0	5,600	0		
	4,4'-DDT	10	10	10	UG/KG	4	18	1	1,300	0	5,600	0		
	ALPHA-CHLORDANE	5	5	5	UG/KG	2	18	1	340	0	1,500	0		
	ENDOSULFAN I	5	5	5	UG/KG	2	18	1	3,300	0	34,000	0		
TPHPRG	TPH-GASOLINE	0.2	0.2	0.2	MG/KG	0.7	18	1	100	0i				
TPHEXT	TPH-DIESEL	57	57	57	MG/KG	11	24	1	1,000	0i				
	TPH-EXTRACTABLE UNKNOWN HYDRO.	46	46	46	MG/KG	10	6	1	1,000	0i				
	TPH-MOTOR OIL	10	180	49	MG/KG	30	15	6	1,000	0i				
TRPH	TRPH	4	560	80	MG/KG	30	21	11	1,000	0i				
O&G	TOTAL OIL & GREASE	57	17,000	2,600	MG/KG	43	9	7	1,000	1i				

TABLE 4.16-5 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 201.198 to 1159.606, 32.349 to 120.681, and 247.742 to 2758.587 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.16-6

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B049	IR08B049	IR08B050	IR08B050	IR08B050	IR38B002
Sampling Depth (feet bgs)	2.25	4.25	7.25	2.25	4.25	6.75	6.25
Sample Number	9137H864	9137H865	9137H866	9137M157	9137M158	9137M159	9414A766
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	04/07/94
Metal (mg/kg)							
ALUMINUM	NA	NA	NA	NA	NA	NA	23,300
ANTIMONY	NA	NA	NA	NA	NA	NA	1.1
ARSENIC	NA	NA	NA	NA	NA	NA	1.9 *
BARIUM	NA	NA	NA	NA	NA	NA	94.7
BERYLLIUM	NA	NA	NA	NA	NA	NA	ND (0.29)
CADMIUM	NA	NA	NA	NA	NA	NA	1.1
CALCIUM	NA	NA	NA	NA	NA	NA	15,100
CHROMIUM	NA	NA	NA	NA	NA	NA	125
COBALT	NA	NA	NA	NA	NA	NA	25.2
COPPER	NA	NA	NA	NA	NA	NA	49.8
IRON	NA	NA	NA	NA	NA	NA	34,200
LEAD	NA	NA	NA	NA	NA	NA	3.2
MAGNESIUM	NA	NA	NA	NA	NA	NA	34,400
MANGANESE	NA	NA	NA	NA	NA	NA	374 *
MERCURY	NA	NA	NA	NA	NA	NA	0.05
MOLYBDENUM	NA	NA	NA	NA	NA	NA	ND (0.15)
NICKEL	NA	NA	NA	NA	NA	NA	175 *
POTASSIUM	NA	NA	NA	NA	NA	NA	662
SELENIUM	NA	NA	NA	NA	NA	NA	ND (0.64)
SILVER	NA	NA	NA	NA	NA	NA	ND (0.17)
SODIUM	NA	NA	NA	NA	NA	NA	1,080
VANADIUM	NA	NA	NA	NA	NA	NA	73.7
ZINC	NA	NA	NA	NA	NA	NA	63.5
Volatile Organic Compound (ug/kg)							
BENZENE	NA	NA	NA	NA	NA	NA	15
CARBON DISULFIDE	NA	NA	NA	NA	NA	NA	ND (11)
TOLUENE	NA	NA	NA	NA	NA	NA	ND (11)
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	NA	NA	NA	NA	NA	NA	ND (360)
ACENAPHTHENE	NA	NA	NA	NA	NA	NA	ND (360)
ANTHRACENE	NA	NA	NA	NA	NA	NA	ND (360)
BENZO(A)ANTHRACENE	NA	NA	NA	NA	NA	NA	ND (360)
BENZO(A)PYRENE	NA	NA	NA	NA	NA	NA	ND (360)
BENZO(B)FLUORANTHENE	NA	NA	NA	NA	NA	NA	ND (360)

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B049	IR08B049	IR08B050	IR08B050	IR08B050	IR38B002
Sampling Depth (feet bgs)	2.25	4.25	7.25	2.25	4.25	6.75	6.25
Sample Number	9137H864	9137H865	9137H866	9137M157	9137M158	9137M159	9414A766
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	04/07/94
Semivolatile Organic Compound (ug/kg)							
BENZO(G,H,I)PERYLENE	NA	NA	NA	NA	NA	NA	ND (360)
BENZO(K)FLUORANTHENE	NA	NA	NA	NA	NA	NA	ND (360)
CARBAZOLE	NA	NA	NA	NA	NA	NA	ND (360)
CHRYSENE	NA	NA	NA	NA	NA	NA	ND (360)
DIBENZ(A,H)ANTHRACENE	NA	NA	NA	NA	NA	NA	ND (360)
DIBENZOFURAN	NA	NA	NA	NA	NA	NA	ND (360)
FLUORANTHENE	NA	NA	NA	NA	NA	NA	ND (360)
FLUORENE	NA	NA	NA	NA	NA	NA	ND (360)
INDENO(1,2,3-CD)PYRENE	NA	NA	NA	NA	NA	NA	ND (360)
NAPHTHALENE	NA	NA	NA	NA	NA	NA	ND (360)
PHENANTHRENE	NA	NA	NA	NA	NA	NA	ND (360)
PYRENE	NA	NA	NA	NA	NA	NA	ND (360)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	6
4,4'-DDE	NA	NA	NA	NA	NA	NA	4
4,4'-DDT	NA	NA	NA	NA	NA	NA	10
ALPHA-CHLORDANE	NA	NA	NA	NA	NA	NA	ND (2)
ENDOSULFAN I	NA	NA	NA	NA	NA	NA	ND (2)
TPH-Purgeable (mg/kg)							
TPH-GASOLINE	NA	NA	NA	NA	NA	NA	ND (0.5)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (11)	ND (11)	ND (10)	ND (12)	ND (11)	ND (11)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	ND (11)	ND (11)	ND (11)	46	ND (12)	ND (11)	NA
TPH-MOTOR OIL	NA	NA	NA	NA	NA	NA	ND (11)
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (22)	96	ND (22)	560	ND (23)	ND (22)	4
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	130	57	ND (56)	420	63	ND (54)	NA

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR08B049	IR08B049	IR08B049	IR08B050	IR08B050	IR08B050	IR38B002
Sampling Depth (feet bgs)	2.25	4.25	7.25	2.25	4.25	6.75	6.25
Sample Number	9137H864	9137H865	9137H866	9137M157	9137M158	9137M159	9414A766
Sample Date	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	09/09/91	04/07/94
Percent Moisture (%)							
% SOLIDS	NA	NA	NA	NA	NA	NA	93.1
pH (pH units)							
PH	8.4	8.0	8.9	8.2	7.6	9.1	10.1

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B002	IR38B003	IR38B003	IR38B004	IR38B004	IR38B004	IR38B005
Sampling Depth (feet bgs)	10.25	6.25	16.25	6.25	11.25	16.25	11.25
Sample Number	9414A767	9414A768	9414A771	9414A773	9414A775	9414A776	9414A778
Sample Date	04/07/94	04/07/94	04/07/94	04/08/94	04/08/94	04/08/94	04/08/94
Metal (mg/kg)							
ALUMINUM	31,000	22,900	25,500	23,900	30,900	19,900	31,000
ANTIMONY	2.1	1.7	3.3	1.5	1.8	1.2	2.2
ARSENIC	7.0 *#	5.8 *#	6.8 *#	2.2 *#	4.1 *#	ND (1.9)	4.6 *#
BARIUM	215	162	264	194	126	107	133
BERYLLIUM	0.57 *	0.43 *	0.49 *	0.25 *	0.27 *	ND (0.20)	0.37 *
CADMIUM	1.3	1.2	1.3	1.2	1.2	0.88	1.1
CALCIUM	11,100	10,300	12,500	14,700	14,600	16,100	8,540
CHROMIUM	294 *	252 *	505 *	174	290 *	119	272 *
COBALT	36.4	30.1	37.4	31.6	34.8	22.0	28.4
COPPER	48.1	45.5	45.6	54.5	39.1	36.6	34.4
IRON	41,400	37,200	39,400	39,300	37,500	31,900	35,500
LEAD	6.2	7.9	8.5	6.5	2.9	3.8	4.3
MAGNESIUM	67,900	52,400	79,300	28,300	70,000	20,400	63,300
MANGANESE	894 *	1,010 *	823 *	1,330 *	741 *	697 *	713 *
MERCURY	0.11	0.07	0.18	0.09	0.07	ND (0.06)	0.11
MOLYBDENUM	ND (0.18)	ND (0.16)	ND (0.19)	ND (0.16)	ND (0.19)	ND (0.17)	ND (0.17)
NICKEL	495 *	383 *	583 *	256 *	526 *	133	420 *
POTASSIUM	1,330	897	1,500	724	811	733	1,200
SELENIUM	ND (0.75)	ND (0.70)	ND (0.80)	ND (0.69)	ND (0.80)	ND (0.71)	ND (0.72)
SILVER	ND (0.20)	ND (0.19)	ND (0.21)	ND (0.19)	ND (0.21)	ND (0.19)	ND (0.19)
SODIUM	606	373	1,450	283	4,040	776	250
VANADIUM	77.1	72.7	72.0	94.9	84.2	88.1	68.5
ZINC	79.1	80.0	78.5	66.0	56.9	51.3	63.8
Volatile Organic Compound (ug/kg)							
BENZENE	5	6	6	ND (12)	ND (13)	ND (12)	64
CARBON DISULFIDE	ND (13)	ND (12)	ND (13)	ND (12)	ND (13)	ND (12)	ND (12)
TOLUENE	ND (13)	4	ND (13)	ND (12)	ND (13)	ND (12)	ND (12)
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	36
ACENAPHTHENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
ANTHRACENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
BENZO(A)ANTHRACENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
BENZO(A)PYRENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
BENZO(B)FLUORANTHENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B002	IR38B003	IR38B003	IR38B004	IR38B004	IR38B004	IR38B005
Sampling Depth (feet bgs)	10.25	6.25	16.25	6.25	11.25	16.25	11.25
Sample Number	9414A767	9414A768	9414A771	9414A773	9414A775	9414A776	9414A778
Sample Date	04/07/94	04/07/94	04/07/94	04/08/94	04/08/94	04/08/94	04/08/94
Semivolatile Organic Compound (ug/kg)							
BENZO(G,H,I)PERYLENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
BENZO(K)FLUORANTHENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
CARBAZOLE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
CHRYSENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
DIBENZ(A,H)ANTHRACENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
DIBENZOFURAN	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
FLUORANTHENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
FLUORENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
INDENO(1,2,3-CD)PYRENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
NAPHTHALENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
PHENANTHRENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	26
PYRENE	ND (420)	ND (390)	ND (440)	ND (390)	ND (440)	ND (400)	ND (400)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
4,4'-DDE	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
4,4'-DDT	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
ALPHA-CHLORDANE	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
ENDOSULFAN I	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
TPH-Purgeable (mg/kg)							
TPH-GASOLINE	ND (0.6)	ND (0.6)	ND (0.7)	ND (0.6)	0.2	ND (0.6)	ND (0.6)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (13)	ND (12)	ND (13)	ND (12)	ND (13)	ND (12)	ND (12)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	ND (13)	36	ND (13)	ND (12)	45	10	10
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (6)	22	ND (7)	39	4	4	4
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B002	IR38B003	IR38B003	IR38B004	IR38B004	IR38B004	IR38B005
Sampling Depth (feet bgs)	10.25	6.25	16.25	6.25	11.25	16.25	11.25
Sample Number	9414A767	9414A768	9414A771	9414A773	9414A775	9414A776	9414A778
Sample Date	04/07/94	04/07/94	04/07/94	04/08/94	04/08/94	04/08/94	04/08/94
Percent Moisture (%)							
% SOLIDS	79.9	86.0	75.2	13.6	24.6	15.7	16.2
pH (pH units)							
PH	8.8	9.5	8.7	8.7	8.6	8.2	8.8

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B005	IR38B006	IR38B006	IR38B006	IR38B007	IR38B007	IR38B007
Sampling Depth (feet bgs)	16.25	6.25	11.25	16.25	6.25	11.25	16.25
Sample Number	9414A779	9415R001	9415R003	9415R004	9415R005	9415R006	9415R008
Sample Date	04/08/94	04/11/94	04/11/94	04/11/94	04/12/94	04/12/94	04/12/94
Metal (mg/kg)							
ALUMINUM	17,800	30,900	29,500	27,400	33,400	12,300	24,900
ANTIMONY	1.8	4.5	4.4	3.5	4.4	ND (0.91)	3.8
ARSENIC	3.1 *#	6.5 *#	3.4 *#	4.9 *#	5.9 *#	5.3 *#	5.9 *#
BARIUM	196	164	132	240	199	185	169
BERYLLIUM	ND (0.15)	0.29 *	0.22 *	0.25 *	0.24 *	ND (0.14)	ND (0.18)
CADMIUM	1.4	ND (0.04)	ND (0.07)	ND (0.01)	0.59	ND (0.09)	0.43
CALCIUM	10,100	13,600	21,800	13,600	14,600	21,600	17,900
CHROMIUM	369 *	375 *	357 *	251 *	325 *	63.1	313 *
COBALT	52.8	43.1	40.9	36.1	40.4	15.1	47.4
COPPER	25.0	54.3	44.7	52.0	48.9	12.4	45.8
IRON	36,800	46,400	45,700	43,000	46,200	19,100	37,600
LEAD	ND (1.5)	8.5	7.3	5.5	6.4	5.1	6.3
MAGNESIUM	134,000	84,800	62,400	51,500	79,900	20,200	82,100
MANGANESE	617 *	917 *	835 *	1,140 *	748 *	323	756 *
MERCURY	0.09	ND (0.06)	ND (0.11)	ND (0.04)	0.08	0.09	0.05
MOLYBDENUM	ND (0.18)	ND (0.99)	ND (0.67)	ND (0.76)	0.65	ND (0.33)	1.5
NICKEL	979 *	595 *	462 *	379 *	495 *	109	584 *
POTASSIUM	624	1,520	1,250	1,300	1,570	758	1,030
SELENIUM	ND (0.79)	0.62	ND (0.24)	0.76	ND (0.21)	ND (0.43)	ND (0.38)
SILVER	ND (0.21)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.08)	ND (0.11)	ND (0.09)
SODIUM	923	ND (23.0)	1,240	ND (23.3)	ND (18.2)	ND (24.6)	1,120
VANADIUM	46.6	82.6	90.1	88.0	83.0	28.8	67.6
ZINC	49.3	89.7	70.0	71.3	83.8	31.8	73.0
Volatile Organic Compound (ug/kg)							
BENZENE	ND (13)	6	ND (12)	ND (12)	ND (11)	ND (11)	ND (11)
CARBON DISULFIDE	ND (13)	1	ND (12)	ND (12)	ND (11)	ND (11)	NA
TOLUENE	ND (13)	ND (12)	ND (12)	ND (12)	ND (11)	NA	NA
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (440)	ND (400)	620	ND (390)	ND (380)	210	ND (380)
ACENAPHTHENE	ND (440)	ND (400)	1,100	ND (390)	ND (380)	ND (380)	ND (380)
ANTHRACENE	ND (440)	ND (400)	1,100	ND (390)	ND (380)	ND (380)	ND (380)
BENZO(A)ANTHRACENE	ND (440)	ND (400)	500	ND (390)	ND (380)	ND (380)	ND (380)
BENZO(A)PYRENE	ND (440)	ND (400)	200 *	ND (390)	ND (380)	ND (380)	ND (380)
BENZO(B)FLUORANTHENE	ND (440)	ND (400)	220	ND (390)	ND (380)	ND (380)	ND (380)

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B005	IR38B006	IR38B006	IR38B006	IR38B007	IR38B007	IR38B007
Sampling Depth (feet bgs)	16.25	6.25	11.25	16.25	6.25	11.25	16.25
Sample Number	9414A779	9415R001	9415R003	9415R004	9415R005	9415R006	9415R008
Sample Date	04/08/94	04/11/94	04/11/94	04/11/94	04/12/94	04/12/94	04/12/94
Semivolatile Organic Compound (ug/kg)							
BENZO(G,H,I)PERYLENE	ND (440)	ND (400)	64	ND (390)	ND (380)	ND (380)	ND (380)
BENZO(K)FLUORANTHENE	ND (440)	ND (400)	230	ND (390)	ND (380)	ND (380)	ND (380)
CARBAZOLE	ND (440)	ND (400)	680	ND (390)	ND (380)	ND (380)	ND (380)
CHRYSENE	ND (440)	ND (400)	420	ND (390)	ND (380)	ND (380)	ND (380)
DIBENZ(A,H)ANTHRACENE	ND (440)	ND (400)	38	ND (390)	ND (380)	ND (380)	ND (380)
DIBENZOFURAN	ND (440)	ND (400)	2,300	ND (390)	62	89	ND (380)
FLUORANTHENE	ND (440)	ND (400)	3,200	ND (390)	ND (380)	ND (380)	ND (380)
FLUORENE	ND (440)	ND (400)	1,000	ND (390)	54	ND (380)	ND (380)
INDENO(1,2,3-CD)PYRENE	ND (440)	ND (400)	71	ND (390)	ND (380)	ND (380)	ND (380)
NAPHTHALENE	ND (440)	ND (400)	380	ND (390)	ND (380)	180	ND (380)
PHENANTHRENE	ND (440)	ND (400)	6,500	31	53	180	ND (380)
PYRENE	ND (440)	ND (400)	2,000	ND (390)	ND (380)	30	ND (380)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDD	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
4,4'-DDE	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
4,4'-DDT	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
ALPHA-CHLORDANE	ND (2)	ND (2)	5	ND (2)	ND (2)	ND (2)	ND (2)
ENDOSULFAN I	ND (2)	ND (2)	5	ND (2)	ND (2)	ND (2)	ND (2)
TPH-Purgeable (mg/kg)							
TPH-GASOLINE	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (13)	ND (13)	ND (12)	ND (12)	ND (12)	ND (12)	ND (12)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	13	ND (130)	180	ND (120)	ND (120)	ND (120)	ND (120)
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	4	ND (31)	86	55	ND (28)	ND (30)	ND (29)
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B005	IR38B006	IR38B006	IR38B006	IR38B007	IR38B007	IR38B007
Sampling Depth (feet bgs)	16.25	6.25	11.25	16.25	6.25	11.25	16.25
Sample Number	9414A779	9415R001	9415R003	9415R004	9415R005	9415R006	9415R008
Sample Date	04/08/94	04/11/94	04/11/94	04/11/94	04/12/94	04/12/94	04/12/94
Percent Moisture (%)							
% SOLIDS	23.8	83.4	83.6	85.5	88.0	88.4	87.8
pH (pH units)							
PH	8.5	9.3	8.3	8.1	9.6	9.1	9.0

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA38SS01	PA39MW01A	PA39MW01A	PA39MW01A
Sampling Depth (feet bgs)	0.00	2.25	4.25	9.25
Sample Number	9309J354	9307J270	9307J271	9307J272
Sample Date	03/02/93	02/16/93	02/16/93	02/16/93
Metal (mg/kg)				
ALUMINUM	12,800	18,500	16,000	25,200
ANTIMONY	ND (6.8)	ND (4.6)	ND (5.7)	ND (9.1)
ARSENIC	12.3 *α	ND (0.79)	2.0 *	ND (0.78)
BARIUM	234	27.0	50.7	65.1
BERYLLIUM	ND (0.16)	0.16 *	ND (0.14)	0.23 *
CADMIUM	2.5	ND (0.44)	ND (0.49)	ND (0.49)
CALCIUM	6,340	10,600	11,000	20,500
CHROMIUM	148	10.9	75.9	55.0
COBALT	16.7	14.3	22.6	28.6
COPPER	1,020 α	119	37.0	27.9
IRON	31,100	25,100	24,400	38,900
LEAD	590 *α	ND (0.67)	1.9	ND (0.67)
MAGNESIUM	10,600	11,000	11,700	23,200
MANGANESE	613 *	415 *	551 *	763 *
MERCURY	1.8	0.08	ND (0.06)	ND (0.06)
MOLYBDENUM	19.5 α	ND (0.53)	ND (0.58)	ND (0.59)
NICKEL	136	6.9	64.0	88.6
POTASSIUM	ND (1,150)	615	821	ND (543)
SELENIUM	ND (0.80)	ND (3.8)	ND (0.42)	ND (0.42)
SILVER	0.74	ND (0.74)	ND (0.95)	ND (1.1)
SODIUM	145	765	1,130	2,070
VANADIUM	45.8	82.0	67.3	107
ZINC	1,540 α	35.4	40.5	38.2
Volatile Organic Compound (ug/kg)				
BENZENE	NA	ND (11)	ND (12)	ND (12)
CARBON DISULFIDE	NA	ND (11)	ND (12)	ND (12)
TOLUENE	NA	ND (11)	ND (12)	ND (12)
Semivolatile Organic Compound (ug/kg)				
2-METHYLNAPHTHALENE	NA	ND (3,500)	ND (390)	ND (390)
ACENAPHTHENE	NA	ND (3,500)	ND (390)	ND (390)
ANTHRACENE	NA	ND (3,500)	ND (390)	ND (390)
BENZO(A)ANTHRACENE	NA	ND (3,500)	ND (390)	ND (390)
BENZO(A)PYRENE	NA	ND (3,500)	ND (390)	ND (390)
BENZO(B)FLUORANTHENE	NA	ND (3,500)	ND (390)	ND (390)

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA38SS01	PA39MW01A	PA39MW01A	PA39MW01A
Sampling Depth (feet bgs)	0.00	2.25	4.25	9.25
Sample Number	9309J354	9307J270	9307J271	9307J272
Sample Date	03/02/93	02/16/93	02/16/93	02/16/93
Semivolatile Organic Compound (ug/kg)				
BENZO(G,H,I)PERYLENE	NA	ND (3,500)	ND (390)	ND (390)
BENZO(K)FLUORANTHENE	NA	ND (3,500)	ND (390)	ND (390)
CARBAZOLE	NA	ND (3,500)	ND (390)	ND (390)
CHRYSENE	NA	ND (3,500)	ND (390)	ND (390)
DIBENZ(A,H)ANTHRACENE	NA	ND (3,500)	ND (390)	ND (390)
DIBENZOFURAN	NA	ND (3,500)	ND (390)	ND (390)
FLUORANTHENE	NA	ND (3,500)	ND (390)	ND (390)
FLUORENE	NA	ND (3,500)	ND (390)	ND (390)
INDENO(1,2,3-CD)PYRENE	NA	ND (3,500)	ND (390)	ND (390)
NAPHTHALENE	NA	ND (3,500)	ND (390)	ND (390)
PHENANTHRENE	NA	ND (3,500)	ND (390)	ND (390)
PYRENE	NA	ND (3,500)	ND (390)	ND (390)
Pesticide/Polychlorinated Biphenyl (ug/kg)				
4,4'-DDD	NA	ND (35)	ND (4)	ND (4)
4,4'-DDE	NA	ND (35)	ND (4)	ND (4)
4,4'-DDT	NA	ND (35)	ND (4)	ND (4)
ALPHA-CHLORDANE	NA	ND (18)	ND (2)	ND (2)
ENDOSULFAN I	NA	ND (18)	ND (2)	ND (2)
TPH-Purgeable (mg/kg)				
TPH-GASOLINE	NA	ND (6)	ND (6)	ND (6)
TPH-Extractable (mg/kg)				
TPH-DIESEL	NA	57	ND (12)	ND (12)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA
TPH-MOTOR OIL	NA	NA	NA	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)				
TRPH	NA	NA	NA	NA
Oil and Grease (mg/kg)				
TOTAL OIL & GREASE	NA	17,000	290	100

TABLE 4.16-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA38SS01	PA39MW01A	PA39MW01A	PA39MW01A
Sampling Depth (feet bgs)	0.00	2.25	4.25	9.25
Sample Number	9309J354	9307J270	9307J271	9307J272
Sample Date	03/02/93	02/16/93	02/16/93	02/16/93
Percent Moisture (%)				
% SOLIDS	NA	94.6	86.5	85.2
pH (pH units)				
PH	6.6	7.6	8.4	9.2

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.16-7

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR38MW01A	9441X521						√				√	√				√			√	√	√	√
IR38MW01A	9441X522						√				√	√				√			√	√	√	√
IR38MW01A	9604Z012						√				√	√				√			√	√	√	√
IR38MW01A	9608J885						√				√	√				√			√	√	√	√
IR38MW03A	9437X475						√				√	√				√			√	√	√	√
IR38MW03A	9437X476						√				√	√				√			√	√	√	√
IR38MW03A	9604W023						√				√	√				√			√	√	√	√
IR38MW03A	9608J884						√				√	√				√			√	√	√	√
PA39MW01A	9307A611			√	√		√	√			√					√			√	√		√
PA39MW01A	9307A612			√	√		√	√			√					√			√	√		√
PA39MW01A	9606W084						√				√	√				√			√	√	√	√
PA39MW01A	9611W159	√					√				√	√		√	√	√			√	√	√	√

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.16-8

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
METAL	ANTIMONY	1.7	1.7	1.7	UG/L	1.6	9	1	15.0	0	6.0	0	500	0
	ARSENIC	1.4	5.4	3.4	UG/L	1.4	9	5	0.04	5	50.0	0	36.0	0
	BARIUM	30.3	61.7	45.9	UG/L	1.3	9	8	2,600	0	1,000	0		
	CALCIUM	37,600	504,000	230,000	UG/L	32.6	9	9						
	COBALT	1.9	7.3	4.8	UG/L	0.52	9	5						
	IRON	14.2	14.2	14.2	UG/L	11.0	9	1						
	LEAD	2.4	2.4	2.4	UG/L	1.1	9	1	4.0	0	50.0	0	8.1	0
	MAGNESIUM	69,500	901,000	433,000	UG/L	70.0	9	9						
	MANGANESE	294	11,800	3,660	UG/L	0.22	9	9	180	9				
	MOLYBDENUM	1.1	300	132	UG/L	0.57	9	6	180	3				
	NICKEL	12.5	12.9	12.7	UG/L	1.1	9	2	730	0	100	0	8.2	2
	POTASSIUM	4,480	129,000	46,600	UG/L	654	9	9						
	SELENIUM	2.1	2.9	2.5	UG/L	2.3	9	2	180	0	50.0	0	71.0	0
	SODIUM	292,000	4,400,000	2,070,000	UG/L	109	9	9						
	THALLIUM	1.9	10.5	6.3	UG/L	1.9	9	3			2.0	2		
	VANADIUM	2.5	3.2	2.9	UG/L	1.1	9	4	260	0				
TPHPRG	TPH-GASOLINE	29	29	29	UG/L	50	9	1	100	0i				
TPHEXT	TPH-DIESEL	62	67	65	UG/L	100	9	2	100	0i				
	TPH-MOTOR OIL	86	970	340	UG/L	100	8	4	100	3i				
ANION	CHLORIDE	1,500,000	1,500,000	1,500,000	UG/L	40,000	1	1						
	FLUORIDE	440	440	440	UG/L	100	1	1			1,400	0		
	SULFATE	256,000	256,000	256,000	UG/L	1,200	1	1						

TABLE 4.16-8 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection Frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
SOLIDS	TOTAL DISSOLVED SOLIDS	3,200,000	3,200,000	3,200,000	UG/L	10,000	1	1						
SALIN	SALINITY	3.1	3.1	3.1	PPT	0.005	1	1						

TABLE 4.16-8 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.16-9

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38MW01A	IR38MW01A	IR38MW01A	IR38MW01A	IR38MW03A	IR38MW03A	IR38MW03A
Sample Number	9441X521	9441X522	9604Z012	9608J885	9437X475	9437X476	9604W023
Sample Date	10/12/94	10/12/94	01/22/96	02/22/96	09/13/94	09/13/94	01/23/96
Metal (ug/L)							
ANTIMONY	ND (2.7)	ND (7.2)	ND (1.6)	ND (1.6)	ND (1.9)	ND (5.2)	ND (1.6)
ARSENIC	ND (1.7)	ND (1.7)	1.4 *	ND (1.4)	3.9 *	4.2 *	5.4 *
BARIUM	48.8	49.3	50.8	50.4	ND (53.8)	ND (56.5)	30.3
CALCIUM	476,000	484,000	422,000	504,000	185,000	183,000	122,000
COBALT	5.3	5.4	7.3	7.1	1.8	1.9	ND (0.94)
IRON	ND (22.0)	ND (10.1)	ND (11.0)	ND (11.0)	ND (18.8)	ND (85.6)	ND (20.8)
LEAD	ND (0.60)	ND (0.60)	ND (0.80)	ND (0.80)	ND (1.0)	ND (1.0)	ND (0.80)
MAGNESIUM	543,000	549,000	901,000	875,000	453,000	462,000	298,000
MANGANESE	7,250 *	7,380 *	11,700 *	11,800 *	473 *	457 *	307 *
MOLYBDENUM	ND (3.2)	ND (3.0)	1.1	ND (0.76)	272 *	254 *	300 *
NICKEL	12.4 B	13.4 B	ND (8.1)	ND (6.7)	ND (15.6)	ND (18.0)	ND (4.4)
POTASSIUM	129,000	129,000	42,200	38,900	26,800	32,100	4,480
SELENIUM	2.5	3.4	ND (2.3)	ND (2.3)	3.1	ND (2.3)	ND (2.3)
SODIUM	4,250,000	4,220,000	4,400,000	4,250,000	678,000	796,000	292,000
THALLIUM	7.9 B	5.1 B	10.5 B	ND (1.9)	ND (2.0)	ND (2.0)	ND (1.9)
VANADIUM	ND (0.90)	ND (0.90)	2.9	3.1	ND (1.1)	ND (1.1)	2.5
TPH-Purgeable (ug/L)							
TPH-GASOLINE	ND (50)	ND (50)	29	ND (50)	ND (50)	ND (50)	ND (50)
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
TPH-MOTOR OIL	ND (470)	ND (350)	ND (100)	120	970	970	ND (100)
Anion (ug/L)							
CHLORIDE	NA	NA	NA	NA	NA	NA	NA
FLUORIDE	NA	NA	NA	NA	NA	NA	NA
SULFATE	NA	NA	NA	NA	NA	NA	NA
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	7.0	7.0	6.8	6.9	7.6	7.7	7.5

TABLE 4.16-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38MW01A	IR38MW01A	IR38MW01A	IR38MW01A	IR38MW03A	IR38MW03A	IR38MW03A
Sample Number	9441X521	9441X522	9604Z012	9608J885	9437X475	9437X476	9604W023
Sample Date	10/12/94	10/12/94	01/22/96	02/22/96	09/13/94	09/13/94	01/23/96
Salinity (ppt)							
SALINITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.16-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38MW03A	PA39MW01A	PA39MW01A	PA39MW01A	PA39MW01A
Sample Number	9608J884	9307A611	9307A612	9606W084	9611W159
Sample Date	02/22/96	02/18/93	02/18/93	02/09/96	03/14/96
Metal (ug/L)					
ANTIMONY	ND (1.6)	ND (14.8)	ND (14.8)	1.7	ND (1.6)
ARSENIC	4.2 *	ND (14.0)	ND (1.4)	ND (1.4)	1.9 *
BARIUM	61.7	46.9	46.7	40.1	37.7
CALCIUM	173,000	99,700	101,000	44,200	37,600
COBALT	2.3	ND (3.0)	ND (3.0)	ND (0.40)	ND (0.75)
IRON	ND (11.0)	ND (17.0)	ND (17.0)	ND (168)	14.2
LEAD	ND (0.80)	ND (1.1)	4.2 *	ND (0.80)	ND (0.80)
MAGNESIUM	522,000	144,000	149,000	80,900	69,500
MANGANESE	350 *	376 *	391 *	310 *	294 *
MOLYBDENUM	216 *	ND (5.3)	ND (4.8)	5.6	6.2
NICKEL	12.5 B	ND (4.5)	ND (5.1)	ND (1.4)	ND (1.9)
POTASSIUM	18,500	56,700	57,800	66,000	33,900
SELENIUM	ND (2.3)	ND (18.0)	ND (1.8)	ND (2.3)	ND (2.3)
SODIUM	926,000	1,660,000	1,690,000	1,180,000	894,000
THALLIUM	ND (1.9)	ND (17.0)	ND (17.0)	ND (1.9)	1.9
VANADIUM	ND (1.6)	3.3	3.1	ND (3.1)	ND (2.2)
TPH-Purgeable (ug/L)					
TPH-GASOLINE	ND (50)	ND (500)	ND (500)	ND (50)	ND (50)
TPH-Extractable (ug/L)					
TPH-DIESEL	ND (100)	ND (500)	ND (500)	67	62
TPH-MOTOR OIL	ND (100)	NA	NA	86	190
Anion (ug/L)					
CHLORIDE	NA	NA	NA	NA	1,500,000
FLUORIDE	NA	NA	NA	NA	440
SULFATE	NA	NA	NA	NA	256,000
Solids (ug/L)					
TOTAL DISSOLVED SOLIDS	NA	NA	NA	NA	3,200,000
pH (pH units)					
PH	7.2	NA	NA	7.4	7.6

TABLE 4.16-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38MW03A	PA39MW01A	PA39MW01A	PA39MW01A	PA39MW01A
Sample Number	9608J884	9307A611	9307A612	9606W084	9611W159
Sample Date	02/22/96	02/18/93	02/18/93	02/09/96	03/14/96
Salinity (ppt)					
SALINITY	NA	NA	NA	NA	3.1

Notes:

NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
ppt	Parts per thousand
µg/L	Microgram per liter
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
B	Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ	Detected concentration greater than maximum contaminant level (MCL) U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.16-10

SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR38B003	9414A769															✓			✓	✓		✓
IR38B004	9414A774															✓			✓	✓		✓
IR38B005	9414A777															✓			✓	✓		✓
IR38B006	9415R002															✓			✓	✓		✓
IR38B007	9415R007															✓			✓	✓		✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.16-11

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
VOC	2-BUTANONE	17	26	22	UG/L	5	5	2	1,900	0				
	METHYLENE CHLORIDE	0.6	0.6	0.6	UG/L	1	5	1	4	0	5	0		
TPHPRG	TPH-GASOLINE	29	29	29	UG/L	50	5	1	100	0i				
TPHEXT	TPH-DIESEL	51	210	110	UG/L	100	5	4	100	1i				
	TPH-MOTOR OIL	62	210	120	UG/L	100	5	4	100	2i				

TABLE 4.16-11 (Continued)

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.16-12

HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B003	IR38B004	IR38B005	IR38B006	IR38B007
Sample Number	9414A769	9414A774	9414A777	9415R002	9415R007
Sample Date	04/07/94	04/08/94	04/08/94	04/11/94	04/12/94
Volatile Organic Compound (ug/L)					
2-BUTANONE	ND (5)	17	26	ND (5)	ND (5)
METHYLENE CHLORIDE	ND (0.8)	ND (1)	0.6	ND (0.5)	ND (1)
TPH-Purgeable (ug/L)					
TPH-GASOLINE	ND (50)	ND (50)	29	ND (50)	ND (50)
TPH-Extractable (ug/L)					
TPH-DIESEL	100	210	ND (100)	67	51
TPH-MOTOR OIL	62	77	210	ND (100)	120

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
µg/L Microgram per liter

TABLE 4.16-13

SUMMARY OF GRAB GROUNDWATER ANALYTICAL TESTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR38B002	9414A765															✓			✓	✓		✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.16-14

STATISTICAL SUMMARY OF GRAB GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
VOC	BENZENE	3	3	3	UG/L	1	1	1	0.4	1	1	1		
TPHEXT	TPH-DIESEL	51	51	51	UG/L	100	1	1	100	0i				
	TPH-MOTOR OIL	550	550	550	UG/L	100	1	1	100	1i				

TABLE 4.16-14 (Continued)

STATISTICAL SUMMARY OF GRAB GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

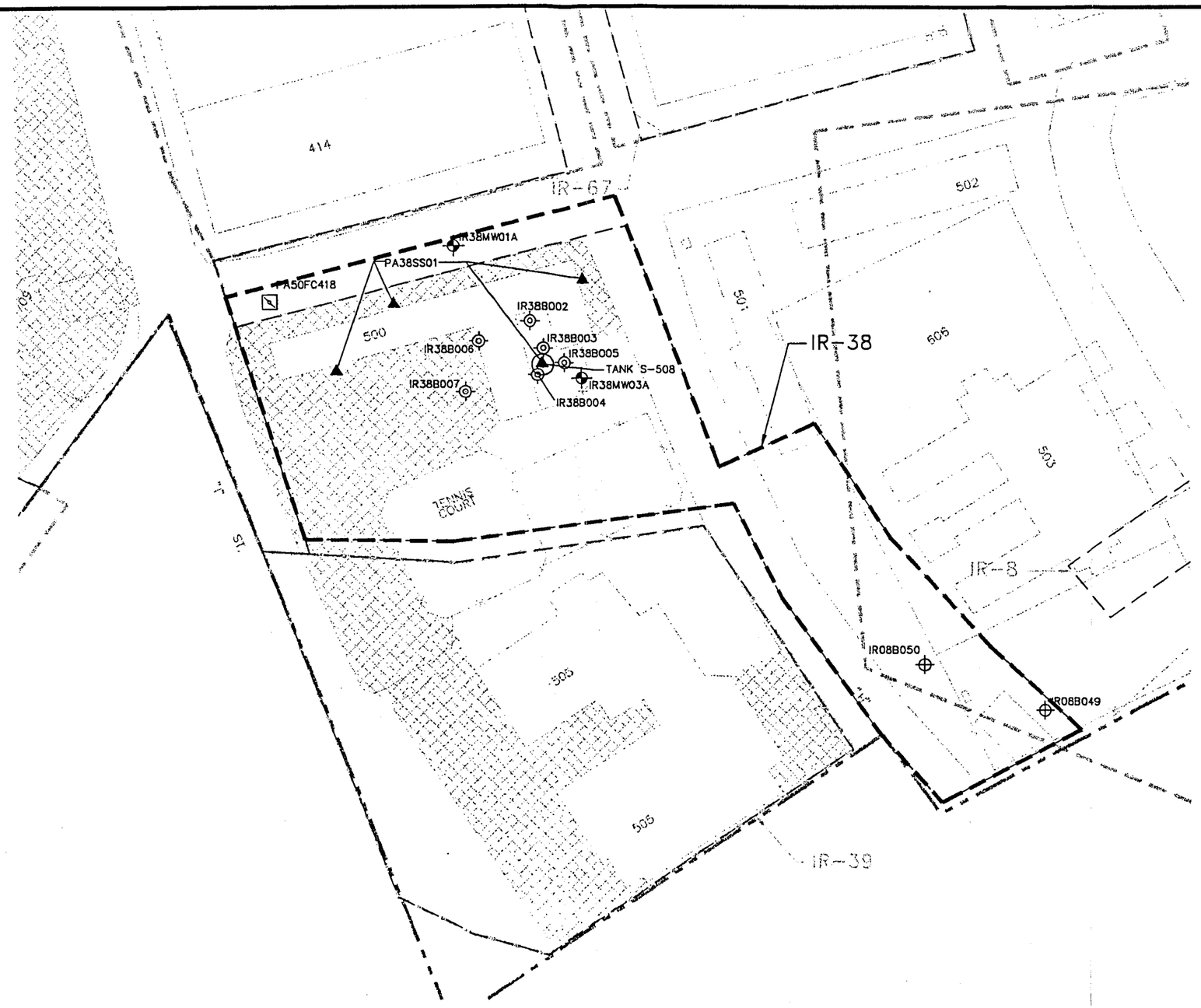
TABLE 4.16-15

GRAB GROUNDWATER ANALYTICAL RESULTS - IR-38
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR38B002
Sample Number	9414A765
Sample Date	04/07/94
Volatile Organic Compound (ug/L)	
BENZENE	3 *δ
TPH-Extractable (ug/L)	
TPH-DIESEL	51
TPH-MOTOR OIL	550

Notes:

NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/L	Microgram per liter
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
δ	Detected concentration greater than maximum contaminant level (MCL) U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent
▒	Detected concentration greater than at least one screening criterion.



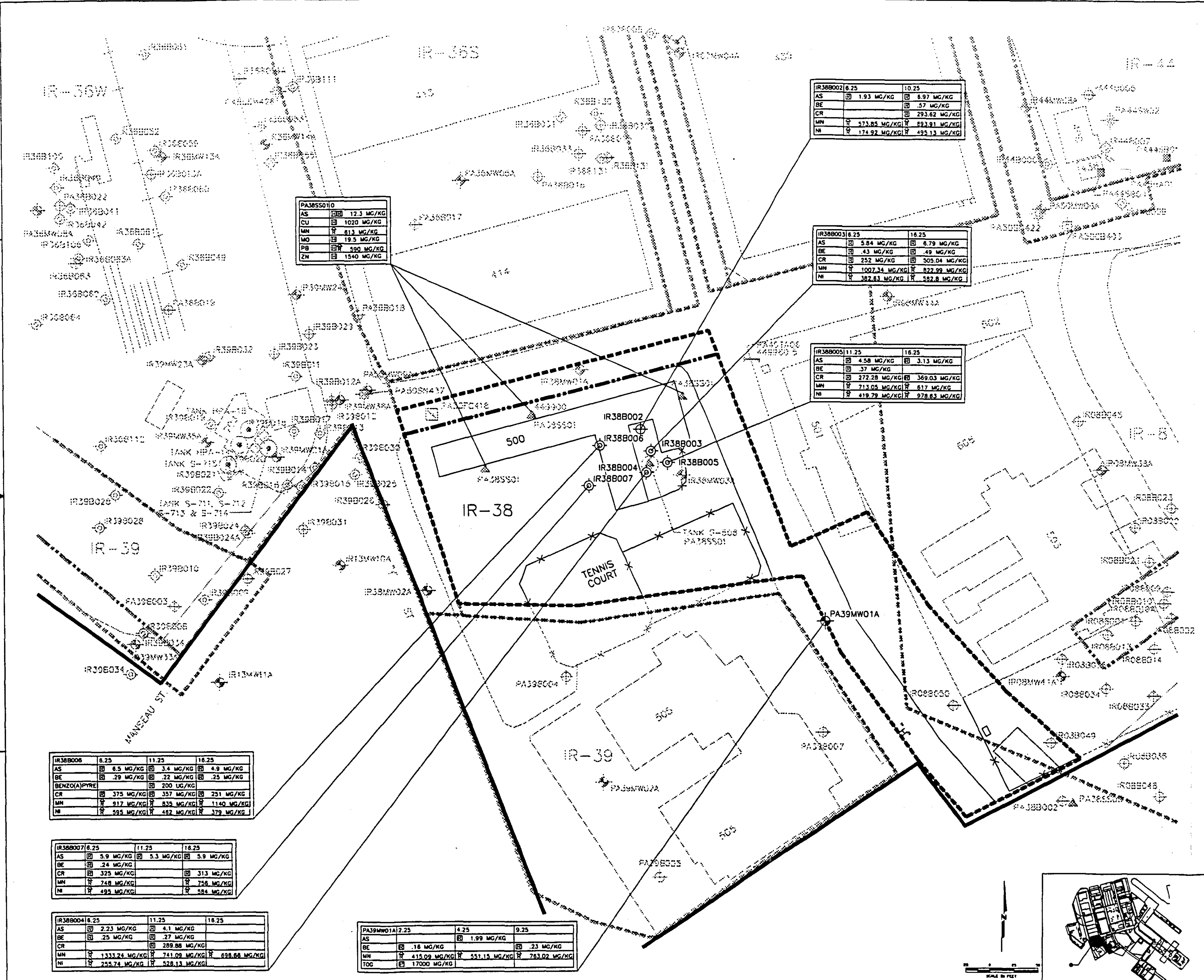
EXPLANATION:

- ▲ SURFACE OR NEAR SURFACE SOIL SAMPLE
- ⊕ SOIL BORING
- A-AQUIFER MONITORING WELL
- BEDROCK AQUIFER MONITORING WELL
- TEST PIT
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- FENCE
- RAILROAD TRACKS
- 0.5 ACRE EXPOSURE AREA BOUNDARY
- DATA SET BOUNDARY
- UNPAVED AREA

50 0 50 100
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.16-1
PARCEL D
IR-38 SITE BOUNDARY
SOIL AND GROUNDWATER SAMPLE LOCATIONS



PA38SS010	0
AS	[H][R] 12.3 MG/KG
CU	[H] 1020 MG/KG
MN	⇧R 613 MG/KG
MO	[H] 19.5 MG/KG
PB	[H]⇧R 590 MG/KG
ZN	[H] 1540 MG/KG

IR38B002	6.25	10.25
AS	[R] 1.93 MG/KG	[R] 6.97 MG/KG
BE		[R] .57 MG/KG
CR		[R] 293.62 MG/KG
MN	⇧R 573.85 MG/KG	⇧R 893.91 MG/KG
NI	⇧R 174.92 MG/KG	⇧R 495.13 MG/KG

IR38B003	6.25	16.25
AS	[R] 5.84 MG/KG	[R] 6.79 MG/KG
BE	[R] .43 MG/KG	[R] .49 MG/KG
CR	[R] 252 MG/KG	[R] 505.04 MG/KG
MN	⇧R 1007.34 MG/KG	⇧R 822.99 MG/KG
NI	⇧R 382.63 MG/KG	⇧R 582.8 MG/KG

IR38B005	11.25	16.25
AS	[R] 4.58 MG/KG	[R] 3.13 MG/KG
BE	[R] .37 MG/KG	
CR	[R] 272.28 MG/KG	[R] 369.03 MG/KG
MN	⇧R 713.05 MG/KG	⇧R 617 MG/KG
NI	⇧R 419.79 MG/KG	⇧R 978.63 MG/KG

IR38B006	6.25	11.25	16.25
AS	[R] 6.5 MG/KG	[R] 3.4 MG/KG	[R] 4.9 MG/KG
BE	[R] .29 MG/KG	[R] .22 MG/KG	[R] .25 MG/KG
BENZO(A)PYRE		[R] 200 UG/KG	
CR	[R] 375 MG/KG	[R] 357 MG/KG	[R] 251 MG/KG
MN	⇧R 917 MG/KG	⇧R 835 MG/KG	⇧R 1140 MG/KG
NI	⇧R 595 MG/KG	⇧R 462 MG/KG	⇧R 379 MG/KG

IR38B007	6.25	11.25	16.25
AS	[R] 5.9 MG/KG	[R] 5.3 MG/KG	[R] 5.9 MG/KG
BE	[R] .24 MG/KG		
CR	[R] 325 MG/KG		[R] 313 MG/KG
MN	⇧R 748 MG/KG		⇧R 756 MG/KG
NI	⇧R 495 MG/KG		⇧R 584 MG/KG

IR38B004	6.25	11.25	16.25
AS	[R] 2.23 MG/KG	[R] 4.1 MG/KG	
BE	[R] .25 MG/KG	[R] .27 MG/KG	
CR		[R] 289.88 MG/KG	
MN	⇧R 1333.24 MG/KG	⇧R 741.09 MG/KG	⇧R 698.66 MG/KG
NI	⇧R 255.74 MG/KG	⇧R 528.13 MG/KG	

PA39MW01A	2.25	4.25	9.25
AS		[R] 1.99 MG/KG	
BE	[R] .16 MG/KG		[R] .23 MG/KG
MN	⇧R 415.09 MG/KG	⇧R 551.15 MG/KG	⇧R 763.02 MG/KG
TOG	[P] 17000 MG/KG		

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION

SOIL SAMPLE DEPTH (feet bgs)

ANALYTE

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (μg/kg) FOR OTHER ORGANICS.

[R] EXCEEDS CARCINOGENIC RESIDENTIAL PRG

⇧R EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG

[H] EXCEEDS HPAL

[P] EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPALs OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

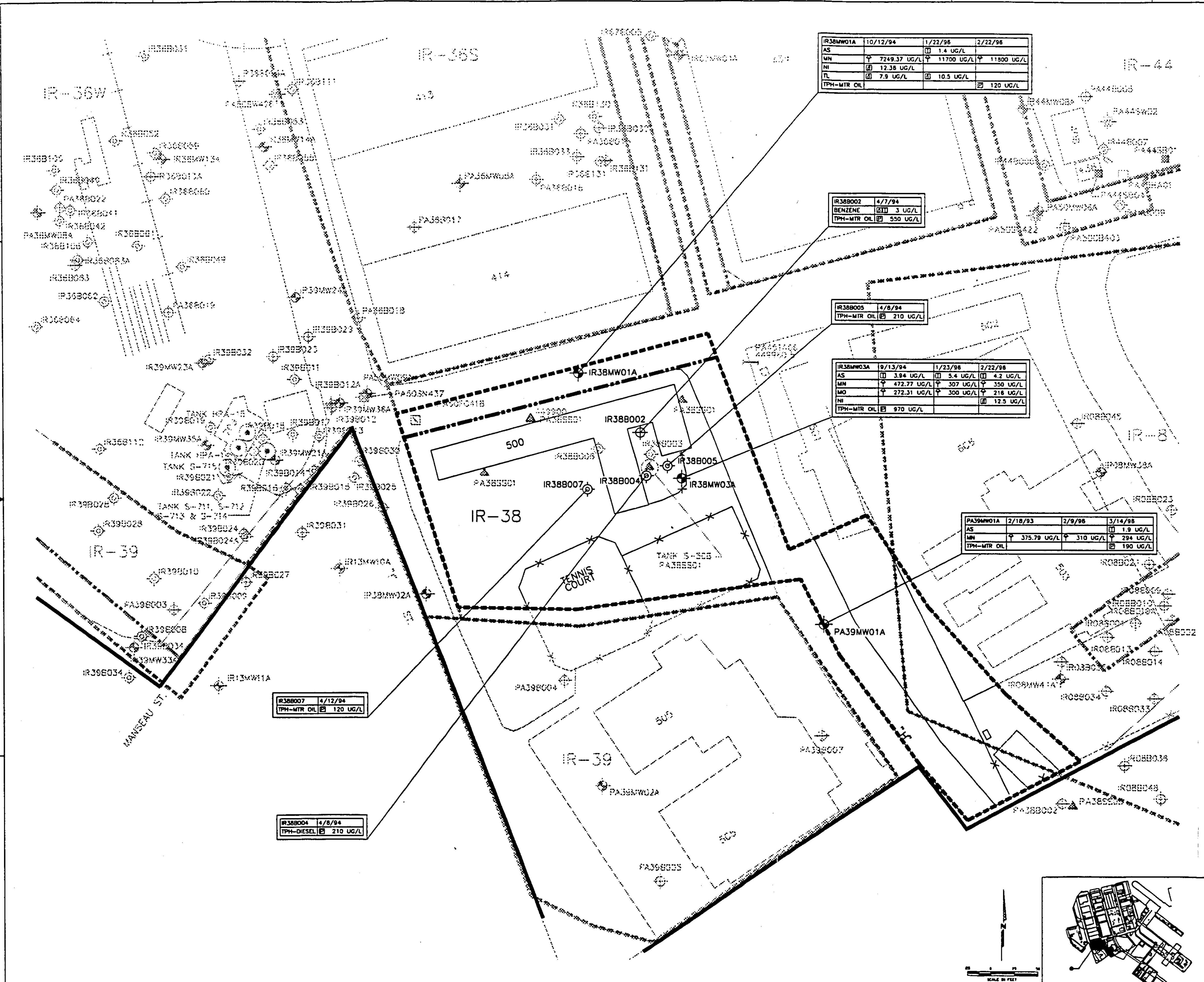
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.16-2 SHT 1 OF 1

IR-38 SOIL RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-38 4.16-2 SH 1 REV -

FILE NAME: 3841621_.DWG



IR38MW01A	10/12/94	1/22/96	2/22/96
AS		1.4 UG/L	
MN	7249.37 UG/L	11700 UG/L	11800 UG/L
NI	12.38 UG/L		
TL	7.9 UG/L	10.5 UG/L	
TPH-MTR OIL			120 UG/L

IR38B002	4/7/94
BENZENE	3 UG/L
TPH-MTR OIL	550 UG/L

IR38B005	4/8/94
TPH-MTR OIL	210 UG/L

IR38MW03A	9/13/94	1/23/98	2/22/98
AS	3.94 UG/L	5.4 UG/L	4.2 UG/L
MN	472.77 UG/L	307 UG/L	350 UG/L
MO	272.31 UG/L	300 UG/L	218 UG/L
NI			12.5 UG/L
TPH-MTR OIL	970 UG/L		

PA39MW01A	2/18/93	2/9/96	3/14/96
AS			1.9 UG/L
MN	375.79 UG/L	310 UG/L	294 UG/L
TPH-MTR OIL			190 UG/L

IR38B007	4/12/94
TPH-MTR OIL	120 UG/L

IR38B004	4/8/94
TPH-DIESEL	210 UG/L

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
DATE OF GROUNDWATER SAMPLE, G=GRAB, OR HYDROPUNCH SAMPLE DEPTH.
ANALYTE
CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)
EXCEEDS CARCINOGENIC TAP WATER PRG
EXCEEDS NON-CARCINOGENIC TAP WATER PRG
EXCEEDS NAWQC
EXCEEDS MCL
EXCEEDS PETROLEUM SCREENING CRITERIA
POSTED DATA ARE INORGANICS AND ORGANICS HITS EXCEEDING EITHER MCL, TAP WATER PRG, NAWQC REFERENCE VALUES OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW MCL, TAP WATER PRG, NAWQC REFERENCE VALUES AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

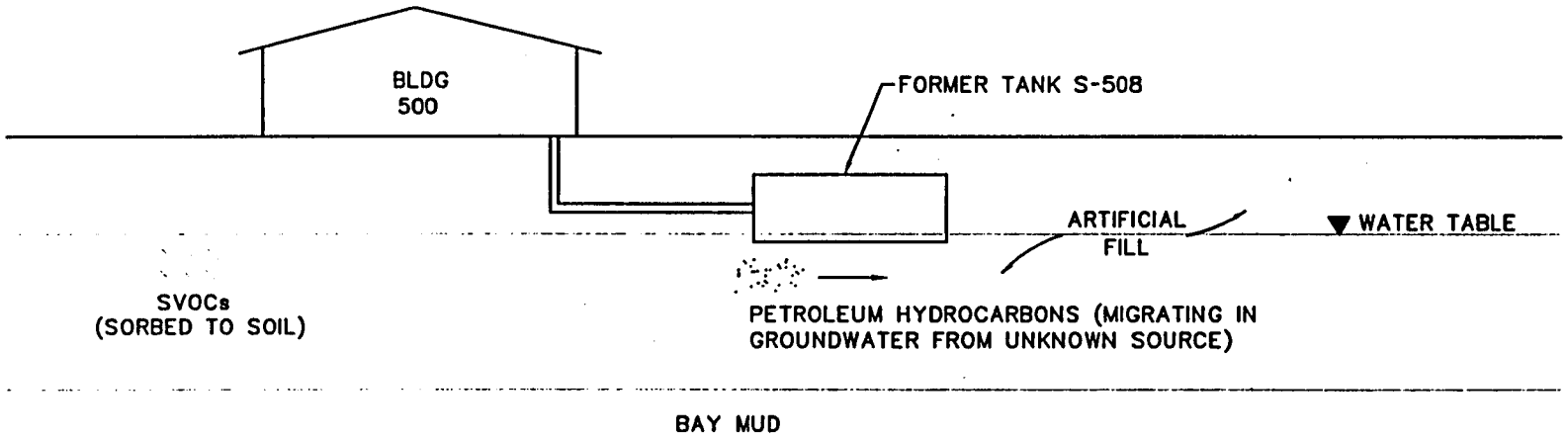
FIGURE 4.16-3 SHT 1 OF 1

IR-38 GROUNDWATER RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-38 4.16-3 SH 1 REV A

FILE NAME: 3841631A.DWG

R:\CAD\069\005. J101\IR-38.DWG MDS AL PLOT:1.1



LEGEND

- MINOR MIGRATION ROUTE
- SVOCs
- PETROLEUM HYDROCARBONS

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.16.4 AND 4.16.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.16.5-1
Schematic Cross Section
Showing Migration of Main
Contaminants at IR-38
Parcel D Remedial Investigation

APPENDIX E

IR-44 SITE FINDINGS
EXCERPTED FROM DRAFT FINAL PARCEL D RI REPORT

4.18 IR-44: BUILDINGS 408, 409, 410, 438, AND LARGE METAL SHED

Site IR-44 was initially identified during the 1990 preliminary assessment as PA-44 (HLA 1990a). Buildings 408, 409, and 438, were identified, during an SA conducted in 1994, as SA-126. In 1995, PA-44 and SA-126 were combined and redesignated IR-44 in compliance with the basewide IR program (PRC 1995).

Site IR-44 is located in the central portion of Parcel D, between Hussey, Manseau, and Cochrane Streets. The site covers approximately 2.5 acres, is entirely paved, and consists of Buildings 408, 409, 410, 438, a large (unnumbered) metal shed located in the eastern portion of the site, and the area surrounding these structures (Figure 4.18-1).

Building 408 was used by the Navy as a furnace shelter and oven drying facility. Buildings 409 and 410 comprised the welder motor hut, and were used to house a welder motor generator that supplied power for the welding stations outside the buildings, to the north and west. Building 438, the metal spray shelter, was used to heat and then spray metal parts with a metal coating (HLA 1994a, 1994b).

A fume-hood structure with two metal spray shelter chambers that vented to the exterior of the building, was located inside Building 438 (HLA 1994a). These chambers were used to spray metal parts with a metal paint coating. Water from a tank reservoir located between Buildings 408 and 438 was used periodically to flush these chambers. The water drained through metal grates in the bottom of the chambers into small tanks which, in turn, appeared to drain outside, east and west of Building 438, onto stained asphalt (HLA 1994a). The spray chambers were removed prior to February 1996.

The large, unnumbered metal shed in the eastern portion of the site was apparently used to store sandblast abrasive. In 1994, large piles of sandblast abrasive were observed inside the four buildings (HLA 1994a). However, a site inspection conducted in February 1996 revealed that the sandblast abrasive piles had been removed. Currently, all five buildings at the site are unoccupied (PRC 1995).

Potential contaminant sources identified at IR-44 include paints and metals used in the spray shelters, and materials used in sandblasting operations.

RI field investigations, geology and hydrogeology, analytical results, the nature and extent of contaminants, contaminant fate and transport, the site-specific risk assessment, and conclusions and recommendations for IR-44 are discussed in the following sections.

4.18.1 RI Field Investigations

In 1990, a preliminary assessment was conducted at PA-44. This assessment involved record reviews and a limited number of site visits. The preliminary assessment recommended IR-44 as a low priority for further investigations (HLA 1990a).

In March 1993, an SI was performed at IR-44. Field activities during this investigation consisted of subsurface soil sample collection, and collection of source characterization samples, including storm drain sediment and sandblast abrasive. Based on the sample analytical results, the SI recommended additional investigation of the storm drains (IR-50, Section 4.21), and that the sandblast abrasive at IR-44 be included in the Navy's sandblast grit fixation program. Because the entire site is paved with concrete and potential leaching of contaminants from the sandblast abrasive through the concrete appeared to be unlikely, investigation of the soil beneath the concrete was deemed unwarranted (HLA 1994b).

Between August and November 1994, an SA was conducted at HPS to identify sites that were not included in the IR program, and that may have previously been contaminated. The SA identified Buildings 408, 409, and 438 (SA-126), and proposed soil and groundwater sample collection at the ends of the discharge pipes from Building 438. During the SA, two soil borings and one monitoring well were drilled within the IR-44 site boundaries, and one monitoring well was drilled within 10 feet, outside of the IR-44 site boundaries. In addition, two borings (PA45HA01 and PA45HA02) were hand-augered adjacent to steam lines, also within the IR-44 site boundaries. Soil samples were not collected from the hand-augered borings because, based on visual observations, releases from the steam lines were not suspected. The analytical results from samples collected from the soil borings and monitoring wells are included in Section 4.18-3 (RI Analytical Results).

Additional investigation of IR-44 was conducted between August 1995 and March 1996. The investigation consisted of source (sediment), soil, and groundwater sampling to evaluate potential contaminants at the site, and aquifer characterization to evaluate specific hydrogeologic parameters. All field activities

conducted between March 1993 and March 1996 are summarized in the table below. The only known removal action at IR-44 involved removal of sandblast abrasive from the site, between 1994 and 1996.

RI Field Activities Summary					
Task	Number of Borings, Wells, or Samples	Characterization			
		Source	Soil	Groundwater	Aquifer
Soil Borings	3		X		
HydroPunch Borings	3		X	X	
Soil Samples[a]	27		X		
Groundwater Monitoring Wells	3			X	
Groundwater Samples[b]	14			X	
Sandblast Abrasive Samples	3	X			
Storm Drain Sediment Samples	3	X			
Additional Activities					
Aquifer Testing (Slug Testing)					
Sandblast Abrasive Removal					

Notes:

a Includes samples collected from soil, monitoring well, and HydroPunch borings; includes 25 samples collected for chemical analysis and two samples collected for physical analysis.

b Includes 10 samples collected from monitoring wells and four samples collected from HydroPunch borings.

Figure 4.18-1 shows the sampling locations within, and near, the boundaries of IR-44. A discussion of the RI sampling procedures and field activities is presented in Appendix I. Boring logs, showing lithology and well construction details, are presented in Appendix J. Results of aquifer testing are presented in Appendix C. RI source, soil, groundwater, and aquifer characterization activities are discussed in the following sections.

Source Characterization

In March 1993, two sandblast abrasive composite samples (PA44SB01 and PA44SB04) were collected at IR-44. One sample was collected west of Building 409 and one was collected inside Building 438 (Figure 4.18-1). These samples were analyzed for the chemical constituents listed in Table 4.18-4. A second sample was collected from location PA44SB01, and analyzed for only hexavalent chromium; this analyte was not

detected in the sample. In addition, three storm drain sediment composite samples (PA44SW02, PA44SW03, and PA50CB403) were collected at the site. One sample was collected from the storm drain east of Building 408, one sample was collected from the storm drain southeast of Building 410, and one sample was collected south of Building 438. The locations for the three samples are shown on Figure 4.18-1. These samples were analyzed for the chemical constituents listed in Table 4.18-1.

In 1994, two borings (PA45HA01 and PA45HA02) were hand-augered adjacent to steam lines within the IR-44 site boundaries (Figure 4.18-1). Soil samples were not collected from these borings because, based on visual observations, contaminant releases from the steam lines were not suspected.

Soil Characterization

In March 1993, one soil boring (PA44B005) was drilled to a depth of 5.5 feet bgs adjacent to a vault near the northeast corner of Building 408 (Figure 4.18-1). One soil sample was collected at approximately 5 feet bgs, from this boring, and analyzed for the chemical constituents listed in Table 4.18-7.

Between May and June 1994, two soil borings (IR50B020 and IR50B021) were drilled to depths of 21.5 feet bgs, each, south of Building 410 (Figure 4.18-1). A total of eight soil samples were collected between approximately 2 and 21 feet bgs, from these borings, and analyzed for the chemical constituents listed in Table 4.18-7.

Between August 1995 and January 1996, three HydroPunch borings (IR44B006, IR44B007, and IR44B009) and one monitoring well (IR44MW08A) were drilled at IR-44. The locations for these borings are shown on Figure 4.18-1. The HydroPunch borings were drilled to depths ranging from approximately 12 to 42 feet bgs, and the monitoring well was drilled to a depth of 21 feet bgs. This well was screened from 5 to 15 feet bgs, in the A-aquifer. A total of 16 soil samples were collected between approximately 1 and 36 feet bgs, from these borings, and analyzed for the chemical constituents listed in Table 4.18-7. Two additional samples were collected from boring IR44B006, at approximately 21 and 36 feet bgs, and analyzed for the physical parameters listed in Table 4.18-8. HydroPunch groundwater samples were also collected from all four borings as discussed in the following section (Groundwater Characterization).

Groundwater Characterization

In April 1993, one monitoring well (PA50MW06A) was installed approximately 10 feet southwest of the southwest corner of IR-44 (Figure 4.18-1). This well was screened from 5 to 15 feet bgs, in the A-aquifer. Soil samples were not collected from the well boring during drilling.

In October 1994, one monitoring well (IR33MW63A) was installed on the western side of the large metal shed (Figure 4.18-1). This well was screened from 6 to 21 feet bgs, in the A-aquifer. Soil samples were not collected from the well boring during drilling.

Between August 1995 and January 1996, a total of four HydroPunch groundwater samples were collected between approximately 9.5 and 15 feet bgs, from borings IR44B006, IR44B007, IR44B009 and IR44MW08A. These samples were analyzed for the chemical constituents listed in Table 4.18-13. A table listing HydroPunch and grab groundwater sample information is included in Appendix C.

Between April 1993 and March 1996, a total of 10 groundwater samples, including duplicates, were collected from the three monitoring wells (IR33MW63A, IR44MW08A, and PA50MW06A) installed at IR-44, and analyzed for the chemical constituents listed in Table 4.18-10.

Aquifer Characterization

In December 1995, slug testing was performed at two monitoring wells (IR44MW08A and PA50MW06A) installed at IR-44. Results for the slug tests are presented in Appendix C and discussed in Section 4.18.2 (Hydrogeology).

4.18.2 Geology and Hydrogeology

This section discusses the surface conditions, geology, and hydrogeology at IR-44. An additional discussion of the surface soils at IR-44, at Parcel D, and at HPS is presented in Appendix H, and additional discussions of the geology and hydrogeology at Parcel D and at HPS are presented in Sections 3.7 and 3.8, respectively.

Surface Conditions

The surface soils at IR-44 consist of Urban Land and Orthents, reclaimed complex, with slopes between 0 and 2 percent (PRC 1994). The ground surface at IR-44 is entirely covered with concrete, with about 30 percent of the surface occupied by Buildings 408, 409, 410, and 438 (see Figure 4.18-1). A base-wide soil distribution map of HPS is shown on Figure 3.6-1.

Geology

The regional geology of the San Francisco Bay area is discussed in Section 3.7.1. Discussions of HPS and Parcel D geology are presented in Sections 3.7.2.and 3.7.3, respectively. A topographic and geologic map of HPS is shown on Figure 3.4-1. A geologic cross-section depicting an interpretation of the lithology at IR-44 is shown on Figure 3.7-11. Additional Parcel D cross-sections are shown on Figures 3.7-10, and 3.7-12 through 3.7-15. Locations of geologic cross-sections within Parcel D are shown on Figure 3.7-8.

Every borelog for IR-44 was considered during interpretation of lithology; all borelogs for this site, including geotechnical borelogs, are presented in Appendix J. Specific borelogs used to construct the cross-section for IR-44 include PA44B005 and IR50B021. Geotechnical borelogs used during interpretation of lithology at IR-44 include DMB225 and DMB226.

From the surface downward, the geologic units at IR-44 consist of Artificial Fill (Qaf), Bay Mud Deposits (Qbm), Undifferentiated Sedimentary Deposits (Qu), and Franciscan Complex (KJf) bedrock. The Artificial Fill consists predominantly of sand, gravel, and clayey silt with shell fragments, and ranges from approximately 6 to 25 feet thick. The Bay Mud Deposits consist of clay with up to 35 percent shell fragments, and range from 25 to 45 feet thick. The Undifferentiated Sedimentary Deposits, which are at least 40 feet thick beneath the site, consist of interbedded sand and clay, with rock fragments and decayed vegetation. The deepest soil boring drilled at IR-44 (100 feet bgs) did not penetrate the total thickness of the Undifferentiated Sedimentary Deposits; therefore, the depth to bedrock at IR-44 is unknown.

The bedrock surface is located on the north flank of a major bedrock high and slopes into a saddle at the head of the two major troughs that are dominant features of the bedrock surface beneath Parcel D (Figure 3.7-1). Undifferentiated sedimentary deposits underlie Bay Mud Deposits beneath most of the site. The Bay

Mud Deposits surface defines a south-trending ridge, and slopes easterly and westerly from the crest of this ridge. The Bay Mud Deposits thicken to the south (Figures 3.7-2 and 3.7-3).

Hydrogeology

A conceptual groundwater flow model of HPS is shown on Figure 3.8-2. Groundwater elevation contouring of the A-aquifer for May and November 1995, and April 1996, is shown on Figures 3.8-4 through 3.8-6, respectively. Groundwater elevation contouring for February 1994 (wet season) is shown on Figure 3.8-3, and is included for comparison with April 1996. The hydrogeologic units, groundwater occurrence, magnitude and direction of groundwater flow, aquifer hydraulic properties, groundwater flow rates, and TDS in groundwater at IR-44 are discussed in the following sections.

Hydrogeologic Units

From the surface downward, the hydrogeologic units at IR-44 consist of the A-aquifer, the Bay Mud Aquitard, the B-aquifer, and the bedrock water-bearing zone. The A-aquifer at IR-44 consists of Artificial Fill. Based on groundwater elevation data, the saturated thickness of the A-aquifer is about 5 to 16 feet. The Bay Mud Aquitard appears to be laterally continuous beneath IR-44 (see Figure 3.7-7). Because no monitoring wells were installed in the B-aquifer, the saturated thickness of this unit at IR-44 is unknown. Because bedrock was not encountered during drilling activities, the depth to the bedrock water-bearing zone at IR-44 is unknown.

Groundwater Occurrence

Groundwater elevations were measured during the wet and dry seasons, and during the transition periods. Based on historical rainfall data for San Francisco, these periods were determined to be December to April (wet season), August to November (dry season), and May (transition period). Groundwater in the A-aquifer at IR-44 occurs at about 8 to 9 feet bgs during the wet season, at about 9 feet bgs during the dry season, and at about 9 feet bgs during the transition period. The A-aquifer is under unconfined water table conditions. Data are not available for the B-aquifer and the bedrock water-bearing zone at IR-44 because no monitoring wells were installed in these hydrogeologic units. Groundwater elevation measurement data for Parcel D are shown in Tables 3.8-3 through 3.8-6 (see Section 3).

Magnitude and Direction of Groundwater Flow

Hydraulic gradients for IR-44 were estimated from groundwater elevation contour maps for May and November 1995, and April 1996, and from groundwater elevation data collected at the site and at nearby IR-36. Groundwater in the A-aquifer at IR-44 generally flows southeast with an hydraulic gradient of 0.003 during the wet season; generally flows east and southeast with an hydraulic gradient of 0.002 during the dry season; and generally flows southeast with an hydraulic gradient of 0.03 to 0.004 during the transition periods. A comparatively steep gradient (0.03) was observed on the west and northwest side of the site during the May 1995 transition period (see Figure 3.8-4). The reason for this change in hydraulic gradient is unknown.

Aquifer Hydraulic Properties

The hydraulic properties of the A-aquifer at IR-44 were estimated from data collected during two slug tests conducted at monitoring wells IR44MW08A and PA50MW06A, screened in the A-aquifer. Hydraulic properties were evaluated using the Bouwer and Rice analysis method, as discussed in Appendix C. The hydraulic conductivity ranges from 22 to 110 feet per day (see Table 3.8-7). The average hydraulic conductivity is typical for silty to clean sand (Heath 1987). The aquifer transmissivity ranges from 180 to 1,800 square feet per day (see Table 3.8-7). Pumping tests were not conducted at IR-44; therefore, the A-aquifer storativity was not evaluated.

The hydraulic properties of the B-aquifer and bedrock water-bearing zone at IR-44 are unknown because no monitoring wells were installed in these hydrogeologic units.

Groundwater Flow Rates

The average linear velocity represents an estimated rate at which contaminants, n groundwater, may move horizontally through the pore spaces in an aquifer. The average linear velocity of groundwater in the A-aquifer at IR-44 was calculated using the equation for groundwater flow presented in Section 3.8. A summary of average linear velocity calculations (may and November 1995, and April 1996) for the A-aquifer at Parcel D is presented in Table 3.8-9. A summary of average linear velocity calculations for February 1994 is included, in Table 3.8-10, for comparison with April 1996.

Using the hydraulic conductivity and the gradients given above, and porosities of 28 and 40 percent (the low and high values in the range of laboratory-tested porosities), the calculated average linear velocity ranges from 0.17 to 1.18 feet per day toward the north and northwest during the wet season; from 0.11 to 0.79 feet per day toward the east and southeast during the dry season, and from 0.22 to 11.79 feet per day toward the southeast during the transition period. The range of velocities reflects the heterogenous hydrogeologic conditions of the Artificial Fill at IR-44.

Other predominant transport or attenuation mechanisms, such as retardation, dispersion, and partitioning characteristics, should be taken into account during the estimation of transport for solute and nonaqueous phase liquids (NAPLs) in groundwater.

Total Dissolved Solids in Groundwater

Groundwater in the A-aquifer at IR-44 exhibits a salinity concentration of 7,400 mg/L and a TDS concentration of 8,500 mg/L (see Table 3.8-11). The secondary drinking water MCL for TDS is 500 mg/L. The RWQCB criteria for a drinking water source in California is 3,000 mg/L, and the EPA criteria for a drinking water source is 10,000 mg/L.

4.18.3 RI Analytical Results

This section presents the results of source (sandblast abrasive and storm drain sediment), soil, and groundwater sampling conducted during the RI investigation of IR-44. The data presented in this section were evaluated using the screening criteria presented in Section 4.0. Figures 4.18-2 and 4.18-3 present analytical results for analytes detected at concentrations exceeding screening criteria at each sampling location in soil and groundwater, respectively.

4.18.3.1 Source Analytical Results

This section presents the source sample analytical results for analytes detected in sandblast abrasive and storm drain sediment samples at concentrations exceeding screening criteria at IR-44. The screening criteria used for evaluation of analytical results for these samples were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0.

HPALs screening criteria is not applicable to sandblast abrasive and storm drain sediment samples because HPALs represent ambient concentrations relevant to soil only. HPALs are presented here for reference only. Analyses for storm drain sediment and sandblast abrasive samples are summarized in Tables 4.18-1 and 4.18-4, respectively (Summary of Storm Drain Sediment Analytical Tests and Summary of Other Sediment Analytical Tests). Statistical summaries of source sample analytical results for detected metals and organic constituents in storm drain sediment and sandblast abrasive samples are presented in Tables 4.18-2 and 4.18-5, respectively. Analytes detected in storm drain sediment and sandblast abrasive samples are listed in Tables 4.18-3 and 4.18-6, respectively. All analytical results for the IR-44 RI are presented in Appendix M.

Metals

Metals detected in storm drain sediment samples, at concentrations exceeding screening criteria, were arsenic, beryllium, chromium, copper, lead, manganese, molybdenum, nickel, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	3/3	26.5	0.32	3	11.10	1
Beryllium	1/3	0.27	0.14	1	0.71	0
Chromium	3/3	278	211	1	a	1
Copper	3/3	668	2,850	0	124.31	3
Lead	3/3	726	130	3	8.99	3
Manganese	3/3	427	382	2	1,431.18	0
Molybdenum	3/3	125	383	0	2.68	3
Nickel	3/3	174	150	1	a	0
Zinc	3/3	1,560	23,000	0	109.66	3

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples.

Metals detected in sandblast abrasive samples, at concentrations exceeding screening criteria, were arsenic, chromium, copper, lead, molybdenum, nickel, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	2/2	13.1	0.32	2	11.10	1
Chromium	2/2	199	211	0	a	2
Copper	2/2	1,050	2,850	0	124.31	2
Lead	2/2	340	130	2	8.99	2
Molybdenum	2/2	106	382	0	2.68	2
Nickel	2/2	161	383	1	a	1
Zinc	2/2	3,210	23,000	0	109.66	2

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples.

Cyanide

Cyanide was not detected in storm drain sediment samples at concentrations exceeding screening criteria. Cyanide was not detected in sandblast abrasive samples and, as a result, does not appear in the sandblast abrasive statistical summary in Table 4.18-5.

Volatile Organic Compounds

Vinyl chloride was the only VOC detected in a storm drain sediment sample, at a concentration exceeding screening criteria. This compound exceeded the PRG (5 μg/kg) in one out of three sediment samples, with a concentration of 67 μg/kg. VOCs were not analyzed for in sandblast abrasive samples.

Semivolatile Organic Compounds

SVOCs detected in storm drain sediment samples, at concentrations exceeding screening criteria, were benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/kg)	PRG Value (μg/kg)	Number of Samples Exceeding PRG
Benzo(a)anthracene	1/3	680	610	1
Benzo(a)pyrene	1/3	520	61	1
Benzo(b)fluoranthene	1/3	1,100	610	1

Note:

μg/kg Micrograms per kilogram

Benzo(a)pyrene was the only SVOC detected in a sandblast abrasive sample at a concentration exceeding screening criteria. This compound exceeded the PRG (61 μg/kg) in one out of two samples, with a concentration of 97 μg/kg.

Pesticides and PCBs

Pesticides were not detected in storm drain sediment samples at concentrations exceeding screening criteria. Aroclor-1260 was the only PCB detected in storm drain sediment samples at concentrations exceeding screening criteria. This compound exceeded the PRG (66 μg/kg) in three out of three samples, with a maximum concentration of 2,300 μg/kg.

Pesticides and PCBs were not analyzed for in sandblast abrasive samples.

Petroleum Hydrocarbons

An unknown extractable TPH compound was detected in a storm drain sediment sample at a concentration exceeding screening criteria. This compound exceeded the criterion (1,000 mg/kg) in one out of two samples, with a concentration of 1,600 mg/kg. TOG was detected in a storm drain sediment sample at a

concentration exceeding screening criteria. This compound exceeded the criterion (1,000 mg/kg) in one out of one sample, with a concentration of 9,000 mg/kg.

Petroleum hydrocarbons were not analyzed for in sandblast abrasive samples.

4.18.3.2 Soil Analytical Results

This section presents the soil analytical results for analytes detected at concentrations exceeding screening criteria at IR-4. The screening criteria used for evaluation of soil analytical results were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Requested analyses for soil samples are summarized in Table 4.18-7 (Summary of Soil Analytical Tests). A statistical summary of soil analytical results for detected metals and organic constituents is presented in Table 4.18-8. Analytes detected in soil samples are listed in Table 4.18-9. All analytical results for the IR-44 RI are presented in Appendix M.

Metals

Metals detected in soil samples, at concentrations exceeding screening criteria, were arsenic, barium, beryllium, chromium, cobalt, lead, manganese, nickel, selenium, thallium, vanadium, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	15/25	36.7	0.32	15	11.10	2
Barium	25/25	499	5,340	0	314.36	1
Beryllium	8/25	0.69	0.14	8	0.71	0
Chromium	25/25	304	211	1	a	0
Cobalt	25/25	65.3	NA	–	a	1
Lead	24/25	27.5	130	0	8.99	9
Manganese	25/25	2,790	382	15	1,431.18	2

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Nickel	25/25	853	150	3	a	0
Selenium	4/25	3.7	383	0	1.95	2
Thallium	3/25	1.4	NA	--	0.81	1
Vanadium	25/25	162	537	0	117.17	1
Zinc	25/25	121	23,000	0	109.86	2

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples.

Volatile Organic Compounds

VOCs were not detected in soil samples at concentrations exceeding screening criteria.

Semivolatile Organic Compounds

SVOCs detected in soil samples, at concentrations exceeding screening criteria, were benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (µg/kg)	PRG Value (µg/kg)	Number of Samples Exceeding PRG
Benzo(a)pyrene	4/24	1,200	61	4
Benzo(b)fluoranthene	3/24	760	610	1
Indeno(1,2,3-cd)pyrene	3/24	900	610	1

Note:

µg/kg Micrograms per kilogram

Pesticides and PCBs

Pesticides and PCBs were not detected in soil samples at concentrations exceeding screening criteria.

Petroleum Hydrocarbons

Petroleum hydrocarbons detected in soil samples, at concentrations exceeding screening criteria, were TPH-mo, TRPH, and TOG as summarized in the following table.

Analyte	Number of Detections/Analyses	Maximum Detected Concentration (mg/kg)	Petroleum Hydrocarbon Screening Criteria (mg/kg)	Number of Samples Exceeding Screening Criteria
TPH-mo	17/24	6,500	1,000	2
TRPH	13/23	10,000	1,000	3
TOG	1/1	3,000	1,000	1

Note:

mg/kg Milligrams per kilogram

4.18.3.3 Groundwater Analytical Results

This section presents the groundwater analytical results for analytes detected at concentrations exceeding screening criteria at IR-44. The screening criteria used for evaluation of groundwater analytical results were tap water PRGs, drinking water MCLs, NAWQC for saltwater aquatic life, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for monitoring well and HydroPunch groundwater samples are summarized in Tables 4.18-10 and 4.18-13, respectively (Summary of Monitoring Well Groundwater Analytical Tests and Summary of HydroPunch Groundwater Analytical Tests). Statistical summaries of groundwater analytical results for detected metals and organic constituents in monitoring well and HydroPunch groundwater samples are presented in Tables 4.18-11 and 4.18-14, respectively. Analytes detected in monitoring well and HydroPunch groundwater samples are listed in Tables 4.18-12 and 4.18-15, respectively. All analytical results for the IR-44 RI are presented in Appendix M.

Metals

Metals detected in monitoring well groundwater samples, at concentrations exceeding screening criteria, were arsenic, cadmium, manganese, mercury, nickel, and silver as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Arsenic	4/9	3.0	0.04	4	50.0	0	36.0	0
Cadmium	2/9	24.9	18.0	1	5.0	1	9.3	1
Manganese	4/9	2,160	180	3	NA	–	NA	–
Mercury	1/9	0.11	11.0	0	2.0	0	0.03	1
Nickel	3/9	18.8	730	0	100	0	8.2	1
Silver	1/9	1.1	180	0	NA	–	0.92	1

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRG for tap water

Metals detected in HydroPunch groundwater samples, at concentrations exceeding screening criteria, were antimony, arsenic, manganese, and nickel as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Antimony	1/1	15.5	15.0	1	6.0	1	500	0
Arsenic	1/1	1.4	0.04	1	50.0	0	36.0	0

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Manganese	1/1	345	180	1	NA	--	NA	--
Nickel	1/1	19.4	730	0	100	0	8.2	1

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRG for tap water

Cyanide

Cyanide was not detected in monitoring well groundwater samples and, as a result, does not appear in the monitoring well groundwater statistical summary in Table 4.18-11. Cyanide was not analyzed for in HydroPunch groundwater samples.

Volatile Organic Compounds

VOCs were not detected in monitoring well groundwater samples at concentrations exceeding screening criteria.

Trichloroethene was the only VOC detected in a HydroPunch groundwater sample at a concentration equal to screening criteria. This compound was detected in one out of four samples; the concentration for the single sample was equal to the PRG of 2 μg/L.

Semivolatile Organic Compounds

SVOCs were not detected in monitoring well groundwater samples and, as a result, do not appear in the monitoring well groundwater statistical summary in Table 4.18-11.

The SVOC 1,4-dichlorobenzene was detected in a HydroPunch groundwater sample at a concentration exceeding screening criteria. This compound exceeded the PRG (0.5 μg/L) in a single sample, with a concentration of 5 μg/L.

Pesticides and PCBs

Pesticides and PCBs were not detected in monitoring well groundwater samples and, as a result, do not appear in the monitoring well groundwater statistical summary in Table 4.18-11.

Gamma-chlordane was the only pesticide detected in a HydroPunch groundwater sample at a concentration exceeding screening criteria. This compound exceeded the PRG (0.05 μg/L) in one out of one sample, with a concentration of 0.07 μg/L. Aroclor-1260 was the only PCB detected in a HydroPunch groundwater sample at a concentration exceeding screening criteria. This compound exceeded the PRG (0.009 μg/L) in one out of one sample, with a concentration of 0.7 μg/L.

Petroleum Hydrocarbons

TPH-mo exceeded the screening criterion (100 μg/L) in five out of eight monitoring well groundwater samples, with a maximum concentration of 370 μg/L. TRPH exceeded the screening criterion (100 μg/L) in one out of nine monitoring well groundwater samples, with a concentration of 600 μg/L.

Petroleum hydrocarbons detected in HydroPunch groundwater samples, at concentrations exceeding screening criteria, were TPH-d, TPH-mo, and TRPH as summarized in the following table.

Analyte	Number of Detections/Analyses	Maximum Detected Concentration (µg/L)	Petroleum Hydrocarbon Screening Criteria (µg/L)	Number of Samples Exceeding Screening Criteria
TPH-d	4/4	8,900	100	4
TPH-mo	4/4	21,000	100	3
TRPH	1/1	1,700	100	1

Note:

µg/L Micrograms per liter

4.18.4 Nature and Extent of Contaminants

The following section describes the nature and extent of the constituents discussed in Section 4.18.3 that exceeded the screening criteria for soil and groundwater at IR-44.

4.18.4.1 Nature and Extent of Contaminants in Soil

Analytical results indicate the following constituents are present in soil at IR-44, at concentrations exceeding the screening criteria:

- Metals
- SVOCs
- Petroleum hydrocarbons

The distribution of these constituents is shown on Figure 4.18-2 and discussed below. For the purpose of this discussion, soil samples collected between 0 and 2 feet bgs will be referred to as surface samples and those collected at depths below 2 feet will be referred to as subsurface samples.

Metals

As discussed in Section 4.18.3, the metals arsenic, barium, beryllium, chromium, cobalt, lead, manganese, nickel, selenium, thallium, vanadium, and zinc are present in soil at IR-44 at concentrations exceeding the screening criteria. The nature and extent of these metals is summarized in the following paragraphs.

Arsenic was detected at concentrations exceeding the PRG (0.32 mg/kg), in three surface and 12 subsurface soil samples. Concentrations for arsenic also exceeded the HPAL (11.10 mg/kg) in two subsurface soil samples. Depths for all samples exceeding screening criteria ranged from 0.75 to 21.25 feet bgs. Sample concentrations exceeding screening criteria ranged from 1.5 to 36.7 mg/kg. The maximum arsenic concentration was detected in subsurface soil collected at a depth of 21.25 feet bgs from boring IR50B020.

Barium was detected at a concentration exceeding the HPAL (314.36 mg/kg), but not the PRG (5,340 mg/kg) in one subsurface soil sample. A concentration of 499 mg/kg was detected in a soil sample collected from 5.25 feet bgs in boring PA44B005.

Beryllium was detected at concentrations exceeding the PRG (0.14 mg/kg), but not the HPAL (0.71 mg/kg) in one surface and seven subsurface soil samples. Depths for these samples ranged from 0.75 to 16.25 feet bgs, and sample concentrations exceeding screening criteria ranged from 0.25 to 0.69 mg/kg. The maximum beryllium concentration was detected in subsurface soil collected at a depth of 5.25 feet bgs from boring PA44B005.

Chromium was detected at a concentration exceeding the PRG (211 mg/kg), but not the HPAL range (84.31 to 1114.67 mg/kg) in one subsurface soil sample. A concentration of 304 mg/kg was detected in a soil sample collected from 10.75 feet bgs in boring IR44MW08A.

Cobalt was detected at a concentration exceeding the HPAL range (16.82 to 117.15 mg/kg) in one subsurface soil sample. A concentration of 35.1 mg/kg was detected in a soil sample collected from 5.25 feet bgs in boring PA44B005.

Lead was detected at concentrations exceeding the HPAL (8.99 mg/kg), but not the PRG (130 mg/kg) in two surface and seven subsurface soil samples. Depths for these samples ranged from 0.75 to 21.25 feet bgs, and sample concentrations exceeding screening criteria ranged from 10.0 to 27.5 mg/kg. The maximum lead concentration was detected in subsurface soil collected at a depth of 16.25 feet bgs from boring IR50B021.

Manganese was detected at concentrations exceeding the PRG (382 mg/kg) in three surface and 12 subsurface soil samples. Concentrations for manganese also exceeded the HPAL (1431.18 mg/kg) in one surface and one subsurface soil sample. Depths for all samples exceeding screening criteria ranged from 0.75 to 10.75 feet bgs. Sample concentrations exceeding screening criteria ranged from 422 to 2,790 mg/kg. The maximum manganese concentration was detected in a sample collected from a depth of 5.25 feet bgs in boring PA44B005.

Nickel was detected at concentrations exceeding the PRG (150 mg/kg), but not the HPAL range (74.85 to 2612.58 mg/kg) in three subsurface soil samples. Depths for these samples ranged from 2.75 to 10.75 feet bgs, and sample concentrations exceeding screening criteria ranged from 153 to 853 mg/kg. The maximum nickel concentration was detected in subsurface soil collected at a depth of 10.75 feet bgs from boring IR44MW08A.

Selenium was detected at concentrations exceeding the HPAL (1.95 mg/kg), but not the PRG (383 mg/kg) in two subsurface soil samples. Depths for these samples ranged from 16.25 to 21.25 feet bgs, and sample concentrations exceeding screening criteria ranged from 3.3 to 3.7 mg/kg. The maximum selenium concentration was detected in subsurface soil collected at a depth of 16.25 feet bgs from boring IR50B020.

Thallium was detected at a concentration exceeding the HPAL (0.81 mg/kg) in one subsurface soil sample. A concentration of 1.4 mg/kg was detected in a soil sample collected from 10.25 feet bgs in boring IR44B006.

Vanadium was detected at a concentration exceeding the HPAL (117.17 mg/kg) in one subsurface soil sample. A concentration of 162 mg/kg was detected in a soil sample collected from 8.75 feet bgs in boring IR44B009.

Zinc was detected at concentrations exceeding the HPAL (109.86 mg/kg), but not the PRG (23,000 mg/kg) in two subsurface soil samples. Depths for these samples ranged from 2.25 to 8.75 feet bgs, and sample concentrations exceeding screening criteria ranged from 117 to 121 mg/kg. The maximum zinc concentration was detected in subsurface soil collected at a depth of 8.75 feet bgs from boring IR44B009.

Semivolatile Organic Compounds

As discussed in Section 4.18.3, the SVOCs benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene are present in soil at IR-44 at concentrations exceeding the screening criteria.

Benzo(a)pyrene was detected at concentrations exceeding the PRG (61 μg/kg) in four subsurface soil samples. Depths for these samples ranged from 16.25 to 21.25 feet bgs, and sample concentrations exceeding the screening criteria ranged from 240 to 1,200 μg/kg. The maximum benzo(a)pyrene concentration was detected in subsurface soil collected at a depth of 16.25 feet bgs from boring IR50B020.

Benzo(b)fluoranthene was detected at a concentration of exceeding the PRG (610 μg/kg) in one subsurface soil sample. The concentration for this sample, which was collected at depth of 16.25 feet bgs from boring IR50B020, was 760 μg/kg.

Indeno(1,2,3-cd)pyrene was detected at a concentration of exceeding the PRG (610 μg/kg) in one subsurface soil sample. The concentration for this sample, which was collected at depth of 16.25 feet bgs from boring IR50B020, was 900 μg/kg.

Petroleum Hydrocarbons

As discussed in Section 4.2.3, the petroleum hydrocarbons measured as TPH-mo, TRPH, and TOG are present in soil at IR-44 at concentrations exceeding screening criteria.

TPH-mo was detected at concentrations exceeding the criterion (1,000 mg/kg) in two surface soil samples. TPH-mo was detected at a concentration of 1,400 mg/kg in a sample collected from a depth of 0.5 feet bgs in boring IR44MW08A, and at a concentration of 6,500 μg/kg in a sample collected from a depth of 1.5 feet bgs in boring IR44B009.

TRPH was detected at concentrations exceeding the criterion (1,000 mg/kg) in two surface soil samples. TRPH was detected at a concentration of 1,500 mg/kg in a sample collected from a depth of 0.5 feet bgs in boring IR44MW08A and at a concentration of 10,000 μg/kg in a sample collected from a depth of 1.5 feet bgs in boring IR44B009.

TOG was detected at concentrations exceeding the criterion (1,000 mg/kg) in one subsurface soil sample. TOG was detected at a concentration of 3,000 mg/kg in a sample collected from a depth of 5.25 feet bgs in boring PA44B005.

Summary of IR-44 Soil Chemistry

Analysis of the metals results indicates a sporadic distribution of metals exceeding the screening criteria at IR-44. The maximum detected concentrations for arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, nickel, selenium, thallium, vanadium, and zinc are distributed among five of the six borings drilled at IR-44.

Barium, lead, selenium, vanadium, and zinc exceeded their HPALs but not the PRGs. Beryllium, chromium, and nickel exceeded the PRG but not the HPAL. Arsenic and manganese exceeded both their HPALs and PRGs.

The lack of apparent trends or discernable patterns, the relationship between the distribution of metals exceeding screening criteria and the potential contaminant sources, and the metals concentrations do not indicate a release of metals to the environment.

The SVOCs benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected in three of six borings at depths ranging from 16.25 to 21.25 feet bgs. The maximum detections for all SVOCs were in boring IR50B020 at a depth of 16.25 feet bgs. The depth, lack of detection in shallow soils, and

infrequent detection, indicates that SVOCs may be associated with petroleum hydrocarbon present in the groundwater at IR-44.

The distribution of petroleum hydrocarbon concentrations exceeding the screening criteria was limited to surface and near surface soils collected at less than 5.5 feet bgs in four borings drilled at IR-44. The borings containing petroleum hydrocarbons surrounding Buildings 408 and 438 appear to be isolated surface releases, since previous site activities were not directly related to petroleum hydrocarbon usage.

4.18.4.2 Nature and Extent of Contaminants in Groundwater

Analytical results indicate the following constituents are present in groundwater at IR-44, at concentrations exceeding their screening criteria:

- Metals
- VOCs
- SVOCs
- Pesticides/PCBs
- Petroleum Hydrocarbons

The distribution of these constituents is shown on Figure 4.18-3 and discussed below. Because contaminant concentrations in groundwater may vary throughout the year due to seasonal variations, the figure has been prepared using the highest concentration detected in the four most recent sampling events, where available, representing all seasons for each monitoring well. The figure shows the maximum extent of groundwater contamination regardless of the season in which the maximum occurs.

Metals

As discussed in Section 4.18.3.2, the metals antimony, arsenic, cadmium, manganese, mercury, nickel, and silver were detected in groundwater samples at concentrations exceeding their screening levels.

Antimony was not detected in any groundwater monitoring well samples, but was detected at a concentration exceeding the MCL (6 μg/L) and the PRG (15 μg/L) in one HydroPunch groundwater sample. A concentration of 15.5 μg/L was detected in HydroPunch sample IR44B009.

Arsenic was detected at concentrations exceeding the PRG (0.04 μg/L), but not the MCL (50 μg/L) or the NAWQC (36 μg/L), in four samples from two monitoring wells. Concentrations for these samples exceeding the PRG ranged from 1.4 to 3.0 μg/L. The maximum arsenic concentration was detected in two samples collected from monitoring wells IR44MW08A, and PA50MW06A. In addition, arsenic was detected above the PRG, at a concentration of 1.4 μg/L, in HydroPunch sample IR44B009.

Cadmium was detected in one of three wells at a concentration exceeding the PRG (18 μg/L), MCL (5 μg/L), and the NAWQC (9.3 μg/L). One sample from monitoring well IR44MW08A, contained a cadmium concentration of 24.9 μg/L.

Manganese was detected at concentrations exceeding the PRG (180 μg/L) in three samples from one monitoring well. Concentrations for these samples exceeding the PRG ranged from 1,040 to 2,340 μg/L. The maximum arsenic concentration was detected in a sample collected from monitoring well IR44MW08A. In addition, manganese was detected above the PRG, at a concentration of 345 μg/L, in HydroPunch sample IR44B009.

Mercury was detected in one of three wells at a concentration exceeding the NAWQC (0.03 μg/L). One of three samples from monitoring well PA50MW06A contained a mercury concentration of 0.11 μg/L.

Nickel was detected in one of three wells at a concentration exceeding the NAWQC (8.2 μg/L). One of three samples collected from monitoring well IR44MW08A contained a nickel concentration of 18.8 μg/L. In addition, nickel was detected above the NAWQC, at a concentration of 19.4 μg/L in HydroPunch sample IR44B009.

Silver was detected in one of three wells at a concentration exceeding the NAWQC (0.92 μg/L). One of three samples collected from monitoring well IR33MW63A contained a silver concentration of 1.1 μg/L.

Volatile Organic Compounds

TCE was detected at a concentration of 2 μg/L in one HydroPunch sample labeled IR44B006. This concentration was at the PRG (2 μg/L), but below the MCL (5 μg/L). No TCE was detected in any monitoring well groundwater samples collected at IR-44.

Semivolatile Organic Compounds

The compound 1,4-dichlorobenzene was detected at a concentration of 5 μg/L in one HydroPunch sample labeled IR44B009. This concentration was above the PRG (0.5 μg/L), and at the MCL (5 μg/L). No 1,4-dichlorobenzene was detected in any monitoring well groundwater samples collected at IR-44.

Pesticides and Polychlorinated Biphenyls

Gamma-chlordane was detected at a concentration of 0.07 μg/L in HydroPunch groundwater sample IR44B009. This concentration exceeded the PRG of 0.05 μg/L. No pesticides were detected in any monitoring well groundwater samples collected at IR-44.

Aroclor-1260 was detected at a concentration of 0.07 μg/L in HydroPunch groundwater sample IR44B009. This concentration exceeded the PRG of 0.009 μg/L. No pesticides were detected in any monitoring well groundwater samples collected at IR-44.

Petroleum Hydrocarbons

TPH-d was not detected in any of the monitoring well groundwater samples collected at IR-44. However, TPH-d was detected at concentrations exceeding the screening criterion (100 μg/L) in all four HydroPunch samples collected at IR-44. Concentrations for these samples exceeding the criterion ranged from 120 to 8,900 μg/L.

TPH-mo was detected at concentrations exceeding the screening criterion (100 μg/L) in 7 samples from three monitoring wells (IR33MW63A, IR44MW08A, and PA50MW06A). Concentrations for these samples exceeding the criterion ranged from 100 to 370 μg/L. TPH-mo was also detected in three HydroPunch groundwater samples (IR44B006, IR44B007, and IR44B009). Concentrations detected in these samples ranged from 2,900 to 21,000 μg/L.

TRPH was detected at a concentration of 600 μg/L in one sample collected from monitoring well IR33MW63A, exceeding the screening criterion of 100 μg/L. TRPH was also detected in one HydroPunch groundwater sample (IR44B009) at a concentration of 1,700 μg/L.

Summary of Groundwater Chemistry

The maximum concentrations for the six metals detected above screening criteria were distributed among three monitoring wells. These metals do not appear to be related to each other, or to organic contamination at IR-44 and are not considered indicative of a release.

The compound TCE was detected at a concentration of 2 μg/L in HydroPunch groundwater sample IR44B006. This sample is located near the western end of the discharge pipe from Building 438. However, no concentrations of TCE above screening criteria were detected in any groundwater monitoring well samples.

Petroleum hydrocarbons were detected in all groundwater monitoring well and HydroPunch samples collected at IR-44. TPH-mo was detected the most frequently, and at the maximum concentration. TPH-mo was detected at a concentration of 21,000 μg/L in HydroPunch groundwater sample IR44B009. This sample is located south of Buildings 408 and 438. The concentrations of TPH-mo decrease to the north. The distribution of TPH-mo indicates that the source of petroleum hydrocarbons at IR-44 may be originating from Buildings 408 and 438 and migrating to the southeast (the dominant groundwater flow direction) with some northerly migration during the wet season. However, since no data has been collected south of IR44B009, TPH-mo may be originating off-site and migrating across IR-44.

One SVOC (1,4-dichlorobenzene), one pesticide (gamma-chlordane), and one PCB (Aroclor-1260) were all detected above screening criteria in HydroPunch groundwater sample IR44B009. These compounds were not detected in any other groundwater samples collected at IR-44. These compounds were not detected in soil at this location; however, soil samples collected from this boring did contain petroleum hydrocarbons at concentrations exceeding screening criteria. It is likely that the source of the SVOC, pesticide, and PCB contamination in this sample is contaminated waste oil from a surface release at this location.

4.18.5 Contaminant Fate and Transport

This section discusses the contaminant fate and transport at IR-44 in relation to the geology and hydrogeology of IR-44 and the nature and extent at IR-44. Potential migration routes, persistence in the environment, and a migration evaluation are discussed below.

The purpose of this section is to identify in what media, and at what location, VOCs, SVOCs, pesticides/PCBs, and petroleum hydrocarbons that exceeded their respective screening criteria may occur in the future. This evaluation is divided into discussions on potential migration routes, persistence in the environment, and a migration evaluation for the chemicals above screening levels at the site. Detailed descriptions of the physical, chemical, and biological processes influencing the fate and transport of the metals and organic compounds at IR-44 are presented in Section 3.0 of Appendix O. Section 4.0 of Appendix O summarizes the physical and chemical characteristics of the metals and organic compounds that exceeded the screening criteria in soil or groundwater at IR-44. Finally, Table O-4 contains a summary of the fate and transport of these chemicals. This table can be used as a quick reference to the fate and transport of metals, VOCs, SVOCs, and petroleum hydrocarbons at IR-44.

4.18.5.1 Potential Migration Routes

Figure 4.18.5-1 shows a conceptual model for contaminant migration at IR-44. In addition, migration rates are summarized on Table 4.18-16.

The source of petroleum hydrocarbons in soil at IR-44 appears to be surface spills or disposal of waste oil. The SVOCs in soil at IR-44 are in deep soil and appear to be related to Bay Mud. The metals detected at concentrations above screening criteria in soil are also dispersed through soil at IR-44 and do not appear to be site related. Potential migration routes for these contaminants are limited. The petroleum hydrocarbons and SVOCs will probably remain sorbed to soil and not migrate. Resuspension of contaminated soil by wind and erosion by surface water are also unlikely migration routes because the site is paved and covered with buildings.

The most important migration route for the petroleum hydrocarbons in groundwater is spreading along the top of the groundwater. TCE is fairly soluble and not readily adsorbed by soil; therefore, it is expected to remain in solution and migrate with groundwater. It may, however, volatilize slowly from groundwater to soil gas. The SVOC in groundwater, 1,4-dichlorobenzene, is fairly soluble and so should migrate with groundwater. The pesticide gamma chlordane in groundwater has a low solubility but may migrate sorged to organic matter or fine particles in groundwater. The PCB Aroclor-1260 detected in groundwater is highly insoluble and is expected to sorb to the saturated soil matrix and not migrate.

The dominant migration route for metals detected in soil at IR-44 will be slow leaching by precipitation from shallow soil to deeper soil and groundwater. Metals in groundwater at IR-44 will equilibrate with the soil matrix through which the groundwater is moving. Metal solubility depends on a complex series of reactions between groundwater and soil, influenced by several factors including the pH and oxidation potential. The potential for metal migration in groundwater is expected to be low.

4.18.5.2 Persistence in the Environment

Metals do not degrade in soil and groundwater and will persist indefinitely at IR-44.

The organic contaminants present in soil at IR-44 are the SVOCs benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene, and petroleum hydrocarbons detected as TPH-mo, TRPH, and TOG. The organic compounds present in groundwater is the VOCs TCE, the SVOC, 1,4-dichlorobenzene, the pesticide gamma-chlordane, the PCB Aroclor-1260, and petroleum hydrocarbons, detected as TPH-d, TPH-mo, and TRPH. Persistence of the organic contaminants at IR-08 is summarized in Table 4.18-16 and described in detail in Appendix O.

4.18.5.3 Migration Evaluation

This section evaluates the migration potential for metals, VOCs, SVOCs, pesticides/PCBs, and petroleum hydrocarbons detected at concentrations above screening levels in soil and groundwater at IR-44. This evaluation considers the mobility of a compound, its chemical characteristics, and its persistence in the environment, to estimate its potential for migrating away from IR-44.

Migration in Soil

The following sections evaluate the migration of metals, the SVOCs benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene, and petroleum hydrocarbons in soil at IR-44.

Metals

Arsenic, barium, beryllium, chromium, cobalt, lead, manganese, nickel, selenium, thallium, vanadium, and zinc were detected at concentrations above screening levels in soil at IR-44. As discussed in Section 4.18.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the soil matrix and the subsurface conditions. In general, with the exception of barium, and manganese, the migration of these metals is very limited as a result of their sorption onto soil under the environmental conditions present at IR-44 (Table O-4). The potential for these metals to be leached from soil to groundwater is, therefore, low. The other metals that are leachable will slowly be transported to the groundwater by infiltrating precipitation.

SVOCs

The SVOCs are all PAHs with very low solubilities in water, low vapor pressures, and high organic carbon partition coefficients (Table O-3). In addition, they are resistant to degradation. It is, therefore, assumed that the PAH SVOCs will remain in their present location and not be degraded.

Petroleum Hydrocarbons

Petroleum hydrocarbons measured as TPH-mo, TRPH, and TOG were detected at concentrations exceeding the screening criteria for soil. These petroleum hydrocarbons are expected to sorb to clay particles and to degrade at various rates depending on the size of the hydrocarbon molecule and site-specific conditions. Once the source of petroleum hydrocarbons is removed, further migration is not expected. The petroleum hydrocarbons are, therefore, expected to remain at their present locations, where they may degrade.

Migration in Groundwater

The following sections evaluate the migration of metals, VOCs, pesticides/PCBs, and petroleum hydrocarbons in groundwater at IR-44.

Metals

Antimony, arsenic, cadmium, manganese, mercury, nickel, and silver were detected at concentrations above screening levels in groundwater at IR-44. As discussed in Section 4.18.5.2, metals are persistent in the environment and are available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the groundwater it is dissolved in, the soil matrix saturated by the groundwater, and subsurface conditions such as the pH and oxidation potential. In general, these metals form compounds that are relatively insoluble in groundwater under the environmental conditions present at IR-44. In addition, the migration of these metals is further limited because of their sorption onto soil under the environmental conditions present at IR-44; therefore, there is a low potential for these metals to be transported in groundwater away from IR-44 (Table O-4).

VOCs

The VOCs TCE is present above the screening criteria in groundwater at IR-44. This compound is soluble in water and has a low organic carbon partitioning coefficient (Table O-3). In addition, it is relatively persistent. It is expected to remain dissolved in groundwater and be transported downgradient in the A-aquifer until it volatilizes from groundwater to soil gas and is absorbed by the soil matrix or degraded.

SVOCs

The SVOC 1,4-dichlorobenzene is present at a concentration exceeding the screening criteria in groundwater at IR-44. This compound is slightly soluble in water but has a fairly high organic carbon partitioning coefficient (Table O-3). In addition it is relatively persistent. It is expected to sorb to soil and remain in its present extent until it is degraded.

Pesticides and PCBs

The pesticide gamma chlordane has a low water solubility and sorbs to soil and organic matter. It is expected to remain in its present distribution and be slowly degraded. The PCB Aroclor-1260 strongly sorbs to soil or organic matter and is resistant to degradation. It is expected to remain in place and not be readily degraded.

Petroleum Hydrocarbons

Petroleum hydrocarbons as TPH-d, TPH-mo, and TRPG were detected in HydroPunch or monitoring well groundwater samples at concentrations exceeding their screening criteria. These hydrocarbons are most likely floating on the top of the saturated zone because they are nearly insoluble in groundwater. Petroleum may not be degraded very rapidly at IR-44 because of the lack of oxygen. The petroleum hydrocarbons present at IR-44 are expected to spread laterally until they are sorbed to soil. However, they may not be rapidly degraded as a result of anaerobic conditions at IR-44.

4.18.6 Risk Assessment

The following sections present the HHRA and a summary of the environmental and ecological risks.

In addition to the data presented in Section 4.18.3, RI Analytical Results, sample results from locations PA45TA00, PA45TA04, PA45TA12, IR45TA22, IR45TA23, and IR45B024 have been included in the calculation of risk for associated exposure areas.

4.18.6.1 Human Health Risk Assessment

This section summarizes the HHRA presented in Appendix N of this RI report conducted under the current industrial, future residential, and future industrial land-use scenarios at IR-44 in accordance with the methodology summarized in Section 4.0.

Current Industrial Land Use Risk and Hazard Characterization

Eleven 0.5-acre exposure areas are within or contact IR-44 (Table 4.0-2 and Figure 4.0-4). Currently, IR-44 is not being used for industrial purposes. However, because soil samples were collected from 0 to 2 feet bgs in unpaved areas at 1 exposure area (AZ25) (Table 4.0-2), an HHRA was conducted for soil. A-aquifer groundwater samples containing VOCs were collected at exposure areas AX27 and AZ25; therefore, an HHRA was conducted for A-aquifer groundwater. The B-aquifer and bedrock water-bearing zone are not currently used as sources of potable drinking water or for industrial purposes and groundwater data are not available for these media; therefore, an HHRA was not conducted for either B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and for A-aquifer groundwater under the RME and average exposure cases are summarized below.

In addition, an evaluation of the potential for current workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

<u>RME Case - Soil</u>

The total ELCR for exposure area AZ25, the only exposure area with available data, is 3×10^{-7} (Table 4.1-26 and Figure 4.1-84).

The total segregated HI is less than 1 for exposure area AZ25, the only exposure area with available soil data (Table 4.1-26).

The U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPCs for lead in exposure area AZ25 is less than 1,000 mg/kg (Table 4.1-26); therefore, potential exposure of industrial workers to lead in soil at IR-44 is not expected to result in adverse health effects under the current industrial scenario.

Average Exposure Case - Soil

The total ELCR for exposure area AZ25, the only exposure area with available soil data, is less than 1×10^{-6} (Table 4.1-26).

The total segregated HI for exposure area AZ25 is less than 1 (Table 4.1-26).

The EPC for lead in exposure area AZ25 is less than 1,000 mg/kg, the level of concern for industrial workers potentially exposed to lead in soil; therefore, potential exposure is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-aquifer Groundwater

For all 2 industrial exposure areas with VOCs in the A-aquifer groundwater, modeled indoor air concentrations are less than the U.S. EPA Region IX ambient air PRGs (see Attachment N-E of Appendix N). Therefore, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-44 is expected to be insignificant.

Future Residential Land Use Risk and Hazard Characterization

Fifty-seven 2,500-ft^2 exposure areas are within or contact IR-44 (Table 4.0-3 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the residential land-use scenario, soil data are available for 12 exposure areas (Table 4.0-3); therefore, an HHRA was conducted for soil. In addition, groundwater data for A-aquifer groundwater are available for 2 exposure area 085079 (Table 4.0-3); therefore, an HHRA was conducted for A-aquifer groundwater. Groundwater data are not available for either the B-aquifer or the bedrock water-bearing

zone; therefore, an HHRA was not prepared for either B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and groundwater from the A-aquifer under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future residents to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the four exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 6×10^{-6} in exposure area 091075 to 7×10^{-5} in exposure area 086075. Of the 12 exposure areas with available soil data, 4 exposure areas have total ELCRs that equal or exceed 1×10^{-6} and 8 exposure areas have ELCRs less than 1×10^{-6}. To facilitate the presentation and discussion of ELCRs, each range was assigned a group number. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$> 1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	0
4	1×10^{-5} to $< 1 \times 10^{-4}$	2
5	1×10^{-6} to $< 1 \times 10^{-5}$	2
6	$< 1 \times 10^{-6}$	8[a]

Note:

[a] Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-27 and are shown graphically in Figure 4.1-85. The distribution of total ELCRs in Groups 4 and 5 and the COPCs contributing to them are summarized below.

- In Group 4, the total ELCRs in exposure areas 086075 and 091074 are largely the result of potential exposure to one or more of the following COPCs: methylene chloride, arsenic, Aroclor-1260, and PAHs.

- In Group 5, total ELCRs in exposure areas 090073 and 091075 are largely the result of potential exposure to Aroclor-1260 and Aroclor-1254.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, in exposure areas in which PCBs and PAHs contribute most significantly to the total ELCRs, ingestion of homegrown produce is the dominant exposure pathway. For exposure areas in which metals contribute significantly to the total ELCRs, ingestion of soil and ingestion of homegrown produce are the dominant exposure pathways.

Of the 12 exposure areas for which soil data are available, total segregated HIs equal or exceed 1 in only 3 exposure areas under the child residential scenario and 2 exposure areas under the adult residential scenario. To facilitate the presentation and discussion of HIs, the HIs exceeding 1 were assigned to a group number. The following breakdown of total segregated HIs that equal or exceed 1 under the child residential scenario was observed:

Group Number	Highest Total Segregated HI Range	Number of Exposure Areas
1	HI ≥ 7	1
2	3 ≤ HI < 7	1
3	1≤ HI< 3	1

The specific exposure areas in the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child residential scenario in Figure 4.1-86.

In Group 1, the total segregated HI for exposure area 091075 is largely the result of potential exposure to mercury, copper, and zinc. The total segregated HIs in Groups 2 and 3 are largely the result of exposure to manganese. Aluminum contributes frequently at low, chemical-specific HIs to the highest total segregated HI in combination with manganese. Ingestion of homegrown produce is the dominant exposure pathway.

Lastly, using the U.S. EPA's Integrated Exposure Uptake Biokinetic Model for lead (U.S. EPA 1994), a lead concentration of 221 mg/kg was determined to be a level of concern for children exposed to lead in soil. The EPC for lead exceeds 221 mg/kg only in exposure area 091075. Information regarding the one

sampling location at which lead was detected at a concentration exceeding 221 mg/kg is presented in Table 4.1-28.

Average Exposure Case - Soil

Among the four exposure areas in which carcinogenic COPCs were detected, total ELCRs range from 1×10^{-6} in exposure areas 090073 and 091075 to 8×10^{-6} in exposure area 086075. Of the 12 exposure areas with available soil data, 4 exposure areas have total ELCRs that exceed 1×10^{-6} and 8 exposure areas have total ELCRs of less than 1×10^{-6} (Table 4.1-27). The exposure areas with total ELCRs that exceed 1×10^{-6} are shown in Figure 4.1-85. Relative contributions of COPCs and pathways contributing to the total ELCRs are similar to those under the RME case.

Of the 12 exposure areas with available soil data, total segregated HIs equal or exceed 1 only in exposure areas 086078, 087079, and 091075 under the child residential scenario and no exposure areas under the adult residential scenario. The specific exposure areas that exceed 1 in each of the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child residential scenario in Figure 4.1-86. Relative contributions of COPCs and pathways contributing to the total segregated HIs are similar to those under the RME case.

The EPC for lead exceeds 221 mg/kg, the level of concern for resident children, only in exposure area 091075. Information regarding the sampling location at which lead was detected at a concentration exceeding 221 mg/kg is presented in Table 4.1-28.

RME and Average Exposure Cases - A-aquifer Groundwater

VOCs were detected in A-aquifer groundwater samples only in exposure area 085079. Under both the RME and average exposure cases, modeled indoor air concentrations, of volatile COPCs are less than their respective U.S. EPA Region IX ambient air PRGs (U.S. EPA 1995). Therefore, the potential for adverse health effects resulting from potential exposure of residents to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-44 is expected to be insignificant.

Future Industrial Land Use Risk and Hazard Characterization

Eleven 0.5-acre exposure areas are within or contact IR-44 (Table 4.0-2 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the industrial land-use scenario, soil data are available for 7 exposure areas (Table 4.0-2); therefore, an HHRA was conducted for soil. In addition, groundwater data for VOCs in A-aquifer groundwater are available for 2 exposure areas (Table 4.0-2). Groundwater data are not available for both the B-aquifer and the bedrock water-bearing zone; therefore, an HHRA was not prepared for either B-aquifer groundwater or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and groundwater from the bedrock water-bearing zone and A-aquifer under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the four exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 3×10^{-7} in exposure area AZ27 to 6×10^{-6} in exposure area AY26. Of the 7 exposure areas with available soil data, 2 exposure areas have total ELCRs that equal or exceed 1×10^{-6} and 5 exposure areas have total ELCRs less than 1×10^{-6}. The following breakdown was observed:

Group Number	Total ELCR Range	Number of Exposure Areas
1	$> 1 \times 10^{-2}$	0
2	1×10^{-3} to $< 1 \times 10^{-2}$	0
3	1×10^{-4} to $< 1 \times 10^{-3}$	0
4	1×10^{-5} to $< 1 \times 10^{-4}$	0
5	1×10^{-6} to $< 1 \times 10^{-5}$	2
6	$< 1 \times 10^{-6}$	5[a]

Note:

[a] Includes exposure areas in which no carcinogenic COPCs were identified, but does not include exposure areas in which no samples were collected.

The specific exposure areas in each of the total ELCR ranges can be identified in Table 4.1-33 and are shown graphically in Figure 4.1-91. In Group 5, the COPCs contributing to the total ELCRs in exposure area AY26 are largely the result of potential exposure to arsenic. The total ELCR in exposure area AZ26 are largely the result of exposure to PAHs and Aroclor-1260.

The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, ingestion of and dermal contact with soil are the dominant exposure pathways.

Total segregated HIs for the 7 exposure areas with available soil data are all less than 1 (Table 4.1-33).

Lastly, the U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. The EPCs for lead in the 7 exposure areas with available soil data are all less than 1,000 mg/kg; therefore, potential exposure of industrial workers to lead in soil is not expected to result in adverse health effects.

<u>Average Exposure Case - Soil</u>

Among the four exposure areas at which carcinogenic COPCs were detected, total ELCRs range from 3×10^{-8} in exposure area AZ27 to 4×10^{-7} in exposure area AY26. Of the 7 exposure areas with available soil data, the total ELCRs for all 7 of these exposure areas are less than 1×10^{-6} (Table 4.1-33).

Total segregated HIs for the 7 exposure areas with available soil data are all less than 1 (Table 4.1-33).

As discussed under the RME case, the EPCs for lead are less than 1,000 mg/kg in all 7 exposure areas with available soil data; therefore, potential exposure of industrial workers to lead in soil is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

As discussed under the current industrial scenario, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs in A-aquifer groundwater in future industrial buildings at IR-44 is expected to be insignificant.

4.18.6.2 Environmental/Ecological Risk

IR-44 is completely covered by pavement. No wetlands are located at IR-44. Few ecological receptors are expected to use the site because of the limited area and poor quality of available habitat. Potential terrestrial exposure pathways do not exist at IR-66 because the area is paved.

Metals in groundwater potentially migrating to the Bay may be an ecological concern at IR-44. Concentrations of cadmium, copper, mercury, and nickel exceed the NAWQC for saltwater aquatic life (see Table 4.18-11 and 4.18-14). Using the NAWQC for screening criteria at IR-44 is a conservative screening approach because the NAWQC are designed to protect ecological receptors in surface waters and are used to evaluate direct discharges to surface water. Groundwater at IR-44 does not discharge directly into the Bay but rather filters indirectly through soils and sediments before reaching the Bay. When groundwater concentrations of chemicals at IR-44 are compared to the NAWQC, factors influencing the fate and transport of chemicals in groundwater such as dilution and attenuation were not considered. Affected groundwater at this site is about 500 feet inland from the Bay. These factors influence the concentrations of contaminants in groundwater reaching the Bay and should be evaluated when determining remedial options for groundwater. Potential ecological risk from these chemicals to aquatic receptors will be addressed during the Parcel D FS.

4.18.7 Conclusions and Recommendations

Based on the results of the RI and HHRA, conclusions and recommendations are summarized below.

4.18.7.1 Conclusions

Site characteristics and potential sources, the nature and extent of contamination, and the HHRA are summarized below.

Site Characteristics and Potential Sources

IR-44 consists of Buildings 408, 409, 410, 438, an unnumbered metal shed, and the paved area between them.

Artificial fill in the area is approximately 5 to 25 feet thick. Groundwater occurs at about 8 to 9 feet bgs and flows with a hydraulic gradient of 0.0001 in the wet season to 0.03 in the transition period, to the north and northeast.

Potential sources of contamination at IR-44 are sandblast grit stored in the buildings, wastewater for two metal spray shelter chambers in Building 438, and surface releases of petroleum hydrocarbons.

Nature and Extent

Distributions of metals exceeding screening criteria in soil and groundwater at IR-44 were not considered indicative of releases.

Benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene exceeded PRGs in one or more soil samples collected from 16.25 to 20.25 feet bgs at IR44MW08A, IR50B020, and IR50B021. The SVOCs detected in Bay Mud Deposits at these depths may have originated before placement of fill material through dredging activities.

Petroleum hydrocarbons exceeding their screening criteria in soil were detected northeast of Building 408 and west of Buildings 408 and 438.

Northeast of Building 408, TOG was detected exceeding its screening criteria at 3,000 mg/kg in the 5.25-foot soil sample collected from PA44B005. This exceedance may be due to the presence of possible cement fragments with road tar coating in the fill material at the sample collection depth.

West of Buildings 408 and 438, TPH-mo and TRPH were detected as high as 1,400 mg/kg and 2,100 mg/kg, respectively.

TPH-d and TPH-mo concentrations near the ends of the two discharge pipes exiting Building 438 on the east and west exceeded screening criteria in HydroPunch groundwater samples. Maximum detected concentrations were TPH-mo at 3,900 μg/L and TPH-d at 2,100 μg/L.

Human Health Risk Assessment

HHRA findings under the current industrial, future residential, and future industrial land use scenarios at IR-44 are summarized below.

Current Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- The total ELCR is less than 1×10^{-6} in exposure area AZ25, the only exposure area with available soil data (Figure 4.1-84 and Table 4.1-26).
- The total segregated HI is less than 1 in exposure area AZ25, the only exposure area with available soil data (Table 4.1-26).
- The EPC for lead is less than 1,000 mg/kg in exposure area AZ25, the only exposure area with available soil data.

Average Exposure Case: Soil

- The total ELCR is less than 1×10^{-6} in exposure area AZ25, the only exposure area with available soil data (Figure 4.1-84 and Table 4.1-26).
- The total segregated HI is less than 1 in exposure area AZ25, the only exposure area with available soil data (Table 4.1-26).

- The EPC for lead is less than 1,000 mg/kg in exposure area AZ25, the only exposure area with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- B-aquifer and bedrock water-bearing zone are currently not used as a source of potable drinking water or for industrial purposes, and data are not available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from the A-aquifer groundwater are not expected to result in adverse health effects at IR-44.

Future Residential Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 4 of the 12 exposure areas with available soil data. Total ELCRs for these 4 exposure areas are less than 1×10^{-4} (Figure 4.1-85 and Table 4.1-27).

- Total segregated HIs equal or exceed 1 in 3 exposure areas for children and 2 exposure areas for adults in the 12 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).

- EPCs for lead equal or exceed 221 mg/kg in only exposure area 091075 of the 12 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 4 of the 12 exposure areas with available soil data. Total ELCRs for these 4 exposure areas are less than 1×10^{-4} (Figure 4.1-85 and Table 4.1-27).

- Total segregated HIs equal or exceed 1 in 3 exposure areas for children and no exposure areas for adults in the 12 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).

- EPCs for lead equal or exceed 221 mg/kg in only exposure area 091075 of the 12 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from A-aquifer groundwater are not expected to result in adverse health effects at IR-44.

Future Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in 2 of the 7 exposure areas. Total ELCR for these 2 exposure areas are less than 1×10^{-4} (Figure 4.1-91 and Table 4.1-33).
- Total segregated HIs for workers are less than 1 in all 7 exposure areas with available soil data (Table 4.1-33).
- EPCs for lead are less than 1,000 mg/kg in all 7 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs are less than 1×10^{-6} for all 7 exposure areas with available soil data (Figure 4.1-91 and Table 4.1-33).
- Total segregated HIs for workers are less than 1 in all 7 exposure areas with available soil data (Table 4.1-33).
- EPCs for lead are less than 1,000 mg/kg in all 7 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- As discussed under the current industrial scenario, the potential for adverse health effects associated with potential exposures to VOCs through inhalation in future industrial buildings is expected to be insignificant at IR-44.

4.18.7.2 Recommendations

IR-44 is recommended for evaluation in the Parcel D FS report for remedial action because results of the HHRA indicate that under the future residential scenario, RME case, a potential risk to human health in one or more exposure areas exist at IR-44 based on: (1) an ELCR exceeding 1×10^{-6} and (2) total HIs exceeding 1, and (3) lead concentrations in soil exceed 221 mg/kg.. In addition, possible risks posed to ecological receptors from analytes detected at IR-44 based on exceedances or the NAWQC are recommended for further evaluation during the Parcel D FS. TPH detected in soil and groundwater at concentrations exceeding the screening criteria are recommended for further evaluation during the petroleum corrective action plan.

TABLE 4.18-1

SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
PA44SW02	9309A635				✓		✓	✓			✓	✓				✓			✓	✓		✓
PA44SW03	9309A636			✓	✓		✓				✓	✓				✓			✓	✓		✓
PA50CB403	9309X926			✓	✓		✓			✓	✓	✓				✓			✓	✓	✓	✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.18-2

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above HPAL
METAL	ALUMINUM	3,180	11,500	6,580	MG/KG	3.9	3	3	76,700	0	100,000	0		
	ANTIMONY	6.5	6.5	6.5	MG/KG	3.6	3	1	30.7	0	681	0	9.05	0
	ARSENIC	3.9	26.5	12.4	MG/KG	1.4	3	3	0.32	3	2.0	3	11.10	1
	BARIUM	99.8	194	147	MG/KG	0.40	3	3	5,340	0	100,000	0	314.36	0
	BERYLLIUM	0.27	0.27	0.27	MG/KG	0.15	3	1	0.14	1	1.1	0	0.71	0
	CADMIUM	1.5	2.3	1.8	MG/KG	1.0	3	3	9.0	0	852	0	3.14	0
	CALCIUM	4,460	56,700	22,800	MG/KG	12.7	3	3						
	CHROMIUM	127	278	183	MG/KG	0.73	3	3	211	1	1,580	0	h	1
	COBALT	12.7	14.9	13.8	MG/KG	1.9	3	3					h	0
	COPPER	402	668	552	MG/KG	0.44	3	3	2,850	0	63,300	0	124.31	3
	IRON	23,300	54,800	40,000	MG/KG	2.4	3	3						
	LEAD	642	726	685	MG/KG	5.4	3	3	130	3	1,000	0	8.99	3
	MAGNESIUM	7,650	11,400	9,480	MG/KG	12.9	3	3						
	MANGANESE	304	427	375	MG/KG	0.27	3	3	382	2	8,300	0	1431.18	0
	MERCURY	0.08	0.75	0.32	MG/KG	0.06	3	3	23.0	0	511	0	2.28	0
	MOLYBDENUM	7.7	125	62.7	MG/KG	0.85	3	3	383	0	8,520	0	2.68	3
	NICKEL	61.7	174	121	MG/KG	7.0	3	3	150	1	34,100	0	h	0
	POTASSIUM	944	944	944	MG/KG	128	3	1						
	SODIUM	251	1,570	768	MG/KG	21.9	3	3						
	VANADIUM	13.9	49.5	27.4	MG/KG	0.66	3	3	537	0	11,900	0	117.17	0
	ZINC	712	1,560	1,200	MG/KG	0.62	3	3	23,000	0	100,000	0	109.86	3
CYAN	CYANIDE	260	260	260	UG/KG	110	3	1	1,300,000	0	13,600,000	0		

TABLE 4.18-2 (Continued)

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
VOC	CARBON DISULFIDE	5	5	5	UG/KG	12	3	1	16,000	0	52,000	0		
	VINYL CHLORIDE	67	67	67	UG/KG	12	3	1	5	1	11	1		
SVOC	ACENAPHTHENE	120	120	120	UG/KG	820	3	1	360,000	0	360,000	0		
	ANTHRACENE	180	180	180	UG/KG	820	3	1	19,000	0	19,000	0		
	BENZO(A)ANTHRACENE	680	680	680	UG/KG	820	3	1	610	1	2,600	0		
	BENZO(A)PYRENE	520	520	520	UG/KG	820	3	1	61	1	260	1		
	BENZO(B)FLUORANTHENE	1,100	1,100	1,100	UG/KG	820	3	1	610	1	2,600	0		
	BENZO(G,H,I)PERYLENE	490	490	490	UG/KG	820	3	1	800,000	0	800,000	0		
	BENZO(K)FLUORANTHENE	310	310	310	UG/KG	820	3	1	610	0	26,000	0		
	CARBAZOLE	210	210	210	UG/KG	820	3	1	22,000	0	95,000	0		
	CHRYSENE	660	660	660	UG/KG	820	3	1	6,100	0	24,000	0		
	FLUORANTHENE	1,500	1,500	1,500	UG/KG	820	3	1	2,600,000	0	27,000,000	0		
	FLUORENE	100	100	100	UG/KG	820	3	1	300,000	0	300,000	0		
	PHENANTHRENE	840	840	840	UG/KG	820	3	1	800,000	0	800,000	0		
	PYRENE	1,100	1,100	1,100	UG/KG	820	3	1	2,000,000	0	20,000,000	0		
PEST	4,4'-DDD	1,200	1,200	1,200	UG/KG	200	2	1	1,900	0	7,900	0		
	AROCLOR-1242	160	160	160	UG/KG	43	2	1						
	AROCLOR-1254	45	84	65	UG/KG	42	2	2	1,400	0	19,000	0		
	AROCLOR-1260	93	2,300	870	UG/KG	690	3	3	66	3	340	1		
TPHPRG	TPH-PURGEABLE UNKNOWN HYDROCA.	4	4	4	MG/KG	1	2	1	100	0i				
TPHEXT	TPH-DIESEL	320	320	320	MG/KG	120	3	1	1,000	0i				
	TPH-EXTRACTABLE UNKNOWN HYDRO.	56	1,600	830	MG/KG	26	2	2	1,000	1i				

TABLE 4.18-2 (Continued)

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
TRPH	TRPH	940	940	940	MG/KG	6	1	1	1,000	0i				
O&G	TOTAL OIL & GREASE	9,000	9,000	9,000	MG/KG	66	1	1	1,000	1i				

TABLE 4.18-2 (Continued)

STATISTICAL SUMMARY OF STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 160.697 to 211.311, 27.320 to 33.563, and 181.834 to 265.039 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.18-3

STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA44SW02	PA44SW03	PA50CB403
Sampling Depth (feet bgs)	2.10	2.10	2.10
Sample Number	9309A635	9309A636	9309X926
Sample Date	03/01/93	03/01/93	03/05/93
Metal (mg/kg)			
ALUMINUM	5,060	3,180	11,500
ANTIMONY	ND (7.7)	ND (7.3)	6.5
ARSENIC	6.8 *#	26.5 *#a	3.9 *#
BARIUM	146	194	99.8
BERYLLIUM	ND (0.18)	ND (0.17)	0.27 *
CADMIUM	2.3	1.5	1.5
CALCIUM	4,460	56,700	7,290
CHROMIUM	278 *a	144	127
COBALT	12.7	13.8	14.9
COPPER	668 a	585 a	402 a
IRON	54,800	41,800	23,300
LEAD	642 *a	726 *a	688 *a
MAGNESIUM	9,420	7,650	11,400
MANGANESE	427 *	394 *	304
MERCURY	0.13	0.08	0.75
MOLYBDENUM	55.3 a	125 a	7.7 a
NICKEL	174 *	61.7	128
POTASSIUM	ND (750)	ND (570)	944
SODIUM	487	251	1,570
VANADIUM	18.9	13.9	49.5
ZINC	1,560 a	1,330 a	712 a
Cyanide (ug/kg)			
CYANIDE	ND (660)	ND (620)	260
Volatile Organic Compound (ug/kg)			
CARBON DISULFIDE	ND (66)	ND (12)	5
VINYL CHLORIDE	ND (66)	ND (12)	67 *#
Semivolatile Organic Compound (ug/kg)			
ACENAPHTHENE	ND (8,700)	120	ND (120,000)
ANTHRACENE	ND (8,700)	180	ND (120,000)
BENZO(A)ANTHRACENE	ND (8,700)	680 *	ND (120,000)
BENZO(A)PYRENE	ND (8,700)	520 *#	ND (120,000)
BENZO(B)FLUORANTHENE	ND (8,700)	1,100 *	ND (120,000)

TABLE 4.18-3 (Continued)

STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA44SW02	PA44SW03	PA50CB403
Sampling Depth (feet bgs)	2.10	2.10	2.10
Sample Number	9309A635	9309A636	9309X926
Sample Date	03/01/93	03/01/93	03/05/93
Semivolatile Organic Compound (ug/kg)			
BENZO(G,H,I)PERYLENE	ND (8,700)	490	ND (120,000)
BENZO(K)FLUORANTHENE	ND (8,700)	310	ND (120,000)
CARBAZOLE	ND (8,700)	210	ND (120,000)
CHRYSENE	ND (8,700)	660	ND (120,000)
FLUORANTHENE	ND (8,700)	1,500	ND (120,000)
FLUORENE	ND (8,700)	100	ND (120,000)
PHENANTHRENE	ND (8,700)	840	ND (120,000)
PYRENE	ND (8,700)	1,100	ND (120,000)
Pesticide/Polychlorinated Biphenyl (ug/kg)			
4,4'-DDD	NA	ND (4)	1,200
AROCLOR-1242	160	ND (41)	NA
AROCLOR-1254	45	84	NA
AROCLOR-1260	93 *	210 *	2,300 *#
TPH-Purgeable (mg/kg)			
TPH-PURGEABLE UNKNOWN HYDROCARBON	4	ND (1)	NA
TPH-Extractable (mg/kg)			
TPH-DIESEL	ND (40)	ND (12)	320
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	1,600	56	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)			
TRPH	NA	NA	940
Oil and Grease (mg/kg)			
TOTAL OIL & GREASE	9,000	NA	NA
Percent Moisture (%)			
% SOLIDS	NA	NA	82.7
pH (pH units)			
PH	7.2	8.3	8.2

TABLE 4.18-3 (Continued)

STORM DRAIN SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.18-4

SUMMARY OF OTHER SEDIMENT ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
PA44SB01	9309A634				✓		✓					✓				✓						
PA44SB01	9309A634C			✓																		
PA44SB04	9309A637			✓	✓		✓					✓				✓						

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.18-5

STATISTICAL SUMMARY OF OTHER SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
METAL	ALUMINUM	1,670	3,180	2,430	MG/KG	3.2	2	2	76,700	0	100,000	0		
	ARSENIC	11.1	13.1	12.1	MG/KG	1.1	2	2	0.32	2	2.0	2	11.10	1
	BARIUM	87.7	217	152	MG/KG	0.21	2	2	5,340	0	100,000	0	314.36	0
	CALCIUM	1,440	5,220	3,330	MG/KG	9.9	2	2						
	CHROMIUM	79.3	199	139	MG/KG	0.71	2	2	211	0	1,580	0	h	2
	COBALT	8.8	11.2	10.0	MG/KG	2.0	2	2					h	0
	COPPER	351	1,050	701	MG/KG	0.53	2	2	2,850	0	63,300	0	124.31	2
	IRON	32,000	76,600	54,300	MG/KG	1.3	2	2						
	LEAD	187	340	264	MG/KG	5.4	2	2	130	2	1,000	0	8.99	2
	MAGNESIUM	1,640	8,210	4,930	MG/KG	6.8	2	2						
	MANGANESE	264	369	317	MG/KG	0.26	2	2	382	0	8,300	0	1431.18	0
	MERCURY	0.81	0.81	0.81	MG/KG	0.05	2	1	23.0	0	511	0	2.28	0
	MOLYBDENUM	9.1	106	57.6	MG/KG	0.80	2	2	383	0	8,520	0	2.68	2
	NICKEL	104	161	133	MG/KG	8.1	2	2	150	1	34,100	0	h	1
	SILVER	0.47	0.56	0.52	MG/KG	0.44	2	2	383	0	8,520	0	1.43	0
	SODIUM	140	536	338	MG/KG	15.5	2	2						
	VANADIUM	6.0	10.8	8.4	MG/KG	0.50	2	2	537	0	11,900	0	117.17	0
	ZINC	857	3,210	2,030	MG/KG	0.63	2	2	23,000	0	100,000	0	109.86	2
SVOC	BENZO(A)ANTHRACENE	43	110	77	UG/KG	350	2	2	610	0	2,600	0		
	BENZO(A)PYRENE	47	97	72	UG/KG	350	2	2	61	1	260	0		
	BENZO(B)FLUORANTHENE	98	220	160	UG/KG	350	2	2	610	0	2,600	0		
	BENZO(G,H,I)PERYLENE	44	96	70	UG/KG	350	2	2	800,000	0	800,000	0		

TABLE 4.18-5 (Continued)

STATISTICAL SUMMARY OF OTHER SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	BENZO(K)FLUORANTHENE	60	60	60	UG/KG	340	2	1	610	0	26,000	0		
	CARBAZOLE	50	50	50	UG/KG	340	2	1	22,000	0	95,000	0		
	CHRYSENE	73	130	100	UG/KG	350	2	2	6,100	0	24,000	0		
	FLUORANTHENE	140	260	200	UG/KG	350	2	2	2,600,000	0	27,000,000	0		
	INDENO(1,2,3-CD)PYRENE	52	120	86	UG/KG	350	2	2	610	0	2,600	0		
	ISOPHORONE	58	58	58	UG/KG	340	2	1	470,000	0	2,000,000	0		
	PHENANTHRENE	83	220	150	UG/KG	350	2	2	800,000	0	800,000	0		
	PHENOL	500	500	500	UG/KG	340	2	1	39,000,000	0	100,000,00	0		
	PYRENE	100	170	140	UG/KG	350	2	2	2,000,000	0	20,000,000	0		

TABLE 4.18-5 (Continued)

STATISTICAL SUMMARY OF OTHER SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 55.617 to 168.715, 12.305 to 28.338, and 42.223 to 194.433 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.18-6

OTHER SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA44SB01	PA44SB04
Sampling Depth (feet bgs)	0.00	0.00
Sample Number	9309A634	9309A637
Sample Date	03/01/93	03/01/93
Metal (mg/kg)		
ALUMINUM	3,180	1,670
ARSENIC	11.1 *#	13.1 *#α
BARIUM	217	87.7
CALCIUM	5,220	1,440
CHROMIUM	199 α	79.3 α
COBALT	11.2	8.8
COPPER	1,050 α	351 α
IRON	32,000	76,600
LEAD	340 *α	187 *α
MAGNESIUM	8,210	1,640
MANGANESE	264	369
MERCURY	0.81	ND (0.05)
MOLYBDENUM	106 α	9.1 α
NICKEL	161 *	104 α
SILVER	0.47	0.56
SODIUM	536	140
VANADIUM	10.8	6.0
ZINC	857 α	3,210 α
Semivolatile Organic Compound (ug/kg)		
BENZO(A)ANTHRACENE	110	43
BENZO(A)PYRENE	97 *	47
BENZO(B)FLUORANTHENE	220	98
BENZO(G,H,I)PERYLENE	96	44
BENZO(K)FLUORANTHENE	60	ND (350)
CARBAZOLE	50	ND (350)
CHRYSENE	130	73
FLUORANTHENE	260	140
INDENO(1,2,3-CD)PYRENE	120	52
ISOPHORONE	58	ND (350)
PHENANTHRENE	220	83
PHENOL	500	ND (350)
PYRENE	170	100

TABLE 4.18-6 (Continued)

OTHER SEDIMENT ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	PA44SB01	PA44SB04
Sampling Depth (feet bgs)	0.00	0.00
Sample Number	9309A634	9309A637
Sample Date	03/01/93	03/01/93
pH (pH units)		
PH	7.9	7.9

Notes:

bgs Below ground surface
mg/kg Milligram per kilogram
NA Not analyzed
ND() Not detected (detection limit in parentheses)
µg/kg Microgram per kilogram

* Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
\# Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α Detected concentration greater than the Hunters Point ambient level.

▒ Detected concentration greater than at least one screening criterion.

TABLE 4.18-7

SUMMARY OF SOIL ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR44B006	9533C090						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B006	9533C091						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B006	9533C094						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B006	9533C095						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B006	9533C096						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B006	9533C098												✓					✓				
IR44B006	9533C100						✓			✓	✓	✓				✓			✓	✓	✓	
IR44B006	9533S095												✓					✓				
IR44B007	9545J577						✓			✓	✓	✓				✓			✓	✓	✓	
IR44B007	9545J578						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B007	9545J579						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B009	9605G041						✓			✓	✓	✓				✓			✓	✓	✓	
IR44B009	9605G042						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44B009	9605G043						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9538J256						✓			✓	✓	✓				✓			✓	✓	✓	
IR44MW08A	9538J257						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9538J259						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9538J260						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR50B020	9421R185						✓				✓	✓				✓			✓	✓	✓	✓
IR50B020	9421R186						✓				✓	✓				✓			✓	✓	✓	✓
IR50B020	9421R187						✓				✓	✓				✓			✓	✓	✓	✓
IR50B020	9421R188						✓				✓	✓				✓			✓	✓	✓	✓
IR50B021	9423R253						✓			✓	✓	✓				✓			✓	✓		✓
IR50B021	9423R254						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR50B021	9423R255						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR50B021	9423R256						✓			✓	✓	✓				✓			✓	✓	✓	✓
PA44B005	9310A691						✓	✓		✓	✓	✓				✓			✓	✓		✓

TABLE 4.18-7 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.18-8

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
METAL	ALUMINUM	3,950	34,300	18,500	MG/KG	3.9	25	25	76,700	0	100,000	0		
	ANTIMONY	0.86	2.8	1.5	MG/KG	0.69	25	7	30.7	0	681	0	9.05	0
	ARSENIC	1.5	36.7	6.8	MG/KG	0.47	25	15	0.32	15	2.0	10	11.10	2
	BARIUM	11.8	499	102	MG/KG	0.44	25	25	5,340	0	100,000	0	314.36	1
	BERYLLIUM	0.25	0.69	0.37	MG/KG	0.10	25	8	0.14	8	1.1	0	0.71	0
	CADMIUM	0.04	0.53	0.29	MG/KG	0.07	25	2	9.0	0	852	0	3.14	0
	CALCIUM	3,640	243,000	54,000	MG/KG	7.0	25	24						
	CHROMIUM	12.8	304	85.4	MG/KG	0.32	25	25	211	1	1,580	0	h	0
	COBALT	4.0	65.3	21.2	MG/KG	0.22	25	25					h	1
	COPPER	9.2	117	44.7	MG/KG	0.21	25	25	2,850	0	63,300	0	124.31	0
	IRON	8,970	56,800	27,500	MG/KG	4.1	25	25						
	LEAD	2.1	27.5	9.2	MG/KG	0.45	25	24	130	0	1,000	0	8.99	9
	MAGNESIUM	3,000	127,000	20,900	MG/KG	6.3	25	25						
	MANGANESE	124	2,790	664	MG/KG	0.12	25	25	382	15	8,300	0	1431.18	2
	MERCURY	0.06	0.40	0.17	MG/KG	0.06	25	12	23.0	0	511	0	2.28	0
	MOLYBDENUM	0.53	2.1	1.5	MG/KG	1.3	25	3	383	0	8,520	0	2.68	0
	NICKEL	16.5	853	95.0	MG/KG	0.68	25	25	150	3	34,100	0	h	0
	POTASSIUM	833	3,580	1,580	MG/KG	33.6	25	24						
	SELENIUM	0.98	3.7	2.3	MG/KG	0.51	25	4	383	0	8,520	0	1.95	2
	SODIUM	26.7	8,570	3,280	MG/KG	30.4	25	20						
	THALLIUM	0.49	1.4	0.85	MG/KG	0.45	25	3					0.81	1
	VANADIUM	17.0	162	64.9	MG/KG	0.27	25	25	537	0	11,900	0	117.17	1

TABLE 4.18-8 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	ZINC	24.4	121	66.2	MG/KG	0.40	25	25	23,000	0	100,000	0	109.86	2
VOC	ACETONE	83	120	100	UG/KG	13	21	2	2,000,000	0	8,400,000	0		
	CARBON DISULFIDE	2	7	5	UG/KG	12	21	4	16,000	0	52,000	0		
	TETRACHLOROETHENE	3	3	3	UG/KG	11	21	1	7,000	0	25,000	0		
SVOC	ANTHRACENE	34	54	41	UG/KG	490	25	3	19,000	0	19,000	0		
	BENZO(A)ANTHRACENE	130	340	220	UG/KG	490	24	3	610	0	2,600	0		
	BENZO(A)PYRENE	240	1,200	570	UG/KG	490	24	4	61	4	260	3		
	BENZO(B)FLUORANTHENE	290	760	490	UG/KG	490	24	3	610	1	2,600	0		
	BENZO(G,H,I)PERYLENE	240	1,200	670	UG/KG	490	24	3	800,000	0	800,000	0		
	BENZO(K)FLUORANTHENE	99	570	290	UG/KG	490	24	4	610	0	26,000	0		
	CHRYSENE	160	430	280	UG/KG	490	24	3	6,100	0	24,000	0		
	FLUORANTHENE	210	930	430	UG/KG	480	25	5	2,600,000	0	27,000,000	0		
	INDENO(1,2,3-CD)PYRENE	200	900	500	UG/KG	490	24	3	610	1	2,600	0		
	PHENANTHRENE	110	250	170	UG/KG	490	25	3	800,000	0	800,000	0		
	PYRENE	330	1,400	660	UG/KG	480	24	5	2,000,000	0	20,000,000	0		
PEST	4,4'-DDT	4	4	4	UG/KG	4	25	1	1,300	0	5,600	0		
	AROCLOR-1260	15	15	15	UG/KG	35	25	1	66	0	340	0		
TPHEXT	TPH-DIESEL	7	740	100	MG/KG	75	25	12	1,000	0i				
	TPH-EXTRACTABLE UNKNOWN HYDRO.	13	370	150	MG/KG	1	4	4	1,000	0i				
	TPH-MOTOR OIL	6	6,500	590	MG/KG	57	24	17	1,000	2i				
TRPH	TRPH	6	10,000	1,200	MG/KG	54	23	13	1,000	3i				
O&G	TOTAL OIL & GREASE	3,000	3,000	3,000	MG/KG	28	1	1	1,000	1i				

TABLE 4.18-8 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
PHYS	DRY BULK DENSITY	85	120	100	%	0	2	2						
	GRAIN SIZE ANALYSIS - %CLAY	29	29	29	%	0	2	2						
	GRAIN SIZE ANALYSIS - %COBBLE.	0	0	0	%	0	2	2						
	GRAIN SIZE ANALYSIS - %GRAVEL	3	3	3	%	0	2	2						
	GRAIN SIZE ANALYSIS - %SAND	50	50	50	%	0	2	2						
	GRAIN SIZE ANALYSIS - %SILT	18	18	18	%	0	2	2						
	MOISTURE CONTENT	17	36	26	%	0	2	2						
	POROSITY	32	50	41	%	0	2	2						
	WET BULK DENSITY	120	140	130	%	0	2	2						
TOC	TOTAL ORGANIC CARBON	29,000,000	29,000,000	29,000,000	UG/KG	100,000	2	1						

TABLE 4.18-8 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 84,312 to 1114.669, 16.823 to 117.149, and 74.851 to 2612.582 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.18-9

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006
Sampling Depth (feet bgs)	6.25	10.25	16.25	21.25	26.25	36.25	0.75
Sample Number	9533C090	9533C091	9533C094	9533C095	9533C096	9533C098	9533C100
Sample Date	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95
Metal (mg/kg)							
ALUMINUM	21,500	27,400	22,900	4,360	5,810	NA	14,900
ANTIMONY	ND (1.9)	ND (1.8)	ND (2.3)	ND (0.81)	ND (0.50)	NA	ND (0.87)
ARSENIC	ND (3.8)	ND (0.88)	ND (2.2)	ND (3.4)	ND (2.8)	NA	7.0 *#
BARIUM	240	64.6	68.2	11.8	15.9	NA	44.2
BERYLLIUM	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	NA	0.34 *
CADMIUM	0.04	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	NA	ND (0.04)
CALCIUM	15,100	15,600	16,100	11,400	12,600	NA	3,640
CHROMIUM	97.2	98.3	115	35.5	37.1	NA	34.6
COBALT	21.6	22.7	21.2	7.2	7.6	NA	11.5
COPPER	32.7	57.2	42.8	10.8	9.2	NA	16.1
IRON	30,700	37,700	29,800	9,270	10,100	NA	27,400
LEAD	10.0 a	2.1	3.7	2.6	2.1	NA	10.2 a
MAGNESIUM	19,600	18,700	17,200	3,900	4,380	NA	9,500
MANGANESE	698 *	362	422 *	127	150	NA	715 *
MERCURY	ND (0.05)	ND (0.06)	ND (0.06)	ND (0.06)	ND (0.06)	NA	ND (0.05)
MOLYBDENUM	ND (1.2)	ND (0.22)	ND (0.37)	ND (0.21)	ND (0.22)	NA	ND (0.33)
NICKEL	100	46.6	60.6	34.5	31.9	NA	34.5
POTASSIUM	1,780	2,330	2,030	1,090	1,010	NA	1,450
SELENIUM	ND (0.71)	ND (0.81)	ND (0.78)	ND (0.79)	ND (0.82)	NA	ND (0.71)
SODIUM	26.7	6,600	4,990	1,980	2,300	NA	ND (47.3)
THALLIUM	0.49	1.4 a	0.65	ND (0.46)	ND (0.48)	NA	ND (0.42)
VANADIUM	69.8	113	87.3	23.6	28.0	NA	42.3
ZINC	73.0	85.4	64.6	24.4	27.1	NA	68.6
Volatile Organic Compound (ug/kg)							
ACETONE	ND (13)	ND (12)	ND (11)	ND (18)	ND (23)	NA	NA
CARBON DISULFIDE	ND (10)	ND (12)	ND (11)	ND (12)	ND (12)	NA	NA
TETRACHLOROETHENE	ND (10)	ND (12)	ND (11)	ND (12)	ND (12)	NA	NA
Semivolatile Organic Compound (ug/kg)							
ANTHRACENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
BENZO(A)ANTHRACENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
BENZO(A)PYRENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
BENZO(B)FLUORANTHENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
BENZO(G,H,I)PERYLENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
BENZO(K)FLUORANTHENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006
Sampling Depth (feet bgs)	6.25	10.25	16.25	21.25	26.25	36.25	0.75
Sample Number	9533C090	9533C091	9533C094	9533C095	9533C096	9533C098	9533C100
Sample Date	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95
Semivolatile Organic Compound (ug/kg)							
CHRYSENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
FLUORANTHENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
INDENO(1,2,3-CD)PYRENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
PHENANTHRENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
PYRENE	ND (350)	ND (400)	ND (380)	ND (390)	ND (400)	NA	ND (350)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDT	ND (17)	ND (4)	ND (4)	ND (4)	ND (20)	NA	ND (17)
AROCLOR-1260	ND (170)	ND (40)	ND (38)	ND (39)	ND (200)	NA	ND (170)
TPH-Extractable (mg/kg)							
TPH-DIESEL	63	ND (12)	11	8	7	NA	140
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	450	6	65	22	19	NA	920
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	690	ND (12)	150	ND (12)	ND (12)	NA	2,100
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	95.7	83.6	86.7	86.1	83.4	NA	96.2
pH (pH units)							
PH	8.9	7.6	8.5	8.7	8.5	NA	8.5
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	NA	NA	120	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	29	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA		NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	3	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	50	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	18	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	17	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006	IR44B006
Sampling Depth (feet bgs)	6.25	10.25	16.25	21.25	26.25	36.25	0.75
Sample Number	9533C090	9533C091	9533C094	9533C095	9533C096	9533C098	9533C100
Sample Date	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95	08/14/95
Physical Characteristic (%)							
POROSITY	NA	NA	NA	NA	NA	32	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	140	NA
Total Organic Carbon (ug/kg)							
TOTAL ORGANIC CARBON	NA	NA	NA	NA	NA	29,000,000	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B007	IR44B007	IR44B007	IR44B009	IR44B009	IR44B009
Sampling Depth (feet bgs)	20.75	0.75	5.50	8.75	1.50	4.50	8.75
Sample Number	9533S095	9545J577	9545J578	9545J579	9605G041	9605G042	9605G043
Sample Date	08/14/95	11/06/95	11/06/95	11/06/95	01/30/96	01/30/96	01/30/96
Metal (mg/kg)							
ALUMINUM	NA	24,500	30,800	27,300	14,200	32,400	34,300
ANTIMONY	NA	1.1	2.8	0.86	ND (0.54)	ND (1.3)	2.2
ARSENIC	NA	1.9 *	ND (0.59)	ND (0.65)	2.2 *#	ND (0.29)	1.5 *
BARIUM	NA	206	114	54.8	65.1	96.9	46.0
BERYLLIUM	NA	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
CADMIUM	NA	ND (0.05)	ND (0.04)	ND (0.05)	ND (0.04)	ND (0.04)	ND (0.05)
CALCIUM	NA	18,200	20,000	16,400	9,440	35,900	18,300
CHROMIUM	NA	114	150	97.9	20.1	104	166
COBALT	NA	39.9	36.2	30.6	11.0	30.3	36.9
COPPER	NA	69.8	76.5	63.9	53.2	57.8	117
IRON	NA	38,400	44,700	37,200	19,200	37,500	56,800
LEAD	NA	10.4 α	6.0	2.9	6.0	ND (0.79)	6.0
MAGNESIUM	NA	23,300	32,400	24,200	8,400	35,100	36,500
MANGANESE	NA	1,520 *α	1,130 *	859 *	428 *	730 *	785 *
MERCURY	NA	ND (0.06)	ND (0.06)	ND (0.07)	ND (0.05)	ND (0.05)	ND (0.06)
MOLYBDENUM	NA	ND (0.27)	ND (0.25)	ND (0.28)	ND (0.13)	ND (0.26)	ND (0.14)
NICKEL	NA	110	94.9	50.6	34.2	54.6	45.8
POTASSIUM	NA	973	1,600	1,160	1,370	1,030	1,300
SELENIUM	NA	ND (0.89)	ND (0.83)	ND (0.90)	ND (0.48)	ND (0.48)	ND (0.53)
SODIUM	NA	870	1,560	4,070	617	1,520	3,780
THALLIUM	NA	ND (0.43)	ND (0.40)	ND (0.44)	ND (0.40)	ND (0.40)	ND (0.44)
VANADIUM	NA	113	105	93.8	48.5	83.2	162 α
ZINC	NA	83.4	93.4	87.3	45.2	64.6	121 α
Volatile Organic Compound (ug/kg)							
ACETONE	NA	NA	ND (10)	ND (12)	NA	ND (16)	ND (22)
CARBON DISULFIDE	NA	NA	ND (10)	ND (12)	NA	ND (10)	ND (12)
TETRACHLOROETHENE	NA	NA	ND (10)	ND (12)	NA	ND (10)	ND (12)
Semivolatile Organic Compound (ug/kg)							
ANTHRACENE	NA	ND (380)	ND (350)	ND (580)	ND (350)	ND (340)	ND (380)
BENZO(A)ANTHRACENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
BENZO(A)PYRENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
BENZO(B)FLUORANTHENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
BENZO(G,H,I)PERYLENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
BENZO(K)FLUORANTHENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B007	IR44B007	IR44B007	IR44B009	IR44B009	IR44B009
Sampling Depth (feet bgs)	20.75	0.75	5.50	8.75	1.50	4.50	8.75
Sample Number	9533S095	9545J577	9545J578	9545J579	9605G041	9605G042	9605G043
Sample Date	08/14/95	11/06/95	11/06/95	11/06/95	01/30/96	01/30/96	01/30/96
Semivolatile Organic Compound (ug/kg)							
CHRYSENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
FLUORANTHENE	NA	ND (380)	ND (350)	ND (580)	ND (350)	ND (340)	ND (380)
INDENO(1,2,3-CD)PYRENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
PHENANTHRENE	NA	ND (380)	ND (350)	ND (580)	ND (350)	ND (340)	ND (380)
PYRENE	NA	ND (380)	ND (350)	ND (580)	NA	ND (340)	ND (380)
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDT	NA	ND (4)	ND (4)	ND (4)	ND (180)	ND (4)	ND (4)
AROCLOR-1260	NA	ND (38)	ND (35)	ND (39)	ND (1,800)	ND (35)	ND (38)
TPH-Extractable (mg/kg)							
TPH-DIESEL	NA	16	8	ND (12)	740	ND (10)	ND (12)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	NA	NA	NA
TPH-MOTOR OIL	NA	150	57	ND (12)	6,500	9	ND (12)
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	NA	110	72	ND (12)	10,000	6	28
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	NA	87.5	94.4	86.2	95.3	95.5	86.7
pH (pH units)							
PH	NA	9.4	9.6	8.4	9.0	9.8	8.3
Physical Characteristic (%)							
DRY BULK DENSITY	85	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	29	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES		NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	3	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	50	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	18	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	36	NA	NA	NA	NA	NA	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B007	IR44B007	IR44B007	IR44B009	IR44B009	IR44B009
Sampling Depth (feet bgs)	20.75	0.75	5.50	8.75	1.50	4.50	8.75
Sample Number	9533S095	9545J577	9545J578	9545J579	9605G041	9605G042	9605G043
Sample Date	08/14/95	11/06/95	11/06/95	11/06/95	01/30/96	01/30/96	01/30/96
Physical Characteristic (%)							
POROSITY	50	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	120	NA	NA	NA	NA	NA	NA
Total Organic Carbon (ug/kg)							
TOTAL ORGANIC CARBON	ND (120,000)	NA	NA	NA	NA	NA	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44MW08A	IR44MW08A	IR44MW08A	IR44MW08A	IR50B020	IR50B020	IR50B020
Sampling Depth (feet bgs)	0.50	10.75	15.75	20.25	2.25	6.25	16.25
Sample Number	9538J256	9538J257	9538J259	9538J260	9421R185	9421R186	9421R187
Sample Date	09/18/95	09/18/95	09/18/95	09/18/95	05/26/94	05/26/94	05/26/94
Metal (mg/kg)							
ALUMINUM	13,800	18,500	7,890	9,070	3,950	29,600	21,100
ANTIMONY	ND (0.69)	1.6	1.2	0.90	ND (6.5)	ND (6.6)	ND (8.9)
ARSENIC	ND (0.64)	ND (1.6)	5.5 *#	5.5 *#	3.0 *#	15.2 *#a	6.9 *#
BARIUM	47.8	103	36.3	21.6	51.4	163	44.8
BERYLLIUM	ND (0.02)	ND (0.02)	ND (0.04)	ND (0.06)	ND (0.21)	0.40 *	0.41 *
CADMIUM	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.06)	ND (0.84)	ND (1.5)	ND (1.1)
CALCIUM	10,100	8,330	187,000	206,000	ND (4,290)	26,500	187,000
CHROMIUM	12.8	304 *	40.8	30.0	27.6	87.5	58.6
COBALT	9.3	65.3	7.6	6.0	4.0	20.3	9.1
COPPER	49.3	33.4	21.3	14.8	32.3	42.7	31.8
IRON	17,000	35,400	10,900	12,400	8,970	38,300	22,300
LEAD	2.9	5.0	16.6 a	7.0	19.5 a	6.7	19.1 a
MAGNESIUM	7,550	127,000	7,030	5,870	3,000	21,200	9,290
MANGANESE	349	1,140 *	325	251	124	744 *	309
MERCURY	0.09	0.08	0.29	0.14	0.10	0.11	0.40
MOLYBDENUM	ND (0.28)	ND (0.29)	ND (0.32)	0.53	ND (1.5)	1.9	2.1
NICKEL	16.5	853 *	40.7	26.8	22.0	88.9	51.6
POTASSIUM	1,160	1,210	2,430	3,580	ND (366)	1,510	2,600
SELENIUM	ND (0.90)	ND (0.94)	ND (1.1)	ND (1.2)	0.98	1.1	3.7 a
SODIUM	459	4,310	5,400	6,880	ND (318)	ND (534)	ND (6,580)
THALLIUM	ND (0.44)	ND (0.46)	ND (0.58)	ND (0.57)	ND (0.42)	ND (0.43)	ND (0.57)
VANADIUM	48.4	60.5	24.5	25.9	17.0	92.2	51.5
ZINC	41.1	63.7	59.0	45.0	117 a	68.2	72.3
Volatile Organic Compound (ug/kg)							
ACETONE	NA	ND (12)	ND (34)	ND (52)	ND (31)	ND (11)	ND (26)
CARBON DISULFIDE	NA	ND (12)	ND (14)	ND (15)	ND (11)	ND (11)	2
TETRACHLOROETHENE	NA	ND (12)	ND (14)	ND (15)	3	ND (11)	ND (14)
Semivolatile Organic Compound (ug/kg)							
ANTHRACENE	ND (380)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	54
BENZO(A)ANTHRACENE	ND (380)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	340
BENZO(A)PYRENE	ND (3,800)	ND (400)	ND (440)	240 *	ND (350)	ND (1,100)	1,200 *#
BENZO(B)FLUORANTHENE	ND (3,800)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	760 *
BENZO(G,H,I)PERYLENE	ND (3,800)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	1,200
BENZO(K)FLUORANTHENE	ND (3,800)	ND (400)	ND (440)	250	ND (350)	ND (1,100)	570

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44MW08A	IR44MW08A	IR44MW08A	IR44MW08A	IR50B020	IR50B020	IR50B020
Sampling Depth (feet bgs)	0.50	10.75	15.75	20.25	2.25	6.25	16.25
Sample Number	9538J256	9538J257	9538J259	9538J260	9421R185	9421R186	9421R187
Sample Date	09/18/95	09/18/95	09/18/95	09/18/95	05/26/94	05/26/94	05/26/94
Semivolatile Organic Compound (ug/kg)							
CHRYSENE	ND (380)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	430
FLUORANTHENE	ND (380)	ND (400)	210	230	ND (350)	ND (1,100)	930
INDENO(1,2,3-CD)PYRENE	ND (3,800)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	900 *
PHENANTHRENE	ND (380)	ND (400)	ND (440)	ND (490)	ND (350)	ND (1,100)	250
PYRENE	ND (380)	ND (400)	330	340	ND (350)	ND (1,100)	1,400
Pesticide/Polychlorinated Biphenyl (ug/kg)							
4,4'-DDT	ND (19)	ND (4)	ND (5)	ND (5)	4	ND (4)	ND (5)
AROCLOR-1260	ND (190)	ND (40)	ND (45)	ND (50)	15	ND (35)	ND (47)
TPH-Extractable (mg/kg)							
TPH-DIESEL	150	ND (30)	14	8	ND (1)	ND (1)	ND (1)
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	NA	NA	NA	NA	170	370	43
TPH-MOTOR OIL	1,400	240	76	52	ND (11)	ND (11)	ND (14)
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	1,500	31	ND (13)	ND (15)	ND (49)	ND (34)	260
Oil and Grease (mg/kg)							
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	NA	NA
Percent Moisture (%)							
% SOLIDS	87.1	83.3	74.1	67.2	NA	NA	NA
pH (pH units)							
PH	8.1	8.0	8.2	8.8	10.0	9.3	8.4
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	NA	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44MW08A	IR44MW08A	IR44MW08A	IR44MW08A	IR50B020	IR50B020	IR50B020
Sampling Depth (feet bgs)	0.50	10.75	15.75	20.25	2.25	6.25	16.25
Sample Number	9538J256	9538J257	9538J259	9538J260	9421R185	9421R186	9421R187
Sample Date	09/18/95	09/18/95	09/18/95	09/18/95	05/26/94	05/26/94	05/26/94
Physical Characteristic (%)							
POROSITY	NA	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (ug/kg)							
TOTAL ORGANIC CARBON	NA	NA	NA	NA	NA	NA	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR50B020	IR50B021	IR50B021	IR50B021	IR50B021	PA44B005
Sampling Depth (feet bgs)	21.25	2.75	6.25	10.75	16.25	5.25
Sample Number	9421R188	9423R253	9423R254	9423R255	9423R256	9310A691
Sample Date	05/26/94	06/08/94	06/08/94	06/08/94	06/08/94	03/10/93
Metal (mg/kg)						
ALUMINUM	18,800	17,800	20,500	23,200	7,810	9,200
ANTIMONY	ND (9.4)	ND (1.5)	ND (1.4)	ND (1.7)	ND (0.77)	ND (7.3)
ARSENIC	36.7 *#α	3.0 *#	2.0 *	1.6 *	7.7 *#	1.7 *
BARIUM	48.5	126	177	158	34.2	499 α
BERYLLIUM	ND (0.30)	0.27 *	0.33 *	0.25 *	0.27 *	0.69 *
CADMIUM	ND (1.2)	ND (0.06)	ND (0.07)	ND (0.08)	0.53	ND (0.47)
CALCIUM	243,000	10,500	12,600	15,600	191,000	4,680
CHROMIUM	51.1	116	115	134	38.9	49.2
COBALT	8.7	24.4	27.1	29.0	6.8	35.1 α
COPPER	29.3	37.1	36.2	49.5	24.1	110
IRON	20,000	29,500	32,100	38,000	15,200	28,200
LEAD	17.5 α	7.3	8.4	5.5	27.5 α	15.2 α
MAGNESIUM	9,640	25,400	28,700	30,200	6,120	7,080
MANGANESE	347	597 *	725 *	727 *	235	2,790 *α
MERCURY	0.27	0.06	0.11	0.07	0.34	ND (0.06)
MOLYBDENUM	ND (2.1)	ND (0.19)	ND (0.15)	ND (3.6)	ND (1.3)	ND (0.56)
NICKEL	39.1	153 *	157 *	128	32.2	65.9
POTASSIUM	2,000	833	990	912	2,540	1,030
SELENIUM	3.3 α	ND (0.63)	ND (0.65)	ND (0.80)	ND (0.89)	ND (0.41)
SODIUM	8,570	608	735	2,720	7,570	ND (30.5)
THALLIUM	ND (0.61)	ND (0.42)	ND (0.43)	ND (0.53)	ND (0.59)	ND (0.38)
VANADIUM	50.4	62.4	70.3	83.6	29.1	36.5
ZINC	54.1	59.4	59.3	69.3	63.4	45.1
Volatile Organic Compound (ug/kg)						
ACETONE	83	ND (14)	ND (14)	ND (16)	120	ND (16)
CARBON DISULFIDE	6	ND (11)	ND (11)	3	7	ND (11)
TETRACHLOROETHENE	ND (15)	ND (11)	ND (11)	ND (13)	ND (15)	ND (11)
Semivolatile Organic Compound (ug/kg)						
ANTHRACENE	34	ND (350)	ND (360)	ND (440)	34	ND (380)
BENZO(A)ANTHRACENE	180	ND (350)	ND (360)	ND (440)	130	ND (380)
BENZO(A)PYRENE	540 *#	ND (350)	ND (360)	ND (440)	300 *#	ND (380)
BENZO(B)FLUORANTHENE	410	ND (350)	ND (360)	ND (440)	290	ND (380)
BENZO(G,H,I)PERYLENE	570	ND (350)	ND (360)	ND (440)	240	ND (380)
BENZO(K)FLUORANTHENE	240	ND (350)	ND (360)	ND (440)	99	ND (380)

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR50B020	IR50B021	IR50B021	IR50B021	IR50B021	PA44B005
Sampling Depth (feet bgs)	21.25	2.75	6.25	10.75	16.25	5.25
Sample Number	9421R188	9423R253	9423R254	9423R255	9423R256	9310A691
Sample Date	05/26/94	06/08/94	06/08/94	06/08/94	06/08/94	03/10/93
Semivolatile Organic Compound (ug/kg)						
CHRYSENE	240	ND (350)	ND (360)	ND (440)	160	ND (380)
FLUORANTHENE	490	ND (350)	ND (360)	ND (440)	300	ND (380)
INDENO(1,2,3-CD)PYRENE	400	ND (350)	ND (360)	ND (440)	200	ND (380)
PHENANTHRENE	150	ND (350)	ND (360)	ND (440)	110	ND (380)
PYRENE	740	ND (350)	ND (360)	ND (440)	490	ND (380)
Pesticide/Polychlorinated Biphenyl (ug/kg)						
4,4'-DDT	ND (5)	ND (4)	ND (4)	ND (4)	ND (5)	ND (19)
AROCLOR-1260	ND (50)	ND (18)	ND (18)	ND (22)	ND (25)	ND (190)
TPH-Extractable (mg/kg)						
TPH-DIESEL	ND (2)	ND (11)	ND (11)	ND (13)	ND (15)	56
TPH-EXTRACTABLE UNKNOWN HYDROCARBON	13	NA	NA	NA	NA	NA
TPH-MOTOR OIL	ND (15)	36	28	ND (13)	61	NA
Total Recoverable Petroleum Hydrocarbons (mg/kg)						
TRPH	ND (38)	NA	37	ND (8)	330	NA
Oil and Grease (mg/kg)						
TOTAL OIL & GREASE	NA	NA	NA	NA	NA	3,000
Percent Moisture (%)						
% SOLIDS	NA	5.1	8.0	25.0	32.3	88.5
pH (pH units)						
PH	8.3	8.7	8.6	8.3	8.2	7.5
Physical Characteristic (%)						
DRY BULK DENSITY	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	NA

TABLE 4.18-9 (Continued)

SOIL ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR50B020	IR50B021	IR50B021	IR50B021	IR50B021	PA44B005
Sampling Depth (feet bgs)	21.25	2.75	6.25	10.75	16.25	5.25
Sample Number	9421R188	9423R253	9423R254	9423R255	9423R256	9310A691
Sample Date	05/26/94	06/08/94	06/08/94	06/08/94	06/08/94	03/10/93
Physical Characteristic (%)						
POROSITY	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	NA
Total Organic Carbon (ug/kg)						
TOTAL ORGANIC CARBON	NA	NA	NA	NA	NA	NA

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.18-10

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR33MW63A	9448X586						✓				✓	✓				✓			✓	✓	✓	✓
IR33MW63A	9448X587						✓				✓	✓				✓			✓	✓	✓	✓
IR33MW63A	9606W052						✓				✓	✓				✓			✓	✓	✓	✓
IR33MW63A	9610J915						✓				✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9542W043						✓				✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9604Z008						✓				✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9608W119						✓				✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9608W120						✓				✓	✓				✓			✓	✓	✓	✓
PA50MW06A	9317X969			✓	✓		✓				✓					✓	✓		✓	✓	✓	✓
PA50MW06A	9605W055						✓				✓	✓				✓			✓	✓	✓	✓
PA50MW06A	9611J921																✓					
PA50MW06A	9611W153	✓			✓		✓				✓	✓		✓	✓	✓			✓	✓	✓	✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.18-11

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
METAL	ALUMINUM	41.0	41.0	41.0	UG/L	19.1	9	1	37,000	0				
	ARSENIC	1.4	3.0	2.0	UG/L	2.8	9	4	0.04	4	50.0	0	36.0	0
	BARIUM	56.6	91.1	73.2	UG/L	1.5	9	9	2,600	0	1,000	0		
	CADMIUM	0.31	24.9	12.6	UG/L	0.20	9	2	18.0	1	5.0	1	9.3	1
	CALCIUM	86,200	295,000	170,000	UG/L	21.4	9	8						
	CHROMIUM	4.0	16.2	10.0	UG/L	0.48	9	5			50.0	0		
	COBALT	0.57	3.5	2.4	UG/L	0.97	9	3						
	COPPER	2.3	2.3	2.3	UG/L	0.50	9	1	1,400	0			2.4	0
	IRON	13.5	41.2	27.4	UG/L	11.0	9	2						
	MAGNESIUM	216,000	1,040,000	552,000	UG/L	151	9	8						
	MANGANESE	2.3	2,160	1,260	UG/L	0.25	9	4	180	3				
	MERCURY	0.11	0.11	0.11	UG/L	0.10	9	1	11.0	0	2.0	0	0.03	1
	MOLYBDENUM	3.2	9.2	5.7	UG/L	1.2	9	6	180	0				
	NICKEL	1.8	18.8	7.5	UG/L	0.90	9	3	730	0	100	0	8.2	1
	POTASSIUM	90,000	321,000	169,000	UG/L	3,670	9	9						
	SELENIUM	2.4	3.1	2.7	UG/L	6.9	8	2	180	0	50.0	0	71.0	0
	SILVER	1.1	1.1	1.1	UG/L	0.50	9	1	180	0			0.92	1
	SODIUM	2,550,000	9,800,000	4,970,000	UG/L	314	9	9						
	VANADIUM	1.6	9.2	4.7	UG/L	0.40	9	4	260	0				
	ZINC	10.5	18.5	14.5	UG/L	3.0	9	2	11,000	0			81.0	0
VOC	TRICHLOROETHENE	0.2	0.6	0.4	UG/L	0.5	9	3	2	0	5	0		
TPHPRG	TPH-GASOLINE	27	27	27	UG/L	50	9	1	100	0i				

TABLE 4.18-11 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
TPHEXT	TPH-DIESEL	51	51	51	UG/L	100	9	1	100	0i				
	TPH-MOTOR OIL	100	370	190	UG/L	100	8	7	100	5i				
TRPH	TRPH	600	600	600	UG/L	1,000	9	1	100	1i				
ANION	CHLORIDE	4,440,000	4,440,000	4,440,000	UG/L	80,000	1	1						
	FLUORIDE	740	740	740	UG/L	100	1	1			1,400	0		
	NITRATE	560	560	560	UG/L	20.0	1	1	58,000	0				
	SULFATE	680,000	680,000	680,000	UG/L	5,000	1	1						
SOLIDS	TOTAL DISSOLVED SOLIDS	8,500,000	8,500,000	8,500,000	UG/L	10,000	1	1						
SALIN	SALINITY	7.4	7.4	7.4	PPT	0.005	1	1						

TABLE 4.18-11 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

j Most probable number of organisms per 100 milliliters (mpn/100 mL)

TABLE 4.18-12

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR33MW63A	IR33MW63A	IR33MW63A	IR33MW63A	IR44MW08A	IR44MW08A	IR44MW08A
Sample Number	9448X586	9448X587	9606W052	9610J915	9542W043	9604Z008	9608W119
Sample Date	12/02/94	12/02/94	02/05/96	03/07/96	10/20/95	01/22/96	02/23/96
Metal (ug/L)							
ALUMINUM	ND (130)	ND (21.8)	ND (19.1)	41.0	ND (18.8)	ND (18.8)	ND (90.0)
ARSENIC	ND (8.5)	ND (1.7)	ND (1.4)	ND (1.4)	ND (2.8)	1.8 *	ND (7.0)
BARIUM	68.0	53.3	89.0	65.3	74.3	63.7	97.3
CADMIUM	ND (1.0)	ND (0.20)	ND (0.20)	0.31	24.9 *B6	ND (0.20)	ND (1.0)
CALCIUM	273,000	213,000	108,000	99,800	295,000	150,000	194,000
CHROMIUM	26.0	ND (7.9)	10.4	4.5	ND (0.50)	4.0	ND (2.0)
COBALT	ND (3.5)	ND (0.70)	ND (0.40)	0.57	3.5	ND (2.0)	3.6
COPPER	ND (1.5)	ND (0.30)	ND (4.2)	2.3	ND (5.0)	ND (3.5)	ND (3.0)
IRON	ND (130)	ND (20.8)	ND (11.0)	13.5	ND (13.8)	ND (11.0)	ND (55.0)
MAGNESIUM	876,000	587,000	346,000	348,000	752,000	465,000	532,000
MANGANESE	ND (6.6)	ND (5.0)	ND (1.1)	2.3	1,850 *	1,040 *	2,340 *
MERCURY	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.12)	ND (0.10)	ND (0.10)
MOLYBDENUM	8.2	ND (5.7)	ND (6.8)	6.9	4.8	4.8	ND (3.4)
NICKEL	ND (17.8)	ND (4.7)	ND (1.0)	1.9	18.8 B	ND (7.5)	ND (3.5)
POTASSIUM	236,000	261,000	146,000	127,000	187,000	132,000	125,000
SELENIUM	ND (11.5)	2.4	ND (2.3)	ND (2.3)	ND (3.9)	ND (2.3)	ND (11.5)
SILVER	ND (2.0)	ND (0.40)	ND (0.50)	1.1 B	ND (0.70)	ND (0.50)	ND (2.5)
SODIUM	7,320,000	7,150,000	3,970,000	3,120,000	5,550,000	3,840,000	3,870,000
VANADIUM	ND (4.5)	ND (0.90)	ND (0.93)	2.5	ND (2.7)	1.6	ND (2.9)
ZINC	ND (8.9)	ND (12.9)	ND (18.7)	10.5	ND (22.7)	ND (16.8)	20.8
Volatile Organic Compound (ug/L)							
TRICHLOROETHENE	ND (10)	ND (10)	ND (0.5)	ND (0.5)	0.6	0.2	0.4
TPH-Purgeable (ug/L)							
TPH-GASOLINE	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	27	ND (50)
TPH-Extractable (ug/L)							
TPH-DIESEL	ND (100)	ND (100)	ND (100)	ND (100)	51	ND (100)	ND (100)
TPH-MOTOR OIL	360	340	100	170	370	110	ND (100)
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	ND (1,000)	ND (1,000)	ND (1,000)	600	ND (1,000)	ND (1,000)	ND (1,000)

TABLE 4.18-12 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR33MW63A	IR33MW63A	IR33MW63A	IR33MW63A	IR44MW08A	IR44MW08A	IR44MW08A
Sample Number	9448X586	9448X587	9606W052	9610J915	9542W043	9604Z008	9608W119
Sample Date	12/02/94	12/02/94	02/05/96	03/07/96	10/20/95	01/22/96	02/23/96
Anion (ug/L)							
CHLORIDE	NA	NA	NA	NA	NA	NA	NA
FLUORIDE	NA	NA	NA	NA	NA	NA	NA
NITRATE	NA	NA	NA	NA	NA	NA	NA
SULFATE	NA	NA	NA	NA	NA	NA	NA
Solids (ug/L)							
TOTAL DISSOLVED SOLIDS	NA	NA	NA	NA	NA	NA	NA
pH (pH units)							
PH	7.5	7.4	7.5	7.0	7.2	7.1	7.2
Salinity (ppt)							
SALINITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.18-12 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44MW08A	PA50MW06A	PA50MW06A	PA50MW06A
Sample Number	9608W120	9317X969	9605W055	9611W153
Sample Date	02/23/96	04/26/93	01/31/96	03/12/96
Metal (ug/L)				
ALUMINUM	ND (18.0)	ND (30.3)	ND (22.6)	ND (30.4)
ARSENIC	1.4 *	ND (5.2)	1.6 *	3.0 *
BARIUM	84.9	86.3	71.6	56.6
CADMIUM	ND (0.20)	ND (1.0)	ND (0.20)	ND (0.20)
CALCIUM	183,000	ND (156,000)	186,000	86,200
CHROMIUM	ND (0.40)	ND (1.5)	ND (2.7)	16.2
COBALT	2.6	ND (2.9)	ND (0.40)	ND (0.92)
COPPER	ND (2.1)	ND (4.1)	ND (3.1)	ND (1.4)
IRON	ND (11.0)	ND (18.8)	ND (13.5)	41.2
MAGNESIUM	497,000	ND (402,000)	1,040,000	216,000
MANGANESE	1,980 *	ND (51.7)	ND (2.2)	ND (1.0)
MERCURY	ND (0.10)	ND (0.04)	0.11 B	ND (0.10)
MOLYBDENUM	4.6	ND (2.8)	ND (4.7)	9.2
NICKEL	ND (8.8)	ND (7.4)	1.8	ND (1.7)
POTASSIUM	111,000	154,000	321,000	90,000
SELENIUM	ND (2.3)	NA	3.1	ND (2.9)
SILVER	ND (0.50)	ND (1.3)	ND (0.50)	ND (0.50)
SODIUM	3,620,000	4,880,000	9,800,000	2,550,000
VANADIUM	ND (2.0)	ND (6.1)	5.4	9.2
ZINC	16.2	ND (35.2)	ND (19.9)	ND (6.5)
Volatile Organic Compound (ug/L)				
TRICHLOROETHENE	0.4	ND (10)	ND (0.5)	ND (0.5)
TPH-Purgeable (ug/L)				
TPH-GASOLINE	ND (50)	ND (500)	ND (50)	ND (50)
TPH-Extractable (ug/L)				
TPH-DIESEL	ND (100)	ND (500)	ND (100)	ND (100)
TPH-MOTOR OIL	ND (100)	NA	100	150
Total Recoverable Petroleum Hydrocarbons (ug/L)				
TRPH	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)

TABLE 4.18-12 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44MW08A	PA50MW06A	PA50MW06A	PA50MW06A
Sample Number	9608W120	9317X969	9605W055	9611W153
Sample Date	02/23/96	04/26/93	01/31/96	03/12/96
Anion (ug/L)				
CHLORIDE	NA	NA	NA	4,440,000
FLUORIDE	NA	NA	NA	740
NITRATE	NA	NA	NA	560
SULFATE	NA	NA	NA	680,000
Solids (ug/L)				
TOTAL DISSOLVED SOLIDS	NA	NA	NA	8,500,000
pH (pH units)				
PH	7.2	NA	7.3	7.3
Salinity (ppt)				
SALINITY	NA	NA	NA	7.4

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
ppt Parts per thousand
µg/L Microgram per liter

* Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
ß Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ Detected concentration greater than maximum contaminant level (MCL)
U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

Detected concentration greater than at least one screening criterion.

TABLE 4.18-13

SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL TESTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR44B006	9533C092																		✓	✓		✓
IR44B007	9545J580																		✓	✓		✓
IR44B009	9605G044						✓				✓	✓				✓			✓	✓	✓	✓
IR44MW08A	9538J258																		✓	✓		✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.18-14

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
METAL	ANTIMONY	15.5	15.5	15.5	UG/L	1.6	1	1	15.0	1	6.0	1	500	0
	ARSENIC	1.4	1.4	1.4	UG/L	1.4	1	1	0.04	1	50.0	0	36.0	0
	BARIUM	28.9	28.9	28.9	UG/L	0.30	1	1	2,600	0	1,000	0		
	CALCIUM	164,000	164,000	164,000	UG/L	14.2	1	1						
	COBALT	13.5	13.5	13.5	UG/L	0.40	1	1						
	IRON	25.6	25.6	25.6	UG/L	11.0	1	1						
	MAGNESIUM	631,000	631,000	631,000	UG/L	261	1	1						
	MANGANESE	345	345	345	UG/L	0.10	1	1	180	1				
	MOLYBDENUM	74.3	74.3	74.3	UG/L	0.60	1	1	180	0				
	NICKEL	19.4	19.4	19.4	UG/L	0.70	1	1	730	0	100	0	8.2	1
	POTASSIUM	220,000	220,000	220,000	UG/L	5,990	1	1						
	SELENIUM	3.4	3.4	3.4	UG/L	2.3	1	1	180	0	50.0	0	71.0	0
	SODIUM	5,340,000	5,340,000	5,340,000	UG/L	257	1	1						
VOC	CIS-1,2-DICHLOROETHENE	0.4	0.4	0.4	UG/L	0.5	4	1	61	0	6	0		
	TRICHLOROETHENE	2	2	2	UG/L	0.5	4	1	2	1	5	0		
SVOC	1,2-DICHLOROBENZENE	3	3	3	UG/L	5	1	1	370	0	600	0		
	1,4-DICHLOROBENZENE	5	5	5	UG/L	5	1	1	0.5	1	5	0		
PEST	4,4'-DDD	0.2	0.2	0.2	UG/L	0.1	1	1	0.3	0				
	4,4'-DDE	0.1	0.1	0.1	UG/L	0.1	1	1	0.2	0				
	ALPHA-CHLORDANE	0.05	0.05	0.05	UG/L	0.05	1	1	0.05	0				
	GAMMA-CHLORDANE	0.07	0.07	0.07	UG/L	0.05	1	1	0.05	1				
	AROCLOR-1260	0.7	0.7	0.7	UG/L	0.5	1	1	0.009	1				

TABLE 4.18-14 (Continued)

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
TPHPRG	TPH-GASOLINE	39	39	39	UG/L	50	4	1	100	0i				
TPHEXT	TPH-DIESEL	120	8,900	2,900	UG/L	530	4	4	100	4i				
	TPH-MOTOR OIL	55	21,000	7,000	UG/L	530	4	4	100	3i				
TRPH	TRPH	1,700	1,700	1,700	UG/L	1,000	1	1	100	1i				

TABLE 4.18-14 (Continued)

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.18-15

HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR44B006	IR44B007	IR44B009	IR44MW08A
Sample Number	9533C092	9545J580	9605G044	9538J258
Sample Date	08/14/95	11/06/95	01/30/96	09/18/95
Metal (ug/L)				
ANTIMONY	NA	NA	15.5 *B	NA
ARSENIC	NA	NA	1.4 *	NA
BARIUM	NA	NA	28.9	NA
CALCIUM	NA	NA	164,000	NA
COBALT	NA	NA	13.5	NA
IRON	NA	NA	25.6	NA
MAGNESIUM	NA	NA	631,000	NA
MANGANESE	NA	NA	345 *	NA
MOLYBDENUM	NA	NA	74.3	NA
NICKEL	NA	NA	19.4 B	NA
POTASSIUM	NA	NA	220,000	NA
SELENIUM	NA	NA	3.4	NA
SODIUM	NA	NA	5,340,000	NA
Volatile Organic Compound (ug/L)				
CIS-1,2-DICHLOROETHENE	0.4	ND (0.5)	ND (0.5)	ND (0.5)
TRICHLOROETHENE	2 *	ND (0.5)	ND (0.5)	ND (0.5)
Semivolatile Organic Compound (ug/L)				
1,2-DICHLOROBENZENE	NA	NA	3	NA
1,4-DICHLOROBENZENE	NA	NA	5 *	NA
Pesticide/Polychlorinated Biphenyl (ug/L)				
4,4'-DDD	NA	NA	0.2	NA
4,4'-DDE	NA	NA	0.1	NA
ALPHA-CHLORDANE	NA	NA	0.05	NA
GAMMA-CHLORDANE	NA	NA	0.07 *	NA
AROCLOR-1260	NA	NA	0.7 *	NA
TPH-Purgeable (ug/L)				
TPH-GASOLINE	ND (50)	ND (50)	39	ND (50)
TPH-Extractable (ug/L)				
TPH-DIESEL	2,100	500	8,900	120
TPH-MOTOR OIL	2,900	3,900	21,000	55

TABLE 4.18-15 (Continued)

HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-44
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

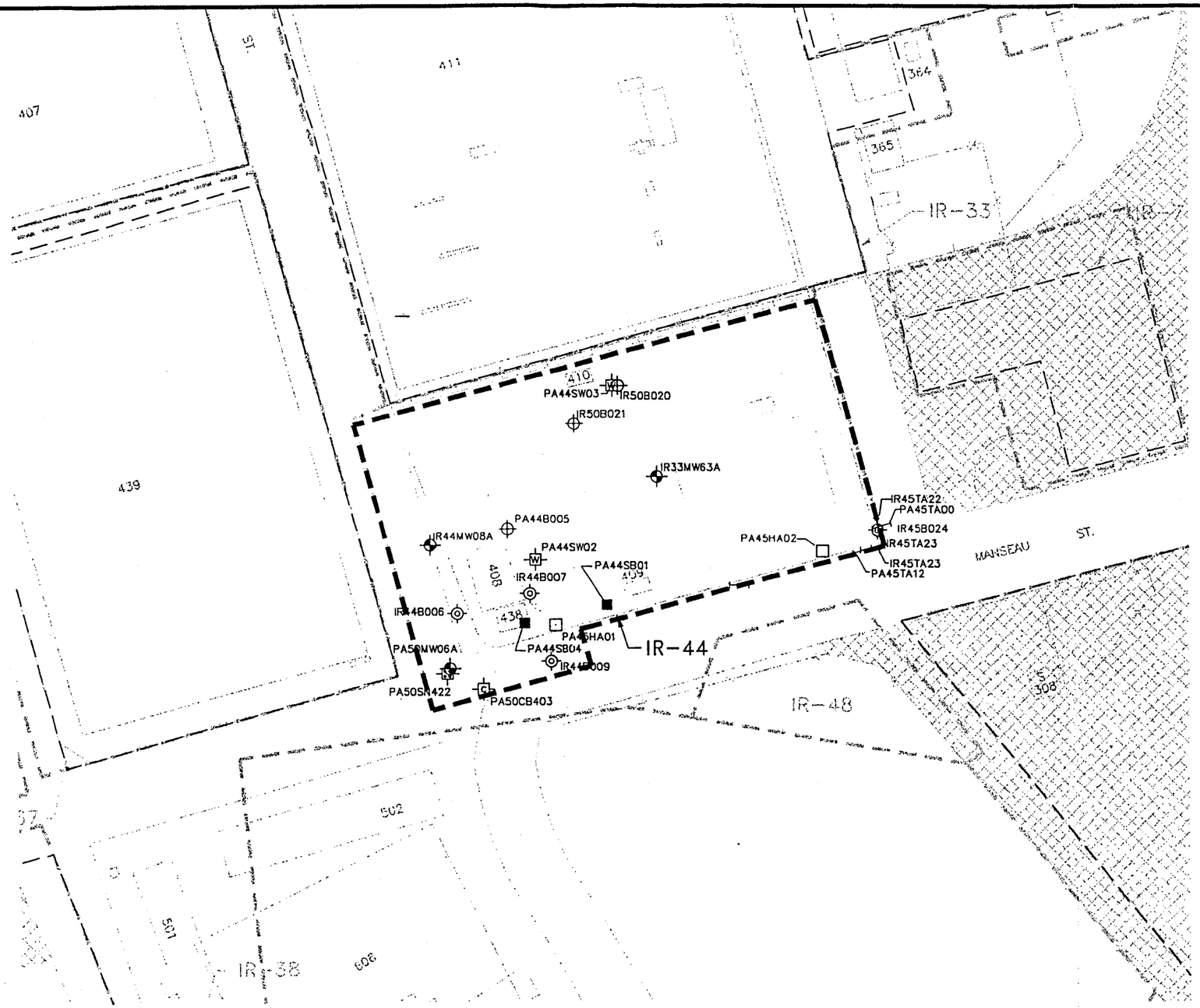
Station Number	IR44B006	IR44B007	IR44B009	IR44MW08A
Sample Number	9533C092	9545J580	9605G044	9538J258
Sample Date	08/14/95	11/06/95	01/30/96	09/18/95
Total Recoverable Petroleum Hydrocarbons (ug/L)				
TRPH	NA	NA	1,700	NA
pH (pH units)				
PH	NA	NA	7.5	NA

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
µg/L Microgram per liter

* Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
β Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ Detected concentration greater than maximum contaminant level (MCL)
U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

Detected concentration greater than at least one screening criterion.



EXPLANATION:

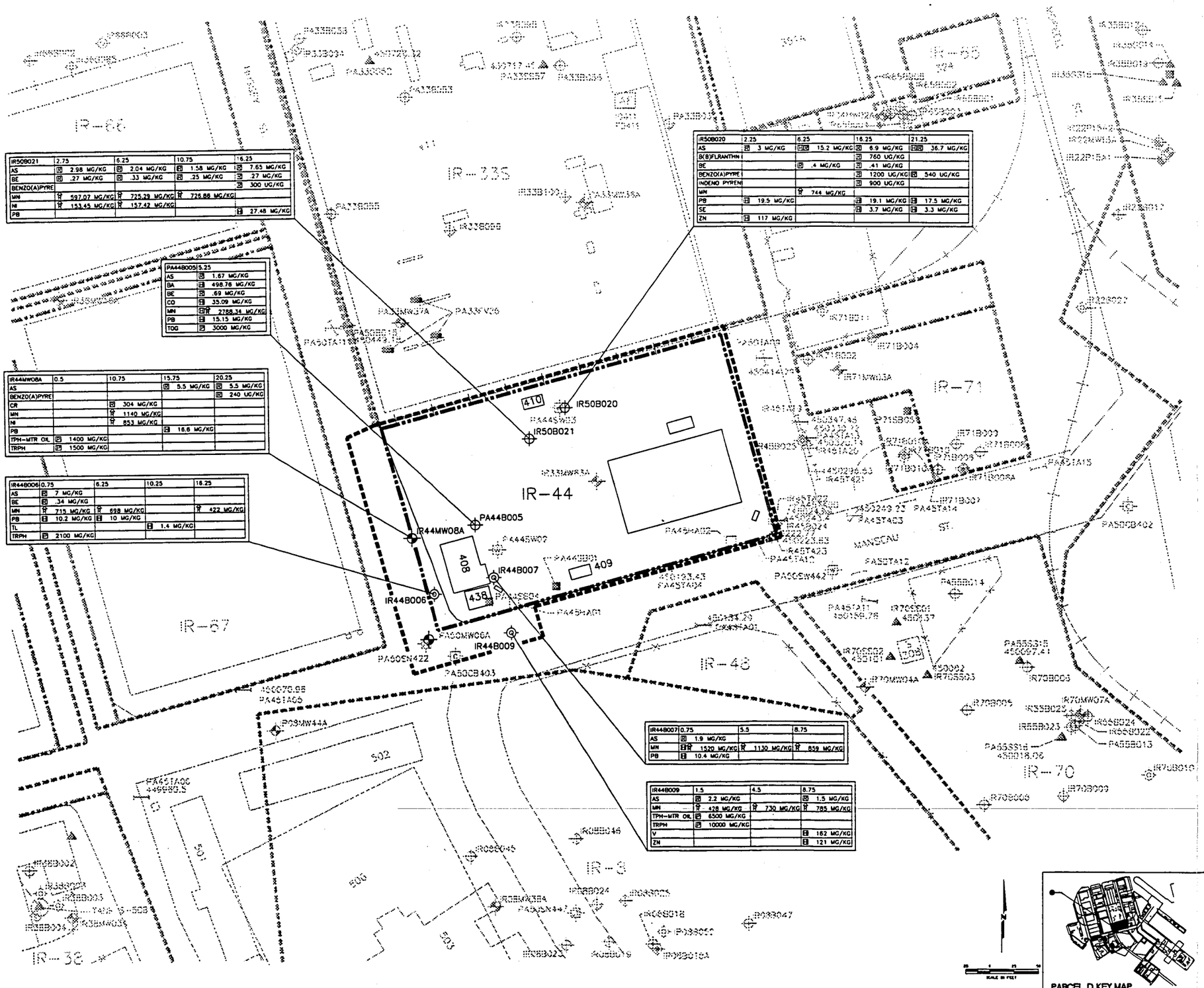
- ▲ SURFACE OR NEAR SURFACE SOIL SAMPLE
- SOIL BORING
- A–AQUIFER MONITORING WELL
- BEDROCK AQUIFER MONITORING WELL
- TEST PIT
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- FENCE
- RAILROAD TRACKS
- 0.5 ACRE EXPOSURE AREA BOUNDARY
- DATA SET BOUNDARY
- UNPAVED AREA

50 0 50 100
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.18–1
PARCEL D
IR–44 SITE BOUNDARY
SOIL AND GROUNDWATER SAMPLE LOCATIONS

DATE: 09/20/96 · 064-0058050105 FILE NAME: HP-D-PI.DWG RVR/AC



IR50B021	2.75	6.25	10.75	16.25
AS	2.98 MG/KG	2.04 MG/KG	1.58 MG/KG	7.65 MG/KG
BE	.27 MG/KG	.33 MG/KG	.25 MG/KG	.27 MG/KG
BENZO(A)PYRE				300 UG/KG
MN	597.07 MG/KG	725.29 MG/KG	726.88 MG/KG	
NI	153.45 MG/KG	157.42 MG/KG		
PB				27.48 MG/KG

IR50B020	2.25	6.25	16.25	21.25
AS	3 MG/KG	15.2 MG/KG	6.9 MG/KG	36.7 MG/KG
B(B)FLRANTHN			760 UG/KG	
BE		.4 MG/KG	.41 MG/KG	
BENZO(A)PYRE			1200 UG/KG	540 UG/KG
INDENO PYREN			900 UG/KG	
MN		744 MG/KG		
PB	19.5 MG/KG		19.1 MG/KG	17.5 MG/KG
SE			3.7 MG/KG	3.3 MG/KG
ZN	117 MG/KG			

PA448005	5.25
AS	1.67 MG/KG
BA	498.76 MG/KG
BE	.69 MG/KG
CO	35.09 MG/KG
MN	2788.34 MG/KG
PB	15.15 MG/KG
TOG	3000 MG/KG

IR44MW08A	0.5	10.75	15.75	20.25
AS			5.5 MG/KG	5.5 MG/KG
BENZO(A)PYRE				240 UG/KG
CR		304 MG/KG		
MN		1140 MG/KG		
NI		853 MG/KG		
PB			16.6 MG/KG	
TPH-MTR OIL	1400 MG/KG			
TRPH	1500 MG/KG			

IR44B006	0.75	6.25	10.25	16.25
AS	7 MG/KG			
BE	.34 MG/KG			
MN	715 MG/KG	698 MG/KG		422 MG/KG
PB	10.2 MG/KG	10 MG/KG		
TL			1.4 MG/KG	
TRPH	2100 MG/KG			

IR44B007	0.75	5.5	8.75
AS	1.9 MG/KG		
MN	1520 MG/KG	1120 MG/KG	859 MG/KG
PB	10.4 MG/KG		

IR44B009	1.5	4.5	8.75
AS	2.2 MG/KG		1.5 MG/KG
MN	428 MG/KG	730 MG/KG	785 MG/KG
TPH-MTR OIL	6500 MG/KG		
TRPH	10000 MG/KG		
V			162 MG/KG
ZN			121 MG/KG

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
SOIL SAMPLE DEPTH (feet bgs)

IR07B045	2.75
TCE	38
As	0.0028

ANALYTE

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (µg/kg) FOR OTHER ORGANICS.

- EXCEEDS CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG
- EXCEEDS HPAL
- EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPALs OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

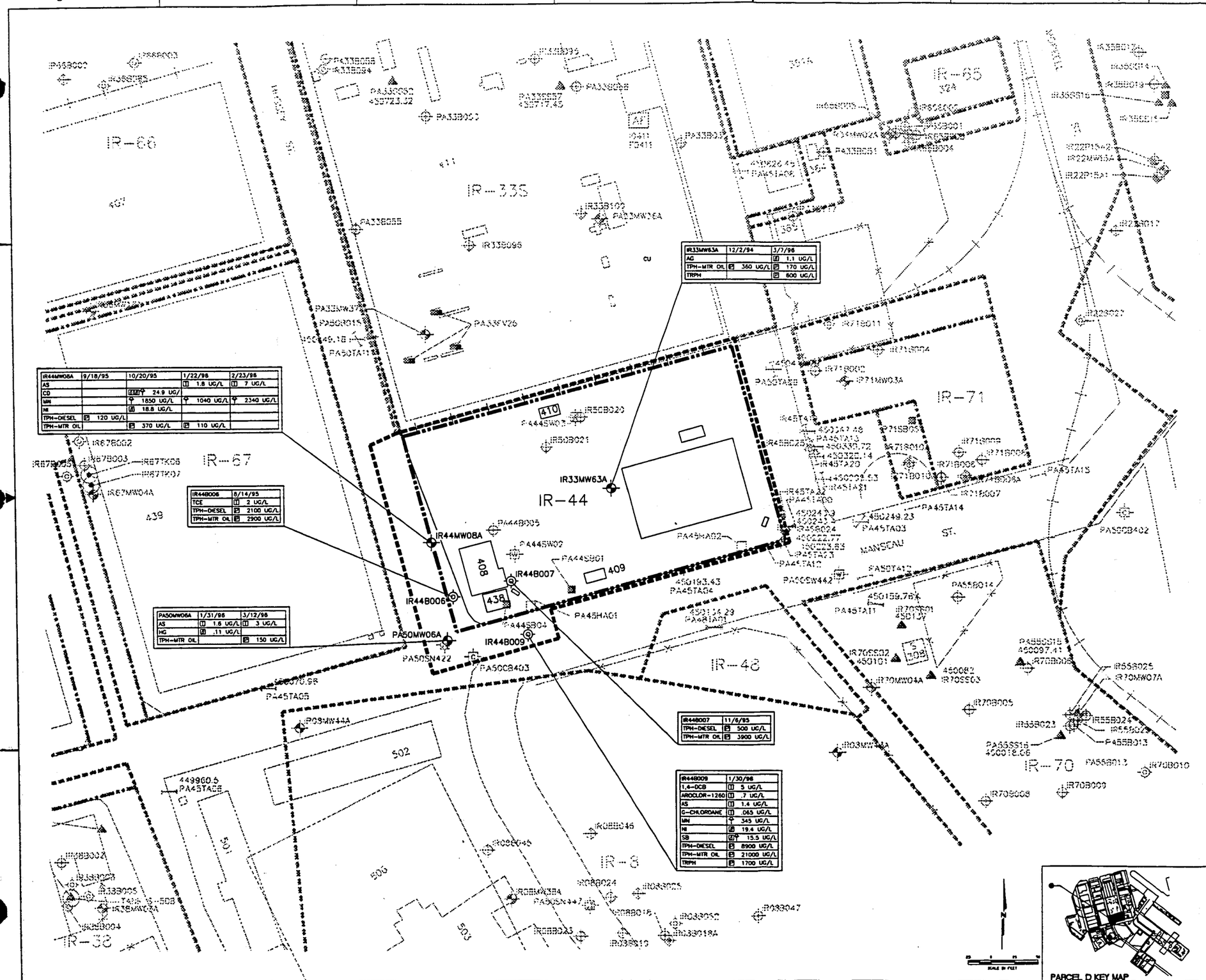
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.18-2 SHT 1 OF 1

IR-44 SOIL RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-44 4.18-2 | SH 1 | REV –

FILE NAME: 4441821_.DWG



IR33MW63A	12/2/94	3/7/96
AG		1.1 UG/L
TPH-MTR OIL	360 UG/L	170 UG/L
TRPH		600 UG/L

IR44MW08A	9/18/95	10/20/95	1/22/96	2/23/96
AS			1.8 UG/L	7 UG/L
CD		24.9 UG/		
MN		1850 UG/L	1040 UG/L	2340 UG/L
NI		18.8 UG/L		
TPH-DIESEL	120 UG/L			
TPH-MTR OIL		370 UG/L	110 UG/L	

IR44B008	8/14/95
TCE	2 UG/L
TPH-DIESEL	2100 UG/L
TPH-MTR OIL	2900 UG/L

PA50MW06A	1/31/96	3/12/96
AS	1.6 UG/L	3 UG/L
HG	.11 UG/L	
TPH-MTR OIL		150 UG/L

IR44B007	11/6/95
TPH-DIESEL	500 UG/L
TPH-MTR OIL	3900 UG/L

IR44B009	1/30/96
1,4-DCB	5 UG/L
AROCLOR-1260	.7 UG/L
AS	1.4 UG/L
G-CHLORDANE	.065 UG/L
MN	345 UG/L
NI	19.4 UG/L
SB	15.5 UG/L
TPH-DIESEL	8900 UG/L
TPH-MTR OIL	21000 UG/L
TRPH	1700 UG/L

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
DATE OF GROUNDWATER SAMPLE, C=GRAB, OR HYDROPUNCH SAMPLE DEPTH.

IR10MW28A	6/15/92
TCE	38
As	0.0039

CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

ANALYTE
- EXCEEDS CARCINOGENIC TAP WATER PRG
- EXCEEDS NON-CARCINOGENIC TAP WATER PRG
- EXCEEDS NAWOC
- EXCEEDS MCL
- EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE INORGANICS AND ORGANICS HITS EXCEEDING EITHER MCL, TAP WATER PRG, NAWOC REFERENCE VALUES OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW MCL, TAP WATER PRG, NAWOC REFERENCE VALUES AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

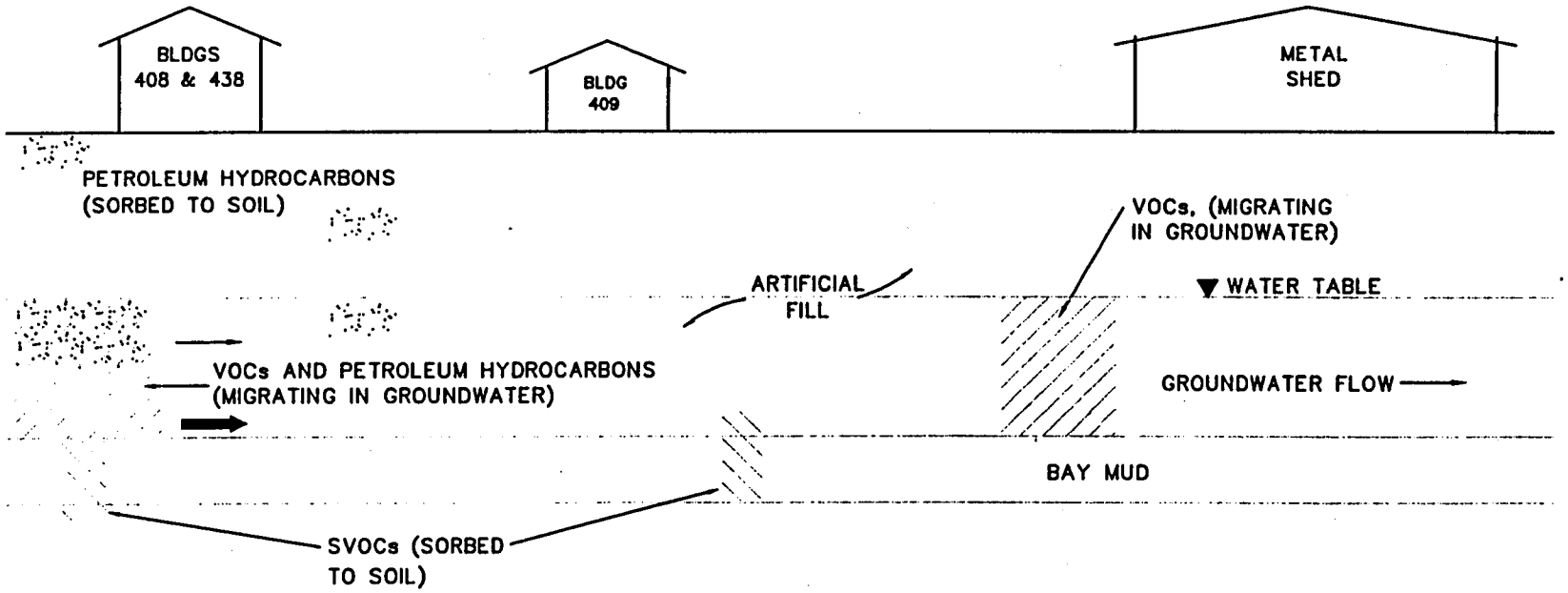
FIGURE 4.18-3 SHT 1 OF 1

IR-44 GROUNDWATER RESULTS EXCEEDING SCREENING CRITERIA PARCEL D RI REPORT

DWG NO. IR-44 4.18-3 SH 1 REV A

FILE NAME: 4441831A.DWG

R:\CAD\069\005. J101\IR-44.DWG MDS AL . PLOT:1.1



FRANCISCAN
COMPLEX BEDROCK

LEGEND

- MAJOR MIGRATION ROUTE
- MINOR MIGRATION ROUTE
- VOC
- SVOC
- PETROLEUM HYDROCARBONS

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.18.4 AND 4.18.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.18.5-1
Schematic Cross Section
Showing Migration of Main
Contaminants at IR-44
Parcel D Remedial Investigation

APPENDIX F

IR-67 SITE FINDINGS
EXCERPTED FROM DRAFT FINAL PARCEL D RI REPORT

4.28 IR-67: BUILDING 439 (SHEET METAL SHOP) AND SURROUNDING AREA

Site IR-67 was initially identified, during a 1994 site assessment, as SA-128 (HLA 1994a). In 1995, the site was redesignated IR-67 in compliance with the basewide IR program (PRC 1995).

Site IR-67 is located in the central portion of Parcel D, between "H", Hussey, and Manseau Streets. The site covers approximately 3.5 acres and consists of Building 439 and the immediate area surrounding this building (Figure 4.28-1) Building 439 is a two-story concrete and metal structure with a concrete floor, constructed in 1974 as a sheet metal shop. However, the building was used by the Navy only as a warehouse. During a 1989 survey, chemicals including chlorinated solvents, PCBs, copper, naphthalene, and waste oil, were identified inside Building 439 (HLA 1994a). A drum containing PCBs, stored inside the building, was noted during the SA. This drum was subsequently removed. However, the removal date is unknown (HLA 1994a).

Five dip tanks (see Figure 4.28-1A), situated 4 feet below grade, and two spray painting booths are located in the northwest portion of Building 439. A large, grate-covered floor sump is located adjacent to the dip tanks, and a sandblasting room is located south of the dip tanks. According to engineering plans, the dip tanks drain through underground piping into two waste USTs located outside the west side of Building 439. During the SA it was noted that the dip tanks, painting booths, and sump appeared to be in new condition (no staining) and to have never been used. Building 439 was used as a cardboard box manufacturing facility and as a warehouse between 1985 and 1990. The building has been vacant since 1990 (HLA 1994a).

The two waste USTs (see Figure 4.28-1A), intended to store acid and alkaline waste, are located outside of Building 439, opposite the dip tank room. The tanks are constructed of 1-foot-thick reinforced concrete and are lined with cast iron. The combined capacity of the two tanks is approximately 13,000 gallons in October 1995, during sampling of the tank contents, it was noted that the acid waste tank contained approximately 5.5 feet of liquid, and the alkaline waste tank contained approximately 0.5 foot of liquid (Uribe 1995). The source of the liquid in the two tanks is unknown, but may be attributed to surface water leaking into the tanks through the tank covers or infiltration of groundwater into the tanks (HLA 1994a).

A below-grade concrete vault is located outside of Building 439 opposite the paint booth room (see Figure 4.28-1A), along the west side of the building. Steam and condensate lines enter the western side of this vault. The portions of the steam and condensate lines leading into Building 439 from the vault were cut and removed on an unknown date. A floor drain is present in the bottom of the vault. According to engineering plans, a pipe leads from the vault drain to the storm drain line running beneath 'H' Street. During the SA, it was noted that no sediment or standing liquid were present on the vault floor (HLA 1994a).

Navy engineering plans indicate that a "flash tank" (see Figure 4.28-1A), with a capacity of approximately 12.5 gallons, was located outside of Building 439, approximately 20 feet north of the concrete vault. This tank was removed on an unknown date. Influent into the flash tank consisted of steam system condensate water from Building 439. Liquids from the flash tank discharged to a drain centered in a concrete pad beneath the flash tank. The liquids, subsequently, drained to the storm drain system line running beneath "H" Street (HLA 1994a).

Potential contaminant sources identified at IR-67 include metals, SVOCs, and petroleum hydrocarbons in the two waste USTs.

RI field investigations, geology and hydrogeology, analytical results, the nature and extent of contaminants, contaminant fate and transport, the site specific risk assessment, and conclusions and recommendations for IR-67 are discussed in the following sections.

4.28.1 RI Field Investigations

In 1988, ERM-West conducted a fence-to-fence survey and inventory of known and suspected hazardous materials at HPS. Navy and tenant facilities, including Building 439, were inspected at this time. The survey did not include sampling or field testing of inventoried materials. Inventoried chemicals stored by the Navy inside Building 439 included chlorinated solvents, PCBs, copper, naphthalene, and waste oil (HLA 1990a).

Between March and April 1994, a site assessment was conducted at IR-67. SA field activities included a records and documents search for potential past contaminant releases and an on-site inspection for evidence

of potential contaminant releases at the investigated sites. Following the SA, removal of a drum containing PCBs, and soil and groundwater sample collection near the two waste USTs, the concrete vault, and the "flash tank" location was recommended (HLA 1994a).

Additional investigation of IR-67 was conducted between September 1995 and April 1996. The investigation consisted of soil and groundwater sampling to evaluate potential contaminants at the site, and aquifer characterization to evaluate specific hydrogeologic parameters. All field activities conducted between September 1995 and April 1996 are summarized in the table below. No known removal actions have been performed at IR-67. The status of the drum containing PCBs in unknown.

Field Activities Summary					
Task	Number of Borings, Wells, or Samples	Characterization			
		Source	Soil	Groundwater	Aquifer
Soil Borings	1		X		
HydroPunch Borings	4		X	X	
Soil Samples[a]	29		X		
Groundwater Monitoring Wells	2			X	
Groundwater Samples[b]	11			X	
Tank Liquid Samples	2	X			
Additional Activities					
Aquifer Testing (Slug Testing)					

Notes:

a Includes samples collected from soil, monitoring well, and HydroPunch borings; 28 samples collected for chemical analysis and one sample collected for physical analysis

b Includes seven samples collected from monitoring wells and four samples collected from HydroPunch borings

Figure 4.28-1 shows the sampling locations within, and near, the boundaries of IR-67. A discussion of the RI sampling procedures and field activities is presented in Appendix I. Boring logs, showing lithology and well construction details, are presented in Appendix J. Results of aquifer testing are presented in Appendix C. RI source, soil, groundwater, and aquifer characterization activities are discussed in the following sections.

Source Characterization

In October 1995, two liquid samples (IR67TK06 and IR67TK07) were collected from the two waste USTs, west of Building 439 (Figure 4.28-1). These samples were analyzed for the chemical constituents listed in Table 4.28-1.

Soil Characterization

In August 1995, one soil boring (IR67B003), three HydroPunch borings (IR67B001, IR67B002, and IR67B005), and one monitoring well (IR67MW04A) were drilled at IR-67, to depths ranging from approximately 21 to 33 feet bgs, west of Building 439 (Figure 4.28-1). Monitoring well IR67MW04A was drilled as a HydroPunch boring. Twenty-eight soil samples were collected between approximately 1 and 33 feet bgs, from these borings, and analyzed for the chemical constituents listed in Table 4.28-4. One sample was collected at approximately 11 feet bgs, from boring IR67B001, and analyzed for the physical parameters listed in Table 4.28-6. HydroPunch groundwater samples were also collected from these four borings, as discussed in the following section (Groundwater Characterization).

Groundwater Characterization

In September 1994, one monitoring well (IR36MW16A) was installed north of Building 439 (Figure 4.28-1). This well was screened from 6 to 21 feet bgs, in the shallow portion of the A-aquifer. Soil samples were not collected from this monitoring well boring.

In August 1995, four HydroPunch groundwater samples (including duplicates) were collected, between approximately 12 and 14.5 feet bgs, from borings IR67B001, IR67B002, IR67B005, and IR67MW04A, and analyzed for the chemical constituents listed in Table 4.28-10. One duplicate sample was also collected from IR67B005. A table listing HydroPunch and grab groundwater sample information is included in Appendix C.

In October 1995, one monitoring well (IR67MW04A) was installed west of Building 439 (Figure 4.28-1). This well was completed in a HydroPunch boring (IR67B004), and was screened from 6 to 21 feet bgs, in the shallow portion of the A-aquifer.

Between September 1994 and April 1996, a total of seven groundwater samples, including duplicates, were collected from wells IR36MW16A and IR67MW04A, and analyzed for the chemical constituents listed in Table 4.28-7.

Aquifer Characterization

In November 1995, slug tests were performed at monitoring wells IR36MW16A and IR67MW04A, installed at IR-67. Results for the slug testing are presented in Appendix C and discussed in Section 4.28.2 (Hydrogeology).

4.28.2 Geology and Hydrogeology

This section discusses the surface conditions, geology, and hydrogeology at IR-67. An additional discussion of the surface soils at IR-67, at Parcel D, and at HPS is presented in Appendix H, and additional discussions of the geology and hydrogeology at Parcel D and at HPS are presented in Sections 3.7 and 3.8, respectively.

Surface Conditions

The surface soils at IR-67 consist of Urban Land and Orthents, reclaimed complex, with slopes between 0 and 2 percent (PRC 1994). The ground surface at IR-67 is entirely covered with asphalt or concrete pavement, and Building 439 covers almost the entire site (see Figure 4.28-1). A base-wide soil distribution map of HPS is shown on Figure 3.6-1.

Geology

The regional geology of the San Francisco Bay area is discussed in Section 3.7.1. Discussions of HPA and Parcel D geology are presented in Sections 3.7.2 and 3.7.3, respectively. A topographic and geologic map of HPS is shown on Figure 3.4-1. A geologic cross-section depicting an interpretation of the lithology at IR-67 is shown on Figure 3.7-13. Additional Parcel D cross-sections are shown on Figures 3.7-10 through 3.7-12, and Figures 3.7-14 through 3.7-15. Locations of geologic cross-sections within Parcel D are shown on Figure 3.7-8.

Every borelog for IR-67 was considered during interpretation of lithology; all borelogs for this site, including geotechnical borelogs, are presented in Appendix J. Specific borelogs used to construct the cross-section for IR-67 include IR36B115 and PA33MW37A. Geotechnical borelogs used during interpretation of lithology at IR-67 include DMB214, DMB230, DMB235, DMB236, DMB237, and DMB317.

From the surface downward, the geologic units at IR-67 consist of Artificial Fill (Qaf), Bay Mud Deposits (Qbm), Undifferentiated Sedimentary Deposits (Qu), and Franciscan Complex (KJf) bedrock. The Artificial Fill consists predominantly of sand and gravel with some clay, and ranges from 20 to 35 feet thick. The Bay Mud Deposits range from 20 to 40 feet thick, and consist of clay with shell fragments. Undifferentiated Sedimentary Deposits beneath IR-67 are approximately 40 feet thick and consist of sandy clay with gravel that grades to firm clay with depth. Depth to bedrock ranges from 92 to 115 feet bgs at IR-67. Bedrock, encountered during drilling activities at IR-67, consists of weathered serpentinite of the Franciscan Complex. The total thickness of the serpentinite bedrock at IR-67 is unknown.

The bedrock surface slopes toward the north and west, extending into a major west-trending trough, which is a dominant feature of the bedrock surface in the western portion of Parcel D (Figure 3.7-1). The Bay Mud Deposits define a high within a closed depression (Figures 3.7-2 and 3.7-3).

Hydrogeology

A conceptual groundwater model of HPS is shown on Figure 3.8-2. Groundwater elevation contouring of the A-aquifer for May and November 1995, and April 1996 is shown in Figures 3.8-4 through 3.8-6, respectively. Groundwater elevation contouring for February 1994 (wet season) is shown on Figure 3.8-3, and is included for comparison with April 1996. The hydrogeologic units, groundwater occurrence, magnitude and direction of groundwater flow, aquifer hydraulic properties, groundwater flow rates, and TDS in groundwater at IR-67 are discussed in the following sections.

Hydrogeologic Units

From the surface downward, the hydrogeologic units at IR-67 consist of the A-aquifer, the Bay Mud Aquitard, the B-aquifer, and the bedrock water-bearing zone. The A-aquifer at IR-67 consists of Artificial

Fill. Based on soil boring data, the saturated thickness of the A-aquifer is about 11 to 28 feet. The Bay Mud Aquitard appears to be laterally continuous beneath the site (Figure 3.7-6). The saturated thickness of the B-aquifer is estimated, from the cross-section shown in Figure 3.7-15 , to be 15 to 55 feet; however, no monitoring wells were installed in this aquifer at IR-67. The bedrock water-bearing zone is present below 92 to 115 feet bgs at IR-67.

Groundwater Occurrence

Groundwater elevations were measured during wet and dry seasons and during the transition periods. Based on historical rainfall data for San Francisco, these periods were determined to be December to April (wet season), August to November (dry season), and May (transition period). Groundwater in the A-aquifer at IR-67 occurs at about 9 feet bgs during the wet and dry seasons, and at about 6 to 9 feet bgs during the transition period. The A-aquifer is under unconfined water table conditions. Data are not available for the B-aquifer and the bedrock water-bearing zone at IR-67 because no monitoring wells were installed in these hydrogeologic units. Groundwater elevation measurement data for Parcel D are shown in Tables 3.8-3 through 3.8-6 (see Section 3).

Magnitude and Direction of Groundwater Flow

Hydraulic gradients for IR-67 were estimated from groundwater elevation contour maps for May and November 1995, and April 1996, as well as groundwater elevation data collected from the site. Groundwater in the A-aquifer at IR-67 generally flows southwest with an hydraulic gradient of 0.002 during the wet season; generally flows west and northwest with an hydraulic gradient of 0.002 during the dry season; and generally flows southwest with an hydraulic gradient of 0.002 to 0.005 during the transition period.

Aquifer Hydraulic Properties

The hydraulic properties of the A-aquifer at IR-67 were estimated from data collected during two slug tests conducted at monitoring wells IR67MW04A and IR36ME16A, both screened in the A-aquifer. Hydraulic properties were evaluated using the Bouwer and Rice analysis method, as discussed in Appendix C. The hydraulic conductivity ranges from 5.2 to 19 feet per day (see Table 3.8-7). The average hydraulic

conductivity is typical for silty to clean sand (Heath 1987). The aquifer transmissivity ranges from 99 to 260 square feet per day (see Table 3.8-7). Pumping tests were not conducted at IR-67; therefore, the A-aquifer storativity was not evaluated.

The hydraulic properties of the B-aquifer and the bedrock water-bearing zone at IR-67 are unknown because no monitoring wells were installed in these hydrogeologic units.

Groundwater Flow Rates

The average linear velocity represents an estimated rate at which contaminants, in groundwater, may move horizontally through the pore spaces in an aquifer. The average linear velocity of groundwater in the A-aquifer at IR-67 was calculated using the equation for groundwater flow presented in Section 3.8. A summary of average linear velocity calculations (May and November 1995, and April 1996) for the A-aquifer at Parcel D is presented in Table 3.8-9. summary of average linear velocity calculations for February 1994 is included, in Table 3.8-10, for comparison with April 1996.

Using the maximum and minimum hydraulic conductivities and gradients given previously and porosities of 28 and 40 percent (the low and high values in the range of laboratory-tested porosities), the calculated average linear velocity ranges from 0.03 to 0.14 feet per day toward the southwest during the wet season; from 0.03 to 0.14 feet per day toward the west and northwest during the dry season; and from 0.03 to 0.34 feet per day toward the southwest during the transition period. The range of velocities reflects the heterogenous hydrogeologic conditions of Artificial Fill at IR-67.

Other predominant transport or attenuation mechanisms, such as retardation, dispersion, and partitioning characteristics, should be taken into account during the estimation of transport for solute and nonaqueous phase liquids (NAPLs) in groundwater.

Total Dissolved Solids in Groundwater

Groundwater in the A-aquifer at IR-67 exhibits a salinity concentration of 14,700 mg/L (see Table 3.8-11). TDS data are not available for groundwater at IR-67.

4.28.3 RI Analytical Results

This section presents the results of source (liquid tank sample), soil, and groundwater sampling conducted during the RI investigation of IR-67. The data presented in this section were evaluated using the screening criteria presented in Section 4.0. Figures 4.28-2 and 4.28-3 present analytical results for analytes detected at concentrations exceeding screening criteria at each sampling location in soil and groundwater, respectively.

Nondetected analytes, discussed in this section, do not appear in statistical summary tables and sampling locations where all analytes were "nondetect" do not appear in analytical results tables. All analytical results, including "nondetects", for the IR-67 RI are presented in Appendix M. Analytical results for only filtered (dissolved) metals are discussed under the "Metals" heading(s) in this section.

4.28.3.1 Source Analytical Results

This section presents the source sample analytical results for analytes detected in liquid tank samples at concentrations exceeding screening criteria at IR-67. The screening criteria used for evaluation of analytical results for these samples were tap water PRGs, drinking water MCLs, NAWQC for saltwater aquatic life, and the criteria for petroleum hydrocarbons as defined in Section 4.0. These screening criteria are not applicable to liquid (tank) sample analytical results. However, because applicable criteria do not exist, they are used here for comparison with detected concentrations in these source characterization samples. Analyses for liquid tank samples are summarized in Table 4.28-1 (Summary of Other Water Analytical Tests). A statistical summary of source sample analytical results for detected metals and organic constituents in liquid tank samples is presented in Table 4.28-2. Analytes detected in liquid tank samples are listed in Table 4.28-3. All analytical results for the IR-67 RI are presented in Appendix M.

Metals

Metals detected in the liquid tank samples, at concentrations exceeding screening criteria, were antimony, arsenic, copper, and nickel, as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Antimony	2/2	15.8	15.0	1	6.0	2	500	0
Arsenic	1/2	28.7	0.04	1	50.0	0	36.0	0
Copper	2/2	59.8	1,400	0	NA	--	2.4	2
Nickel	1/2	97.4	730	0	100	0	8.2	1

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRG for tap water

Volatile Organic Compounds

VOCs were not detected in liquid tank samples and, as a result, do not appear in the other water statistical summary in Table 4.28-2.

Semivolatile Organic Compounds

Pentachlorophenol was the only SVOC detected in a liquid tank sample at a concentration exceeding screening criteria. This compound exceeded the PRG (0.6 μg/L), the MCL (1 μg/L), and the NAWQC (8 μg/L) in one out of two samples, with a concentration of 9 μg/L.

Pesticides and PCBs

Pesticides and PCBs were not detected in liquid tank samples and, as a result, do not appear in the other water statistical summary in Table 4.28-2.

Petroleum Hydrocarbons

TPH-d exceeded the screening criterion (100 μg/L) in both liquid tank samples, with a maximum concentration of 720 μg/L. TPH-mo exceeded the screening criterion (100 μg/L) in both liquid tank samples, with a maximum concentration of 2,000 μg/L.

4.28.3.2 Soil Analytical Results

This section presents the soil analytical results for analytes detected at concentrations exceeding screening criteria at IR-67. The screening criteria used for evaluation of soil analytical results were residential PRGs for metals and organics, HPALs for metals, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for soil samples are summarized in Table 4.28-4 (Summary of Soil Analytical Tests). A statistical summary of soil analytical results for detected metals and organic constituents is presented in Table 4.28-5. Analytes detected in soil samples are listed in Table 4.28-6. All analytical results for the IR-67 RI are presented in Appendix M.

Metals

Metals detected in soil samples, at concentrations exceeding screening criteria, were arsenic, barium, chromium, cobalt, lead, manganese, nickel, thallium, vanadium, and zinc as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Arsenic	13/28	10.9	0.32	13	11.10	0
Barium	28/28	646	5,340	0	314.36	2
Chromium	28/28	328	211	7	a	0
Cobalt	28/28	51.9	NA	–	a	1
Lead	27/28	18.3	130	0	8.99	4
Manganese	28/28	3,880	382	27	1,431.18	8
Nickel	28/28	645	150	16	a	0

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (mg/kg)	PRG Value (mg/kg)	Number of Samples Exceeding PRG	HPAL Value (mg/kg)	Number of Samples Exceeding HPAL
Thallium	17/28	7.4	NA	--	0.81	15
Vanadium	28/28	146	537	0	117.17	3
Zinc	28/28	139	23,000	0	109.86	2

Notes:

mg/kg Milligrams per kilogram
NA Not available
-- Not applicable
a HPALs for chromium, cobalt, and nickel are based on magnesium concentration in a given sample; no single value applies to all samples

Volatile Organic Compounds

VOCs were not detected in soil samples and, as a result, do not appear in the soil statistical summary in Table 4.28-5.

Semivolatile Organic Compounds

SVOCs were not detected in soil samples at concentrations exceeding screening criteria.

Pesticides and PCBs

Pesticides and PCBs were not detected in soil samples and, as a result, do not appear in the soil statistical summary in Table 4.28-5.

Petroleum Hydrocarbons

Petroleum hydrocarbons were not detected in soil samples at concentrations exceeding screening criteria.

4.28.3.3 Groundwater Analytical Results

This section presents the groundwater analytical results for analytes detected at concentrations exceeding screening criteria at IR-67. The screening criteria used for evaluation of groundwater analytical results were tap water PRGs, drinking water MCLs, NAWQC for saltwater aquatic life, and the criteria for petroleum hydrocarbons as defined in Section 4.0. Analyses for monitoring well and HydroPunch groundwater samples are summarized in Tables 4.28-7 and 4.28-10, respectively (Summary of Monitoring Well Groundwater Analytical Tests and Summary of HydroPunch Groundwater Analytical Tests). Statistical summaries of groundwater analytical results for detected metals and organic constituents in monitoring well and HydroPunch groundwater samples are presented in Tables 4.28-8 and 4.28-11, respectively. Analytes detected in monitoring well and HydroPunch groundwater samples are listed in Tables 4.28-9 and 4.28-12, respectively. All analytical results for the IR-67 RI are presented in Appendix M.

Metals

Metals detected in monitoring well groundwater samples, at concentrations exceeding screening criteria, were arsenic, cadmium, manganese, mercury, nickel, and thallium as summarized in the following table.

Analyte	Number of Detections/ Analyses	Maximum Detected Concentration (μg/L)	PRG* Value (μg/L)	Number of Samples Exceeding PRG	MCL Value (μg/L)	Number of Samples Exceeding MCL	NAWQC Value (μg/L)	Number of Samples Exceeding NAWQC
Arsenic	2/6	2.6	0.04	2	50.0	0	36.0	0
Cadmium	4/6	5.7	18.0	0	5.0	1	9.3	0
Manganese	6/6	29,600	180	6	NA	–	NA	–
Mercury	2/6	0.10	11.0	0	2.0	0	0.03	2
Nickel	5/6	73.1	730	0	100	0	8.2	5
Thallium	2/6	50.7	NA	–	2.0	2	NA	–

Notes:

μg/L Micrograms per liter
NA Not available
-- Not applicable
* PRGs for tap water

4.28.4 Nature and Extent of Contaminants

The following section describes the nature and extent of the constituents discussed in Section 4.28.3 that exceeded the screening criteria for soil and groundwater.

4.28.4.1 Nature and Extent of Contaminants in Soil

Analytical results indicate that metals are present in soil at IR-67, at concentrations exceeding their screening criteria. The distribution of these constituents is shown on Figure 4.28-2 and discussed below. For the purposes of this discussion, soil samples collected between 0 and 2 feet bgs will be referred to as surface samples and those collected at depths of 2 feet or more will be referred to as subsurface samples.

Metals

As discussed in Section 4.28.3, the metals arsenic, barium, chromium, cobalt, lead, manganese, nickel, thallium, vanadium, and zinc are present in soil at IR-67 at concentrations exceeding the screening criteria. The nature and extent of these metals are summarized in the following paragraphs.

Arsenic was detected at concentrations exceeding the PRG (0.32 mg/kg), but not the HPAL (11.10 mg/kg), in five surface soil and eight subsurface soil samples. Depths for the samples ranged from 0.75 to 15.75 feet bgs and concentrations ranged from 1.0 to 10.9 mg/kg. The maximum arsenic concentration was detected in surface soil collected at a depth of 1.25 feet bgs from boring IR67B003.

Barium was detected at concentrations exceeding the HPAL (314.36 mg/kg), but not the PRG (5,340 mg/kg), in two subsurface soil samples. Depths for both samples were 5.75 feet bgs and concentrations ranged from 322 to 646 mg/kg. The maximum barium concentration was detected in subsurface soil from boring IR67B005.

Chromium was detected at concentrations exceeding the PRG (211 mg/kg), but not the HPAL (which varies per sample) in two surface soil and five subsurface soil samples. The depths for the samples ranged from 1.25 to 20.75 feet bgs and the concentrations ranged from 211 to 328 mg/kg. The maximum concentration of chromium was detected in subsurface soil at a depth of 5.75 feet bgs from boring IR67B002.

Cobalt was detected at a concentration exceeding the HPAL (which varies per sample) in one subsurface soil sample. There is currently no PRG available for cobalt. Cobalt was detected at a concentration of 45.4 mg/kg from boring IR67B005 at a depth of 5.75 feet bgs.

Lead was detected at concentrations exceeding the HPAL (8.99 mg/kg), but not the PRG (130 mg/kg), in one surface soil and three subsurface soil samples. The depths for the samples ranged from 0.75 to 20.75 feet bgs and the concentrations ranged from 9.1 to 18.3 mg/kg. The maximum concentration of lead was detected in subsurface soil at a depth of 5.50 feet bgs from boring IR67B003.

Manganese was detected at concentrations exceeding the PRG (382 mg/kg) in five surface soil and 22 subsurface soil samples. The HPAL (1,431.18 mg/kg) was also exceeding in one surface soil and 7 subsurface soil samples. The depths for all samples ranged from 0.75 to 30.75 feet bgs, and the concentrations ranged from 585 to 3,880 mg/kg. The maximum concentration of manganese was detected in subsurface soil at a depth of 5.75 feet bgs from boring IR67B005.

Nickel was detected at concentrations exceeding the PRG (150 mg/kg), but not the HPAL (which varies per sample), in five surface soil and 11 subsurface soil samples. The depths of the samples ranged from 0.75 to 20.75 feet bgs, and concentrations ranged from 158 to 645 mg/kg. The maximum concentration of nickel detected was from subsurface soil at a depth of 20.75 feet bgs from boring IR67MW04A.

Thallium was detected at concentrations exceeding the HPAL (0.81 mg/kg) in one surface soil and 13 subsurface soil samples. There is currently no PRG for thallium. The depths of the samples ranged from 1.25 to 30.75 feet bgs, and concentrations ranged from 1.0 to 7.4 mg/kg. The maximum concentration of thallium detected was from a depth of 25.75 feet bgs from boring IR67B003.

Vanadium was detected at concentrations exceeding the HPAL (117.17 mg/kg), but not the PRG (537 mg/kg), in three subsurface soil samples. Depth for these samples ranged from 20.75 to 30.75 feet bgs, and concentrations exceeding screening criteria ranged from 127 to 146 mg/kg. The maximum vanadium concentration was detected in a subsurface soil sample collected at a depth of 25.75 feet bgs from boring IR67B003.

Zinc was detected at concentrations exceeding the HPAL (109.86 mg/kg), but not the PRG (23,000 mg/kg) in two subsurface soil samples. The depths for the two samples were 25.75 and 30.75 feet bgs with concentrations of 139 and 128 mg/kg, respectively. Both samples where zinc was detected above the screening criteria were from boring IR67B003.

Summary of Soil Chemistry

Analysis of the metals results indicates a sporadic distribution of metals exceeding the screening criteria. Maximum results were detected at inconsistent depths ranging from 1.25 to 25.75 feet bgs. Maximum metal concentrations were detected in all four borings drilled at IR-67.

Barium, lead, vanadium, and zinc exceeded their HPALs; but do not exceed their PRGs. Arsenic, chromium, and nickel exceed the PRG but not the HPALs. Manganese exceeded its HPAL and PRG. However, these detections were sporadic and not associated with potential organic contamination.

The lack of apparent trends or discernable patterns, the relationship between the distribution of metals exceeding screening criteria and the potential contaminant sources and the concentrations of metals detected do not indicate a release of metals to the environment.

4.28.4.2 Nature and Extent of Contaminants in Groundwater

Analytical results indicate the following constituents are present in groundwater at IR-67 at concentrations exceeding their screening criteria:

- Metals
- SVOCs
- Petroleum Hydrocarbons

The distributions of these constituents is shown on Figure 4.28-3 and discussed below. Because contaminant concentrations in groundwater may vary throughout the year due to seasonal variations, the figure has been prepared using the highest concentrations detected in the four most recent sampling events,

where available, representing all seasons for each monitoring well. The figure shows the maximum extent of groundwater contamination regardless of the season in which the maximum occurs.

Metals

As discussed in Section 4.28.3.2, the metals arsenic, cadmium, manganese, mercury, nickel, and thallium were detected in monitoring well groundwater samples at concentrations exceeding their screening criteria.

Arsenic was detected at concentrations exceeding the PRG (0.04 μg/L), but not the MCL (50 μg/L) nor the NAWQC (36 μg/L), in two samples from two monitoring wells. The concentrations of arsenic ranged from 1.8 to 2.6 μg/L. The highest concentration was detected from well IR36MW16A.

Cadmium was detected at a concentration exceeding the MCL (5.0 μg/L), but not the PRG (18.0 μg/L) nor the NAWQC (9.3 μg/L), in one groundwater sample. The concentration of cadmium detected was 5.7 μg/L from well IR67MW04A.

Manganese was detected at concentration exceeding the PRG (180 μg/L) in six groundwater samples from two monitoring wells. There are currently no MCL or NAWQC values available for manganese. The concentrations of manganese ranged from 12,400 to 29,600 μg/L. The maximum concentration of manganese detected was from well IR67MW04A.

Mercury was detected at concentrations exceeding the NAWQC (0.03 μg/L), but not the PRG (11.0 μg/L) nor the MCL (2.0 μg/L), in two groundwater samples from two monitoring wells. The maximum concentration of mercury detected was 0.10 μg/L in both wells (IR36MW16A and IR67MW04A).

Nickel was detected at concentrations exceeding the NAWQC (8.2 μg/L), but not the PRG (730 μg/L) nor the MCL (100 μg/L) in 5 groundwater samples from two monitoring wells. The concentrations of nickel ranged from 24.5 to 73.1 μg/L. The maximum concentration of nickel was detected in monitoring well IR36MW16A.

Thallium was detected at concentrations exceeding the MCL (2.0 μg/L) in two groundwater samples from two monitoring wells. The concentrations of thallium ranged from 11.4 to 50.7 μg/L. The maximum concentration of thallium was detected in monitoring well IR67MW04A.

Semivolatile Organic Compounds

The SVOC hexachloroethane was detected at a concentration exceeding the PRG (5 μg/L) in one groundwater sample. The concentration of hexachloroethane detected was 100 μg/L in monitoring well IR67MW04A.

Petroleum Hydrocarbons

TPH-mo was detected at concentrations exceeding the PRG (100 μg/L) in two samples from two monitoring wells. Concentrations exceeding the screening criteria ranged from 150 to 570 μg/L. The maximum concentration was detected in a groundwater sample from well IR36MW16A.

TRPH was detected at a concentration exceeding the PRG (100 μg/L) in one sample. The concentration of TRPH detected was 500 μg/L from monitoring well IR36MW16A.

Summary of Groundwater Chemistry

The concentrations of arsenic, cadmium, mercury, and nickel in groundwater exceeding screening criteria are isolated occurrences and are not indicative of a release of metals to groundwater.

Arsenic and nickel are commonly detected at concentrations exceeding screening criteria in groundwater throughout Parcel D (see Section 4.1). However the distribution of arsenic and nickel in groundwater at IR-67 are similar to the parcel-wide distribution with no obvious clustering of higher concentrations in the vicinity of IR-67 (Figures 4.1-72 and 4.1-78). Although cadmium concentrations exceeded screening criteria in the groundwater sample collected from well IR67MW04A, cadmium concentrations did not exceed the screening criteria in other soil or groundwater samples collected at adjacent sampling locations. The lack of an identifiable soil source and isolated occurrence of this metal in groundwater indicates that the cadmium concentrations likely represent background levels.

The area surrounding IR-67 is characterized by higher concentrations of manganese and thallium in groundwater than generally found throughout of Parcel D (Figure 4.1-76 and 4.1-79). The alkaline and acid waste tanks adjacent to the western side of Building 439 and/or the storm drain line running beneath 'H' Street may be potential sources for the elevated concentrations of manganese and thallium in groundwater. No releases of manganese, thallium, or other metals to soil or groundwater were identified at IR-67. Manganese concentrations detected in the liquid samples collected from the alkaline and acid waste tanks were 2.4 μg/L and 1.8 μg/L, respectively, and are well below the MCL of 180 μg/L. Thallium was not detected in the liquid samples collected from the alkaline and acid waste tanks.

The SVOC hexachloroethane that was detected at a concentration exceeding its screening criteria is an isolated occurrence and does not form a continuous volume in groundwater. No other SVOCs were detected in the groundwater sample collected from well IR67MW04A. SVOCs were not detected in the groundwater samples collected from monitoring well IR36MW16A or in the four HydroPunch groundwater samples collected at IR-67. Hexachloroethane was not detected in the two liquid source characterization samples collected from the underground waste tanks.

Petroleum hydrocarbons TPH-mo and TRPH detected in groundwater samples at IR-67 indicate a potential release from the underground alkaline and acid waste tanks at IR-67. Petroleum hydrocarbons TPH-d and TPH-mo were detected in the two liquid source characterization samples collected from the underground waste tanks.

4.28.5 Contaminant Fate and Transport

This section discuses contaminant fate and transport at IR-67 in relation to geology and hydrogeology at IR-67 and the nature and extent of contaminants at IR-67. Potential migration routes, persistence in the environment, and migration evaluation are discussed below.

The purpose of this section is to identify in what media, and at what location, the metals, SVOCs, and petroleum hydrocarbons that exceeded their respective screening criteria may occur in the future. This evaluation is divided into discussions on potential migration routes, persistence in the environment, and a migration evaluation for the chemicals above screening levels at the site. Detailed descriptions of the physical, chemical, and biological processes influencing the fate and transport of the metals and organic

compounds at IR-67 are presented in Section 3.0 of Appendix O. Section 4.0 of Appendix O summarizes the physical and chemical characteristics of the metals and organic compounds that exceeded the screening criteria in soil or groundwater at IR-67. Finally, Table O-4 contains a summary of the fate and transport of these chemicals. This table can be used as a quick reference to the fate and transport of metals, SVOCs, and petroleum hydrocarbons at IR-67.

4.28.5.1 Potential Migration Routes

Figure 4.28.5-1 shows a conceptual model for contaminant migration at IR-67. In addition, migration routes are summarized on Table 4.28-13. No point source for the metals or the SVOC hexachloroethane have been found. The dominant migration route for metals detected in soil at IR-67 will be slow leaching by precipitation from shallow soil to deeper soil and groundwater. Resuspension of soil by wind or erosion by precipitation are expected to be less significant migration routes at IR-67. Metals in groundwater will equilibrate with the soil matrix through which the groundwater is moving. Metal solubility depends on a complex series of reactions between groundwater and soil, influenced by several factors including the pH and oxidation potential. The potential for metal migration in groundwater is expected to be low. The SVOC hexachloroethane is slightly soluble in water and should not migrate away from IR-67.

The petroleum hydrocarbons in groundwater may have been released from the alkaline and acid waste tanks at IR-67. No other potential sources were identified. Petroleum hydrocarbons floating at the top of the groundwater table will migrate laterally downgradient until sorbed by the soil matrix.

4.28.5.2 Persistence in the Environment

Metals do not degrade in soil and groundwater and will persist indefinitely at IR-67. The only organic compound present in groundwater is the SVOC hexachloroethane. Hexachloroethane is resistant to biodegradation and is expected to persist at IR-67. Persistence of the organic contaminants at IR-67 is summarized in Table 4.28-13 and described in detail in Appendix O.

4.28.5.3 Migration Evaluation

This section evaluates the migration potential for metals, SVOCs, and petroleum hydrocarbons concentrations detected above screening levels in soil and groundwater at IR-67. This evaluation considers the mobility of a compound, its chemical characteristics, and its persistence in the environment to estimate its potential for migrating away from IR-67.

Migration in Soil

The following sections evaluate the migration of metals in soil at IR-67.

Metals

Arsenic, barium, chromium, cobalt, lead, manganese, nickel, thallium, vanadium, and zinc were detected above screening levels in soil at IR-67. As discussed in Section 4.28.5.2, metals are persistent in the environment and are therefore available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by complex interactions between the soil matrix and the subsurface conditions. In general, with the exception of barium, manganese, and vanadium, the migration of these metals is very limited as a result of their sorption onto soil under the environmental conditions present at IR-67 (Table O-4). The potential for these metals to be leached from soil to groundwater is, therefore, low. The other metals that are leachable will slowly be transported to the groundwater by infiltrating precipitation.

Migration in Groundwater

The following sections evaluate the migration of metals, the SVOC hexachloroethane, and petroleum hydrocarbons in groundwater at IR-67.

Metals

Arsenic, cadmium, manganese, mercury, nickel, and thallium were detected above screening levels in groundwater at IR-67. As discussed in Section 4.28.5.2, metals are persistent in the environment and are available to migrate. As discussed in Appendix O, the geochemistry of each metal is controlled by

complex interactions between the groundwater it is dissolved in, the soil matrix saturated by the groundwater, and subsurface conditions such as the pH and oxidation potential. In general, these metals form compounds that are relatively insoluble in groundwater under the environmental conditions present at IR-67. In addition, the migration of these metals is further limited because of their sorption onto soil under the environmental conditions present at IR-67; therefore, there is a low potential for these metals to be transported in groundwater away from IR-67 (Table O-4).

SVOCs

The SVOC hexachloroethane is moderately soluble in water and has a low vapor pressure. It has a high organic carbon partitioning coefficient and can be slowly biodegraded (Tables O-3 and O-4). It is therefore expected to sorb to soil from groundwater and be biodegraded.

Petroleum Hydrocarbons

Petroleum hydrocarbons as TPH-mo, and TRPH were detected in groundwater samples at concentrations exceeding their screening criteria. Petroleum may not be degraded very rapidly at IR-67 because of the lack of oxygen; however, petroleum hydrocarbons are nearly insoluble in water and are expected to be sorbed by the soil matrix. The petroleum present at IR-67 is, therefore, expected to be sorbed to soil but not rapidly degraded. If there is excess petroleum in soil above that which can be absorbed, it will continue to migrate downgradient until it is sorbed by soil.

4.28.6 Risk Assessment

The following sections present the HHRA and a summary of the environmental and ecological risks. In addition to the data presented in Section 4.28.3 sample results from the following locations have been included in the calculation of risk for those associated exposure areas:

Sampling Location	Exposure Area
IR36B115	AU29
IR36B130	AU29
IR36B032	AU29
IR36B031	AU29

Sampling Location	Exposure Area
IR36B015	AU29
IR36B033	AU29
IR36B131	AU29
IR36B114	AU29

4.28.6.1 Human Health Risk Assessment at IR-67

This section summarizes the HHRA presented in Appendix N of this RI report conducted under the current industrial, future residential, and future industrial land-use scenarios at IR-67 in accordance with the methodology summarized in Section 4.0.

Current Industrial Land Use Risk and Hazard Characterization

Fifteen 0.5-acre exposure areas are within or contact IR-67 (Table 4.0-2 and Figure 4.0-4). Currently, IR-67 is not used for residential or industrial purposes. Soil samples were not collected from 0 to 2 feet bgs in unpaved areas at (Table 4.0-2); therefore, an HHRA was not conducted for soil. A-aquifer groundwater samples containing VOCs were collected at industrial exposure areas AX27 and AX29 (Table 4.0-2); therefore, an HHRA was conducted for A-aquifer groundwater. B-aquifer and bedrock water-bearing zone is not currently used as a source of potable drinking water or for industrial purposes, and groundwater data are not available for these media (Table 4.0-2); therefore, an HHRA was not conducted for either the B-aquifer or bedrock water-bearing zone groundwater. The risk and hazard characterizations for A-aquifer groundwater under the RME and average exposure cases are summarized below.

RME and Average Exposure Cases - A-Aquifer Groundwater

For 2 industrial exposure area with VOCs in the A-aquifer groundwater, modeled indoor air concentrations are less than the U.S. EPA Region IX ambient air PRGs (see Attachment N-E of Appendix N). Therefore, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs that migrate from A-aquifer groundwater into on-site buildings at IR-67 is expected to be insignificant.

Future Residential Land Use Risk and Hazard Characterization

Seventy-seven 2,500-ft^2 exposure areas are within or contact IR-67 (Table 4.0-3 and Figure 4.0-3). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the residential land-use scenario, soil data are available for 7 exposure areas (Table 4.0-3); therefore, an HHRA was conducted for soil. Groundwater data are not available for B-aquifer, bedrock water-bearing zone, and A-Aquifer for residential exposure areas (Table 4.0-3); therefore, an HHRA was not conducted for either the B-aquifer, bedrock water-bearing zone, or A-aquifer groundwater. The risk and hazard characterizations for soil under the RME and average exposure cases are summarized below. In addition, an evaluation of the potential for future residents to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 7 exposure areas with available soil data, carcinogenic COPCs were detected in only exposure area 077083. The total ELCR for exposure area 077083 is 5×10^{-8}, which is less than 1×10^{-6} (Table 4.1-27 and Figure 4.1-85).

Of the 7 exposure areas for which soil data are available, total segregated HIs equal or exceed 1 in 2 exposure areas under the child residential scenario and no exposure areas under the adult residential scenario. To facilitate the discussion and presentation of total segregated HIs, HIs exceeding 1 were assigned a group number. The following breakdown of total segregated HIs that equal or exceed 1 under the child residential scenario was observed:

Group Number	Highest Total Segregated HI Range	Number of Exposure Areas
1	$HI \geq 7$	0
2	$3 \leq HI < 7$	1
3	$1 \leq HI < 3$	1

The specific exposure areas in the total segregated HI ranges can be identified in Table 4.1-28 and are shown graphically for the child residential scenario in Figure 4.1-86.

In Groups 2 and 3, the highest total segregated HIs in exposure areas 077082 and 078083 are largely the result of potential exposure to manganese and thallium. Aluminum contributes frequently at low, chemical-specific HIs to the highest total segregated HI in combination with manganese. Collectively, ingestion of homegrown produce is the dominant exposure pathway.

Lastly, using the U.S. EPA's Integrated Exposure Uptake Biokinetic Model for lead (U.S. EPA 1994), a lead concentration of 221 mg/kg was determined to be a level of concern for children exposed to lead in soil. EPCs for lead are less than 221 mg/kg in all 7 exposure areas with available soil data.

<u>Average Exposure Case - Soil</u>

Among the 7 exposure areas with available soil data, carcinogenic COPCs were detected in only exposure area 077083. The total ELCR for exposure area 077083 is 1×10^{-8}, which is less than 1×10^{-6} (Table 4.1-27 and Figure 4.1-85).

Total segregated HIs equal or exceed 1 in 2 of 7 exposure areas with available soil data under both child and adult residential scenario (Table 4.1-28 and Figure 4.1-86 for child residential scenario only).

EPCs for lead are less than 221 mg/kg, the level of concern for child residential scenario, in all 7 exposure areas with available soil data.

Future Industrial Land Use Risk and Hazard Characterization

Fifteen 0.5-acre exposure areas are within or contact IR-67 (Table 4.0-2 and Figure 4.0-4). Table 4.0-4 correlates the 2,500-ft^2 residential exposure areas to the 0.5-acre industrial exposure areas. Under the industrial land-use scenario, soil data are available for 8 exposure areas (Table 4.0-2); therefore, an HHRA was conducted for soil. A-aquifer groundwater samples containing VOCs were collected at exposure areas AX27 and AX29 (Table 4.0-2); therefore, an HHRA was conducted for A-aquifer groundwater. Groundwater data are not available for B-aquifer and bedrock water-bearing zone (Table 4.0-2); therefore, an HHRA was not conducted for either the B-aquifer or bedrock water-bearing zone groundwater. The risk and hazard characterizations for soil and groundwater from A-aquifer under the RME and average exposure cases

are summarized below. In addition, an evaluation of the potential for future workers to be exposed to lead in soil at a level of concern is also presented for the RME and average exposure cases.

RME Case - Soil

Among the 3 exposure areas in which carcinogenic COPCs were detected, total ELCRs range from 2×10^{-10} in exposure area AW26 to 2×10^{-5} in exposure area AV29. Of the 8 exposure areas with available soil data, only exposure area AV29 has a total ELCRs that equal or exceed 1×10^{-6} and 7 exposure areas have total ELCRs less than 1×10^{-6} (Table 4.1-33 and Figure 4.1-91). The total ELCR in exposure area AV29 is largely the result of potential exposure to arsenic. The relative contribution of particular exposure pathways to the total ELCR in a given exposure area is related to the COPCs that contribute most to the total ELCR in that exposure area. Specifically, ingestion of and dermal contact with soil are the dominant exposure pathways.

Total segregated HIs are less than 1 for all 8 exposure areas with available soil data (Table 4.1-33).

Lastly, the U.S. EPA Region IX PRG for lead in industrial soil of 1,000 mg/kg was determined to be a level of concern for industrial workers potentially exposed to lead in soil. EPCs for lead are less than 1,000 mg/kg in all 8 exposure areas with available soil data.

Average Exposure Case - Soil

Among the 3 exposure areas in which carcinogenic COPCs were detected, total ELCRs range from 2×10^{-11} in exposure area AW26 to 1×10^{-6} in exposure area AV29. Of the 8 exposure areas with available soil data, only the ELCR for exposure area AV29 equals or exceeds 1×10^{-6} (Table 4.1-33 and Figure 4.1-91). Relative contributions of COPCs and pathways contributing to the total ELCR are similar to those under the RME case.

Total segregated HIs are less than 1 for all 8 exposure areas with available soil data (Table 4.1-33).

Lastly, EPCs for lead are less than 1,000 mg/kg, the level of concern for industrial workers to lead in soil, in all 8 exposure areas with available soil data; therefore, potential exposure of industrial workers is not expected to result in adverse health effects.

RME and Average Exposure Cases - A-Aquifer Groundwater

As discussed under the current industrial scenario, the potential for adverse health effects resulting from potential exposure of industrial workers to VOCs in A-aquifer groundwater in future industrial buildings at IR-67 is expected to be insignificant.

4.28.6.2 Environmental/Ecological Risk

IR-67 is completely covered by pavement. No wetlands are located at IR-67. Few ecological receptors are expected to use the site because of the limited area and poor quality of available habitat. Potential terrestrial exposure pathways do not exist at IR-67, because the area is completely paved.

The potential for affected groundwater migrating to San Francisco Bay may be a pathway of concern at IR-67. Currently, affected groundwater at IR-67 contains concentrations of mercury and nickel exceed the NAWQC for saltwater aquatic life (see Table 4.28-8 and 4.28-11). Using the NAWQC for screening criteria at IR-67 is a conservative screening approach because the NAWQC are designed to protect ecological receptors in surface waters and are used to evaluate direct discharges to surface water. Groundwater at IR-67 does not discharge directly into the Bay but rather filters indirectly through soils and sediments before reaching the Bay. To compare groundwater concentrations of chemicals at IR-67 to the NAWQC, factors influencing the fate and transport of chemicals in groundwater such as dilution and attenuation should have been considered. Affected groundwater at this site is about 700 feet inland from the bay. These factors influence the concentrations of contaminants in groundwater reaching the Bay and will be evaluated when determining remedial options for groundwater in the Parcel D FS. Potential ecological risk from these contaminants to aquatic receptors will be addressed during the Parcel D FS. Potential ecological risk from these chemicals to aquatic receptors will be addressed during the Phase 1B ERA.

4.28.7 Conclusions and Recommendations

Based on the results of the RI and HHRA, conclusions and recommendations are summarized below.

4.28.7.1 Conclusions

Site characteristics and potential sources, the nature and extent of contamination, and the HHRA are summarized below.

Site Characteristics and Potential Sources

IR-67 consists of Building 439 including two underground alkaline/acid waste tanks outside the western side of the building.

Artificial fill in the area is approximately 20 to 35 feet thick. Groundwater occurs at about 6 to 9 feet bgs and flows with a hydraulic gradient of about 0.001 to the northwest.

The potential sources of contamination at IR-67 are the two underground tanks. These tanks were found to contain low concentrations of pentachloropheno, TPH-d, and TPH-mo.

Nature and Extent of Contamination

Seven metals were detected in soils at concentrations exceeding their HPALs. Of these seven metals, only manganese was detected at concentrations exceeding its PRG. The distribution of manganese concentrations in soil is not indicative of a point source release of metals. No sources of manganese or metals in soil were identified at IR-67.

Five metals were detected in the groundwater sample collected in monitoring well IR67MW04A at concentrations exceeding their respective screening criteria. The groundwater in the area surrounding IR-67 is characterized by an area of higher manganese and thallium concentrations than are generally found throughout the remainder of Parcel D. Manganese was detected at concentrations of 29,600 μg/L, 12,900 μg/L, and 12,400 μg/L in wells IR67MW04A, IR08MW44A, and IR36MW16A, respectively.

Groundwater samples collected from these three wells also contain the three highest concentrations of thallium detected in groundwater throughout Parcel D, ranging up to 50.7 μg/L in well IR67MW04A. No releases of manganese, thallium, or other metals to soil or groundwater were identified at IR-67. Manganese concentrations detected in the liquid samples collected from the alkaline and acid waste tanks were 2.4 and 1.8 μg/L, respectively, and are well below the MCL of 180 μg/L. Thallium was not detected in the liquid samples collected from the alkaline and acid waste tanks.

Naturally occurring arsenic and nickel are commonly detected at concentrations exceeding their screening criteria in groundwater throughout Parcel D, as described in Section 4.1.1.2. The distributions of arsenic and nickel in groundwater at IR-67 are similar to the parcel-wide distribution, with no obvious clustering of higher concentrations of in the vicinity of IR-67.

The SVOC hexachloroethane was detected at a concentration exceeding its screening criteria in the groundwater sample collected from well IR67MW04A. The source of hexachloroethane is unknown. No other SVOCs or VOCs were detected in the groundwater sample collected from well IR67MW04A, and SVOCs were not detected in the four HydroPunch groundwater samples collected at IR-67.

Human Health Risk Assessment

HHRA findings under the current industrial, future residential, and future industrial land use scenarios at IR-67 are summarized below.

Current Industrial Land Use Risk and Hazard Characterization

<u>RME and Average Exposure Cases: Soil</u>

- No data are available for this medium; therefore, an HHRA was not conducted for soil.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- B-aquifer and bedrock water-bearing zone are currently not used as a source of potable drinking water or for industrial purposes, and data are not available for these media; therefore, an HHRA was not conducted for B-aquifer and bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- Based on modeled indoor air concentration results, indoor air concentrations of VOCs migrating from the A-aquifer groundwater are not expected to result in adverse health effects at IR-67.

Future Residential Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs are less than 1×10^{-6} in all 7 exposure areas with available soil data (Figure 4.1-85 and Table 4.1-27).
- Total segregated HIs equal or exceed 1 in 2 exposure areas for children and 1 exposure area for adults in the 7 exposure areas with available soil data (Figure 4.1-86 for children only and Table 4.1-28).
- EPCs for lead are less than 221 mg/kg in all 7 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs are less than 1×10^{-6} in all 7 exposure areas with available soil data (Figure 4.1-85 and Table 4.1-27).
- Total segregated HIs equal or exceed 1 of 7 exposure areas with available soil data for children and no exposure areas for adults (Figure 4.1-86 for children only and Table 4.1-28).
- EPCs for lead are less than 221 mg/kg in all 7 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- No data are available for this media; therefore, an HHRA was not conducted for A-aquifer groundwater.

Future Industrial Land Use Risk and Hazard Characterization

RME Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in only exposure area AV29 of the 8 exposure areas with available soil data. The total ELCRs for this exposure area is less than 1×10^{-4} (Figure 4.1-91 and Table 4.1-33).

- Total segregated HIs for workers are less than 1 in all 8 exposure areas with available soil data (Table 4.1-33).

- EPCs for lead are less than 1,000 mg/kg in all 8 exposure areas with available soil data.

Average Exposure Case: Soil

- Total ELCRs equal or exceed 1×10^{-6} in only exposure area AV29 of the 8 exposure areas with available soil data. The total ELCR for this exposure area is less than 1×10^{-4} (Figure 4.1-91 and Table 4.1-33).

- Total segregated HIs for workers are less than 1 in all 8 exposure areas with available soil data (Table 4.1-33).

- EPCs for lead are less than 1,000 mg/kg in all 8 exposure areas with available soil data.

RME and Average Exposure Cases: B-Aquifer and Bedrock Water-Bearing Zone Groundwater

- No data are available for these media; therefore, an HHRA was not conducted for B-aquifer or bedrock water-bearing zone groundwater.

RME and Average Exposure Cases: A-Aquifer Groundwater

- As discussed under the current residential scenario, the potential for adverse health effects associated with potential exposure to VOCs through inhalation in future industrial buildings is expected to be insignificant at IR-67.

4.28.7.2 Recommendations

IR-67 is recommended for evaluation in the Parcel D FS report for remedial action because results of the HHRA indicate that under the future residential scenario, RME case, a potential risk to human health in one or more exposure areas exists at IR-67 based on ECLRs exceeding 1×10^{-6}. In addition, possible risks posed to ecological receptors from analytes detected at IR-67 based on exceedances of the NAWQC are recommended for further evaluation during the Parcel D FS.

TABLE 4.28-1

SUMMARY OF OTHER WATER ANALYTICAL TESTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR67TK06	9540W035						✓				✓	✓				✓			✓	✓	✓	✓
IR67TK07	9540W036						✓				✓	✓				✓			✓	✓	✓	✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.28-2

STATISTICAL SUMMARY OF OTHER WATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above NAWQC
METAL	ANTIMONY	8.4	15.8	12.1	UG/L	3.0	2	2	15.0	1	6.0	2	500	0
	ARSENIC	28.7	28.7	28.7	UG/L	2.8	2	1	0.04	1	50.0	0	36.0	0
	BARIUM	1.0	34.0	17.5	UG/L	0.40	2	2	2,600	0	1,000	0		
	CALCIUM	6,920	25,500	16,200	UG/L	7.0	2	2						
	COPPER	22.7	59.8	41.3	UG/L	0.80	2	2	1,400	0			2.4	2
	IRON	23.2	23.2	23.2	UG/L	13.8	2	1						
	MAGNESIUM	1,240	12,600	6,920	UG/L	3.8	2	2						
	MANGANESE	1.8	2.4	2.1	UG/L	0.30	2	2	180	0				
	MOLYBDENUM	6.4	37.7	22.1	UG/L	1.2	2	2	180	0				
	NICKEL	97.4	97.4	97.4	UG/L	1.3	2	1	730	0	100	0	8.2	1
	POTASSIUM	46,700	53,100	49,900	UG/L	50.1	2	2						
	SODIUM	263,000	395,000	329,000	UG/L	124	2	2						
	VANADIUM	2.0	5.6	3.8	UG/L	0.80	2	2	260	0				
SVOC	PENTACHLOROPHENOL	9	9	9	UG/L	25	2	1	0.6	1	1	1	8	1
TPHEXT	TPH-DIESEL	220	720	470	UG/L	100	2	2	100	2i				
	TPH-MOTOR OIL	250	2,000	1,100	UG/L	100	2	2	100	2i				

TABLE 4.28-2 (Continued)

STATISTICAL SUMMARY OF OTHER WATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.28-3

OTHER WATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67TK06	IR67TK07
Sample Number	9540W035	9540W036
Sample Date	10/06/95	10/06/95
Metal (ug/L)		
ANTIMONY	8.4 δ	15.8 *δ
ARSENIC	28.7 *	ND (2.8)
BARIUM	1.0	34.0
CALCIUM	6,920	25,500
COPPER	59.8 B	22.7 B
IRON	23.2	ND (13.8)
MAGNESIUM	1,240	12,600
MANGANESE	1.8	2.4
MOLYBDENUM	37.7	6.4
NICKEL	97.4 B	ND (3.5)
POTASSIUM	46,700	53,100
SODIUM	395,000	263,000
VANADIUM	2.0	5.6
Semivolatile Organic Compound (ug/L)		
PENTACHLOROPHENOL	9 *δδ	ND (25)
TPH-Extractable (ug/L)		
TPH-DIESEL	220	720
TPH-MOTOR OIL	250	2,000
pH (pH units)		
PH	9.0	8.7

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
µg/L Microgram per liter

* Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
B Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ Detected concentration greater than maximum contaminant level (MCL)
U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

Detected concentration greater than at least one screening criterion.

TABLE 4.28-4

SUMMARY OF SOIL ANALYTICAL TESTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR67B001	9534D034						✓			✓	✓	✓				✓			✓	✓	✓	
IR67B001	9534D035						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B001	9534D036						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B001	9534D037												✓					✓				
IR67B001	9534D038						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B001	9534D039						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B002	9534D029						✓			✓	✓	✓				✓			✓	✓	✓	
IR67B002	9534D030						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B002	9534D031						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B002	9534D032						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B002	9534D033						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D016						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D017						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D018						✓			✓	✓	✓							✓	✓		✓
IR67B003	9534D019						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D020						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D021						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D022						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B003	9534D023						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B005	9534D011						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B005	9534D012						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B005	9534D013						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B005	9534D014						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67B005	9534D015						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67MW04A	9534D024						✓			✓	✓	✓				✓			✓	✓	✓	
IR67MW04A	9534D025						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67MW04A	9534D026						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67MW04A	9534D027						✓			✓	✓	✓				✓			✓	✓	✓	✓
IR67MW04A	9534D028						✓			✓	✓	✓				✓			✓	✓	✓	✓

TABLE 4.28-4 (Continued)

SUMMARY OF SOIL ANALYTICAL TESTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.28-5

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
METAL	ALUMINUM	4,850	41,300	23,400	MG/KG	3.8	28	28	76,700	0	100,000	0		
	ANTIMONY	3.5	4.7	4.1	MG/KG	0.53	28	2	30.7	0	681	0	9.05	0
	ARSENIC	1.0	10.9	4.9	MG/KG	0.63	28	13	0.32	13	2.0	12	11.10	0
	BARIUM	16.7	646	171	MG/KG	0.07	28	28	5,340	0	100,000	0	314.36	2
	CALCIUM	2,910	196,000	21,100	MG/KG	3.4	28	28						
	CHROMIUM	18.5	328	151	MG/KG	0.42	28	28	211	7	1,580	0	h	0
	COBALT	4.6	51.9	30.3	MG/KG	0.12	28	28					h	1
	COPPER	12.1	75.7	44.0	MG/KG	0.19	28	28	2,850	0	63,300	0	124.31	0
	IRON	9,450	73,600	35,200	MG/KG	3.7	28	28						
	LEAD	2.0	18.3	6.3	MG/KG	0.35	28	27	130	0	1,000	0	8.99	4
	MAGNESIUM	4,560	107,000	34,600	MG/KG	3.8	28	28						
	MANGANESE	246	3,880	1,280	MG/KG	0.14	28	28	382	27	8,300	0	1431.18	8
	MERCURY	0.06	0.17	0.10	MG/KG	0.06	28	8	23.0	0	511	0	2.28	0
	NICKEL	15.7	645	211	MG/KG	0.77	28	28	150	16	34,100	0	h	0
	POTASSIUM	343	2,710	1,050	MG/KG	6.5	28	28						
	SODIUM	83.5	4,870	1,360	MG/KG	31.0	28	14						
	THALLIUM	0.62	7.4	2.8	MG/KG	0.47	28	17					0.81	15
	VANADIUM	19.6	146	80.9	MG/KG	0.14	28	28	537	0	11,900	0	117.17	3
	ZINC	28.9	139	71.7	MG/KG	0.07	28	28	23,000	0	100,000	0	109.86	2
SVOC	2-METHYLNAPHTHALENE	100	130	120	UG/KG	370	27	2	800,000	0	800,000	0		
	ANTHRACENE	75	75	75	UG/KG	370	27	1	19,000	0	19,000	0		
	NAPHTHALENE	180	180	180	UG/KG	370	27	1	800,000	0	800,000	0		

TABLE 4.28-5 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection Frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Residential PRG Value	Above[e] Res PRG	Industrial PRG Value	Above[f] Ind PRG	HPAL Value	Above[g] HPAL
	PHENANTHRENE	89	89	89	UG/KG	370	27	1	800,000	0	800,000	0		
TPHEXT	TPH-DIESEL	7	29	17	MG/KG	11	28	7	1,000	0i				
	TPH-MOTOR OIL	9	190	53	MG/KG	13	28	11	1,000	0i				
TRPH	TRPH	14	130	68	MG/KG	11	27	7	1,000	0i				
PHYS	DRY BULK DENSITY	120	120	120	%	0	1	1						
	GRAIN SIZE ANALYSIS - %CLAY	16	16	16	%	0	1	1						
	GRAIN SIZE ANALYSIS - %COBBLE.	0	0	0	%	0	1	1						
	GRAIN SIZE ANALYSIS - %GRAVEL	23	23	23	%	0	1	1						
	GRAIN SIZE ANALYSIS - %SAND	48	48	48	%	0	1	1						
	GRAIN SIZE ANALYSIS - %SILT	14	14	14	%	0	1	1						
	MOISTURE CONTENT	18	18	18	%	0	1	1						
	POROSITY	35	35	35	%	0	1	1						
	WET BULK DENSITY	140	140	140	%	0	1	1						

TABLE 4.28-5 (Continued)

STATISTICAL SUMMARY OF SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
HPAL	Hunters Point ambient level
MG/KG	Milligram per kilogram
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PHYS	Physical characteristic
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/KG	Microgram per kilogram
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than residential PRG

f Total number of samples showing concentrations greater than industrial PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

g Total number of samples showing concentrations greater than HPAL

h HPALs for chromium, cobalt, and nickel are based on the concentration of magnesium in each sample; thus, no single value applies to all samples. The range of HPAL values for chromium, cobalt, and nickel are 112.506 to 990.432, 20.897 to 107.192, and 111.329 to 2220.533 mg/kg respectively.

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.28-6

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B001	IR67B001	IR67B001	IR67B001	IR67B001	IR67B001	IR67B002
Sampling Depth (feet bgs)	0.75	5.75	10.75	10.75	15.75	20.75	0.75
Sample Number	9534D034	9534D035	9534D036	9534D037	9534D038	9534D039	9534D029
Sample Date	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95
Metal (mg/kg)							
ALUMINUM	31,500	41,300	22,800	NA	15,300	18,900	23,900
ANTIMONY	ND (1.1)	ND (2.7)	ND (2.1)	NA	ND (2.1)	ND (2.7)	ND (1.8)
ARSENIC	1.0 *	5.9 *#	ND (1.4)	NA	ND (2.6)	ND (2.8)	4.9 *#
BARIUM	105	81.2	273	NA	168	145	240
CALCIUM	41,700	11,600	15,500	NA	8,340	10,300	11,100
CHROMIUM	81.7	309 *	137	NA	130	171	194
COBALT	28.8	33.0	37.5	NA	26.0	30.0	28.2
COPPER	40.2	33.6	50.1	NA	31.0	32.9	55.2
IRON	31,800	40,700	40,100	NA	26,800	37,000	34,300
LEAD	3.5	8.2	3.2	NA	4.9	9.1 α	8.4
MAGNESIUM	34,700	97,200	21,300	NA	16,500	15,800	50,500
MANGANESE	959 *	794 *	2,010 *α	NA	960 *	1,050 *	1,820 *α
MERCURY	0.09	0.06	ND (0.06)	NA	ND (0.06)	ND (0.10)	0.08
NICKEL	158 *	530 *	110	NA	170 *	267 *	333 *
POTASSIUM	757	1,190	663	NA	726	878	1,590
SODIUM	ND (91.2)	ND (28.7)	2,210	NA	307	450	ND (28.2)
THALLIUM	ND (0.44)	ND (0.45)	4.1 α	NA	1.4 α	1.7 α	ND (2.4)
VANADIUM	61.0	80.6	99.6	NA	71.0	96.6	66.8
ZINC	52.6	79.0	78.0	NA	54.7	65.9	66.4
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (370)	130	ND (390)	NA	ND (400)	ND (400)	ND (370)
ANTHRACENE	ND (370)	ND (370)	ND (390)	NA	ND (400)	ND (400)	ND (370)
NAPHTHALENE	ND (370)	180	ND (390)	NA	ND (400)	ND (400)	ND (370)
PHENANTHRENE	ND (370)	89	ND (390)	NA	ND (400)	ND (400)	ND (370)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (11)	ND (11)	ND (12)	NA	ND (12)	ND (12)	27
TPH-MOTOR OIL	9	ND (11)	ND (12)	NA	ND (12)	ND (12)	85
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (11)	ND (11)	ND (12)	NA	ND (12)	ND (12)	130

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B001	IR67B001	IR67B001	IR67B001	IR67B001	IR67B001	IR67B002
Sampling Depth (feet bgs)	0.75	5.75	10.75	10.75	15.75	20.75	0.75
Sample Number	9534D034	9534D035	9534D036	9534D037	9534D038	9534D039	9534D029
Sample Date	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95	08/22/95
Percent Moisture (%)							
% SOLIDS	90.7	89.0	84.7	NA	81.7	82.6	90.6
pH (pH units)							
PH	8.3	8.9	7.5	NA	8.5	8.2	8.2
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	120	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	16	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA		NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	23	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	48	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	14	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	18	NA	NA	NA
POROSITY	NA	NA	NA	35	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	140	NA	NA	NA

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B002	IR67B002	IR67B002	IR67B002	IR67B003	IR67B003	IR67B003
Sampling Depth (feet bgs)	5.75	10.75	15.75	20.75	1.25	5.50	12.25
Sample Number	9534D030	9534D031	9534D032	9534D033	9534D016	9534D017	9534D018
Sample Date	08/22/95	08/22/95	08/22/95	08/22/95	08/21/95	08/21/95	08/21/95
Metal (mg/kg)							
ALUMINUM	29,700	13,800	23,200	25,000	23,200	26,600	4,850
ANTIMONY	ND (2.6)	ND (1.4)	ND (1.4)	ND (2.0)	ND (2.6)	ND (1.9)	ND (0.46)
ARSENIC	4.7 *#	2.4 *#	2.1 *#	ND (0.62)	10.9 *#	ND (4.6)	ND (2.6)
BARIUM	322 α	165	284	66.8	210	165	216
CALCIUM	17,300	6,850	15,000	15,700	9,820	14,600	2,910
CHROMIUM	328 *	141	113	32.1	220 *	157	18.5
COBALT	45.8	24.1	34.7	29.2	27.0	34.3	13.7
COPPER	75.7	29.2	70.6	36.9	39.3	50.3	27.9
IRON	42,300	29,400	37,400	51,900	30,100	39,100	9,940
LEAD	7.2	7.4	3.2	2.9	8.6	18.3 α	2.5
MAGNESIUM	81,600	10,000	22,600	22,700	47,900	45,400	4,560
MANGANESE	2,240 *α	607 *	1,900 *α	1,570 *α	1,080 *	1,070 *	1,400 *
MERCURY	0.09	ND (0.06)	ND (0.06)	ND (0.06)	ND (0.06)	0.13	ND (0.05)
NICKEL	520 *	170 *	97.4	15.7	318 *	290 *	38.9
POTASSIUM	1,150	642	657	455	1,870	1,550	343
SODIUM	ND (27.9)	ND (235)	ND (564)	1,560	ND (28.6)	ND (28.5)	ND (26.6)
THALLIUM	4.5 α	ND (0.67)	ND (3.1)	3.6 α	0.64	1.2 α	1.9 α
VANADIUM	104	89.5	80.0	145 α	60.1	87.2	21.4
ZINC	93.3	51.5	80.7	95.0	67.7	85.4	30.2
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (360)	ND (400)	ND (380)	ND (370)	100	ND (370)	NA
ANTHRACENE	ND (360)	ND (400)	ND (380)	ND (370)	75	ND (370)	NA
NAPHTHALENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (370)	ND (370)	NA
PHENANTHRENE	ND (360)	ND (400)	ND (380)	ND (370)	ND (370)	ND (370)	NA
TPH-Extractable (mg/kg)							
TPH-DIESEL	13	ND (12)	ND (11)	ND (11)	26	8	ND (10)
TPH-MOTOR OIL	12	ND (12)	ND (11)	ND (11)	54	60	ND (10)
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (11)	ND (12)	ND (11)	ND (11)	62	100	NA

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B002	IR67B002	IR67B002	IR67B002	IR67B003	IR67B003	IR67B003
Sampling Depth (feet bgs)	5.75	10.75	15.75	20.75	1.25	5.50	12.25
Sample Number	9534D030	9534D031	9534D032	9534D033	9534D016	9534D017	9534D018
Sample Date	08/22/95	08/22/95	08/22/95	08/22/95	08/21/95	08/21/95	08/21/95
Percent Moisture (%)							
% SOLIDS	91.6	83.2	88.0	90.8	89.4	89.7	96.2
pH (pH units)							
PH	8.2	8.2	7.4	7.2	8.6	8.6	8.2
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	NA	NA
POROSITY	NA	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B003	IR67B003	IR67B003	IR67B003	IR67B003	IR67B005	IR67B005
Sampling Depth (feet bgs)	16.00	20.75	25.75	30.75	32.75	1.25	5.75
Sample Number	9534D019	9534D020	9534D021	9534D022	9534D023	9534D011	9534D012
Sample Date	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95
Metal (mg/kg)							
ALUMINUM	18,700	22,800	39,100	34,900	6,610	20,000	15,100
ANTIMONY	ND (2.2)	ND (1.6)	3.5	ND (2.6)	ND (0.61)	ND (1.7)	ND (2.4)
ARSENIC	ND (3.0)	ND (0.62)	ND (1.5)	ND (0.73)	ND (3.8)	6.9 *#	ND (0.69)
BARIUM	68.4	59.3	183	113	16.7	144	646 α
CALCIUM	9,920	17,800	33,600	31,000	196,000	9,370	9,740
CHROMIUM	134	66.2	111	91.7	22.0	211 *	110
COBALT	21.4	27.4	51.9	40.8	4.6	27.1	45.4 α
COPPER	29.7	48.1	65.1	57.4	12.1	37.3	64.1
IRON	31,000	32,300	73,600	62,500	9,450	28,300	31,400
LEAD	5.0	ND (1.3)	3.7	3.2	2.7	7.2	4.2
MAGNESIUM	17,300	14,100	31,400	27,400	5,110	47,100	15,000
MANGANESE	585 *	683 *	2,510 *α	1,930 *α	246	1,030 *	3,880 *α
MERCURY	ND (0.10)	ND (0.06)	ND (0.06)	ND (0.07)	ND (0.07)	ND (0.09)	ND (0.05)
NICKEL	161 *	29.4	96.6	71.7	21.8	291 *	105
POTASSIUM	733	374	1,700	1,170	2,710	1,360	482
SODIUM	643	897	2,600	2,420	4,870	ND (28.6)	140
THALLIUM	ND (0.47)	3.0 α	7.4 α	4.8 α	0.62	1.0 α	6.0 α
VANADIUM	92.7	112	146 α	127 α	19.6	58.5	47.8
ZINC	58.4	55.2	139 α	128 α	28.9	70.0	77.1
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (390)	ND (370)	ND (420)	ND (430)	ND (480)	ND (370)	ND (350)
ANTHRACENE	ND (390)	ND (370)	ND (420)	ND (430)	ND (480)	ND (370)	ND (350)
NAPHTHALENE	ND (390)	ND (370)	ND (420)	ND (430)	ND (480)	ND (370)	ND (350)
PHENANTHRENE	ND (390)	ND (370)	ND (420)	ND (430)	ND (480)	ND (370)	ND (350)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (12)	ND (11)	ND (13)	ND (13)	ND (14)	29	ND (11)
TPH-MOTOR OIL	ND (12)	ND (11)	ND (13)	ND (13)	ND (14)	19	9
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (12)	ND (11)	ND (13)	ND (13)	ND (14)	ND (11)	14

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B003	IR67B003	IR67B003	IR67B003	IR67B003	IR67B005	IR67B005
Sampling Depth (feet bgs)	16.00	20.75	25.75	30.75	32.75	1.25	5.75
Sample Number	9534D019	9534D020	9534D021	9534D022	9534D023	9534D011	9534D012
Sample Date	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95	08/21/95
Percent Moisture (%)							
% SOLIDS	84.5	90.0	77.7	76.8	69.0	89.4	94.8
pH (pH units)							
PH	7.6	7.1	8.2	8.6	8.8	8.6	8.0
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	NA	NA
POROSITY	NA	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B005	IR67B005	IR67B005	IR67MW04A	IR67MW04A	IR67MW04A	IR67MW04A
Sampling Depth (feet bgs)	11.25	15.75	20.75	0.75	5.75	10.75	15.75
Sample Number	9534D013	9534D014	9534D015	9534D024	9534D025	9534D026	9534D027
Sample Date	08/21/95	08/21/95	08/21/95	08/22/95	08/22/95	08/22/95	08/22/95
Metal (mg/kg)							
ALUMINUM	27,800	23,600	24,300	21,800	16,300	16,500	31,200
ANTIMONY	ND (2.7)	ND (1.1)	ND (1.0)	ND (1.7)	ND (0.70)	ND (1.5)	4.7
ARSENIC	6.9 *#	ND (2.4)	ND (0.72)	2.8 *#	6.4 *#	3.6 *#	5.6 *#
BARIUM	165	162	70.9	203	76.6	128	184
CALCIUM	15,300	16,900	17,500	12,500	6,090	10,900	14,200
CHROMIUM	277 *	122	91.4	146	65.3	138	307 *
COBALT	40.2	25.0	31.0	28.2	15.0	20.8	39.1
COPPER	64.3	40.1	42.9	63.3	16.8	30.4	47.8
IRON	38,200	33,400	34,200	32,000	27,700	24,700	38,100
LEAD	9.3 α	3.3	2.0	12.0 α	6.4	8.5	7.9
MAGNESIUM	50,900	16,100	19,800	35,400	16,000	26,300	67,800
MANGANESE	1,020 *	712 *	1,250 *	1,200 *	801 *	691 *	1,020 *
MERCURY	ND (0.06)	ND (0.06)	ND (0.06)	0.17	ND (0.05)	ND (0.06)	0.08
NICKEL	398 *	99.6	70.5	198 *	72.4	182 *	452 *
POTASSIUM	1,420	513	645	1,160	1,050	1,130	1,790
SODIUM	83.5	512	1,270	ND (27.8)	ND (27.9)	ND (29.6)	ND (220)
THALLIUM	1.2 α	1.4 α	2.8 α	ND (1.4)	ND (1.2)	ND (1.1)	ND (1.1)
VANADIUM	78.5	114	91.2	73.1	53.4	55.9	71.4
ZINC	84.6	62.8	65.2	80.4	46.6	58.3	77.8
Semivolatile Organic Compound (ug/kg)							
2-METHYLNAPHTHALENE	ND (380)	ND (380)	ND (390)	ND (360)	ND (360)	ND (390)	ND (410)
ANTHRACENE	ND (380)	ND (380)	ND (390)	ND (360)	ND (360)	ND (390)	ND (410)
NAPHTHALENE	ND (380)	ND (380)	ND (390)	ND (360)	ND (360)	ND (390)	ND (410)
PHENANTHRENE	ND (380)	ND (380)	ND (390)	ND (360)	ND (360)	ND (390)	ND (410)
TPH-Extractable (mg/kg)							
TPH-DIESEL	ND (12)	ND (12)	ND (12)	ND (27)	ND (11)	10	7
TPH-MOTOR OIL	ND (12)	ND (12)	ND (12)	190	18	98	33
Total Recoverable Petroleum Hydrocarbons (mg/kg)							
TRPH	ND (12)	ND (12)	ND (12)	110	19	42	ND (12)

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B005	IR67B005	IR67B005	IR67MW04A	IR67MW04A	IR67MW04A	IR67MW04A
Sampling Depth (feet bgs)	11.25	15.75	20.75	0.75	5.75	10.75	15.75
Sample Number	9534D013	9534D014	9534D015	9534D024	9534D025	9534D026	9534D027
Sample Date	08/21/95	08/21/95	08/21/95	08/22/95	08/22/95	08/22/95	08/22/95
Percent Moisture (%)							
% SOLIDS	85.6	85.6	84.5	92.0	91.7	86.4	82.0
pH (pH units)							
PH	8.7	7.6	7.3	8.2	8.5	9.3	7.9
Physical Characteristic (%)							
DRY BULK DENSITY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %CLAY	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SAND	NA	NA	NA	NA	NA	NA	NA
GRAIN SIZE ANALYSIS - %SILT	NA	NA	NA	NA	NA	NA	NA
MOISTURE CONTENT	NA	NA	NA	NA	NA	NA	NA
POROSITY	NA	NA	NA	NA	NA	NA	NA
WET BULK DENSITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67MW04A
Sampling Depth (feet bgs)	20.75
Sample Number	9534D028
Sample Date	08/22/95
Metal (mg/kg)	
ALUMINUM	36,800
ANTIMONY	ND (2.4)
ARSENIC	ND (0.74)
BARIUM	128
CALCIUM	8,210
CHROMIUM	317 *
COBALT	39.0
COPPER	39.6
IRON	39,200
LEAD	8.5
MAGNESIUM	107,000
MANGANESE	856 *
MERCURY	0.09
NICKEL	645 *
POTASSIUM	626
SODIUM	1,120
THALLIUM	ND (1.4)
VANADIUM	60.9
ZINC	73.7
Semivolatile Organic Compound (ug/kg)	
2-METHYLNAPHTHALENE	ND (440)
ANTHRACENE	ND (440)
NAPHTHALENE	ND (440)
PHENANTHRENE	ND (440)
TPH-Extractable (mg/kg)	
TPH-DIESEL	ND (13)
TPH-MOTOR OIL	ND (13)
Total Recoverable Petroleum Hydrocarbons (mg/kg)	
TRPH	ND (13)

TABLE 4.28-6 (Continued)

SOIL ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67MW04A
Sampling Depth (feet bgs)	20.75
Sample Number	9534D028
Sample Date	08/22/95
Percent Moisture (%)	
% SOLIDS	75.7
pH (pH units)	
PH	7.6
Physical Characteristic (%)	
DRY BULK DENSITY	NA
GRAIN SIZE ANALYSIS - %CLAY	NA
GRAIN SIZE ANALYSIS - %COBBLES	NA
GRAIN SIZE ANALYSIS - %GRAVEL	NA
GRAIN SIZE ANALYSIS - %SAND	NA
GRAIN SIZE ANALYSIS - %SILT	NA
MOISTURE CONTENT	NA
POROSITY	NA
WET BULK DENSITY	NA

Notes:

%	Percent
bgs	Below ground surface
mg/kg	Milligram per kilogram
NA	Not analyzed
ND()	Not detected (detection limit in parentheses)
µg/kg	Microgram per kilogram
*	Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for residential use
#	Detected concentration greater than U.S. Environmental Protection Agency Region IX PRG for industrial use
α	Detected concentration greater than the Hunters Point ambient level.
▒	Detected concentration greater than at least one screening criterion.

TABLE 4.28-7

SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL TESTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR36MW16A	9439X498						√				√	√				√			√	√	√	√
IR36MW16A	9439X499						√				√	√				√			√	√	√	√
IR36MW16A	9605W054						√				√	√				√			√	√	√	√
IR36MW16A	9610J906						√				√	√				√			√	√	√	√
IR36MW16A	9610J907						√				√	√				√			√	√	√	√
IR67MW04A	9544W139						√				√	√				√			√	√	√	√
IR67MW04A	9602J792						√				√	√				√			√	√	√	√
IR67MW04A	9607J877						√					√				√			√	√	√	√
IR67MW04A	9615Z039	√									√	√		√						√		

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.28-8

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
METAL	ALUMINUM	585	585	585	UG/L	95.5	6	1	37,000	0				
	ANTIMONY	4.1	4.1	4.1	UG/L	1.2	6	1	15.0	0	6.0	0	500	0
	ARSENIC	1.8	2.6	2.2	UG/L	1.5	6	2	0.04	2	50.0	0	36.0	0
	BARIUM	44.0	86.1	64.9	UG/L	1.2	6	6	2,600	0	1,000	0		
	CADMIUM	0.25	5.7	1.7	UG/L	0.40	6	4	18.0	0	5.0	1	9.3	0
	CALCIUM	493,000	1,470,000	912,000	UG/L	41.8	6	6						
	COBALT	2.6	20.0	8.8	UG/L	0.73	6	6						
	COPPER	1.3	1.3	1.3	UG/L	2.5	6	1	1,400	0			2.4	0
	IRON	17.8	713	257	UG/L	25.7	6	3						
	MAGNESIUM	1,540,000	2,070,000	1,790,000	UG/L	97.9	6	6						
	MANGANESE	12,400	29,600	18,700	UG/L	0.23	6	6	180	6				
	MERCURY	0.10	0.10	0.10	UG/L	0.10	6	2	11.0	0	2.0	0	0.03	2
	MOLYBDENUM	3.2	3.2	3.2	UG/L	3.0	6	1	180	0				
	NICKEL	24.5	73.1	50.7	UG/L	1.7	6	5	730	0	100	0	8.2	5
	POTASSIUM	16,000	70,500	27,400	UG/L	869	6	6						
	SODIUM	2,060,000	3,380,000	2,530,000	UG/L	131	6	6						
	THALLIUM	11.7	50.7	31.2	UG/L	2.0	6	2			2.0	2		
	VANADIUM	4.9	4.9	4.9	UG/L	2.0	6	1	260	0				
	ZINC	19.5	79.6	54.2	UG/L	2.3	6	3	11,000	0			81.0	0
SVOC	HEXACHLOROETHANE	100	100	100	UG/L	10	6	1	5	1				
TPHEXT	TPH-DIESEL	73	73	73	UG/L	100	6	1	100	0i				
	TPH-MOTOR OIL	62	570	260	UG/L	100	6	3	100	2i				

TABLE 4.28-8 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
TRPH	TRPH	500	500	500	UG/L	1,000	6	1	100	1i				
ANION	CHLORIDE	10,200,000	10,200,000	10,200,000	UG/L	400,000	1	1						
	FLUORIDE	130	130	130	UG/L	100	1	1			1,400	0		
	SULFATE	1,420,000	1,420,000	1,420,000	UG/L	6,250	1	1						
SALIN	SALINITY	14.7	14.7	14.7	PPT	0.005	1	1						

TABLE 4.28-8 (Continued)

STATISTICAL SUMMARY OF MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

TABLE 4.28-9

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR36MW16A	IR36MW16A	IR36MW16A	IR36MW16A	IR36MW16A	IR67MW04A	IR67MW04A
Sample Number	9439X498	9439X499	9605W054	9610J906	9610J907	9544W139	9602J792
Sample Date	09/27/94	09/27/94	01/31/96	03/05/96	03/05/96	10/31/95	01/11/96
Metal (ug/L)							
ALUMINUM	ND (35.3)	ND (35.3)	ND (18.0)	1,160	ND (19.1)	ND (18.8)	ND (37.1)
ANTIMONY	7.6 δ	ND (1.2)	ND (1.6)	ND (8.0)	ND (1.6)	ND (3.0)	ND (1.6)
ARSENIC	2.0 *	3.2 *	ND (1.4)	ND (7.0)	ND (1.4)	ND (2.8)	1.8 *
BARIUM	45.5	44.1	44.0	71.0	48.8	86.1	78.7
CADMIUM	0.33	0.44	ND (0.54)	ND (1.0)	0.56	5.7 δ	0.25
CALCIUM	1,580,000	1,360,000	523,000	1,410,000	524,000	1,420,000	592,000
COBALT	4.7	4.0	2.6	5.7	3.9	20.0	11.9
COPPER	ND (1.7)	ND (1.7)	ND (2.2)	ND (2.5)	1.4	ND (1.2)	ND (1.3)
IRON	ND (18.8)	ND (18.8)	ND (11.0)	1,420	ND (11.0)	ND (68.0)	41.0
MAGNESIUM	2,100,000	1,840,000	1,620,000	1,650,000	1,710,000	1,860,000	1,540,000
MANGANESE	12,200 *	12,500 *	13,000 *	16,800 *	14,100 *	29,600 *	20,200 *
MERCURY	ND (0.10)	ND (0.10)	0.10 B	ND (0.10)	ND (0.10)	ND (0.10)	0.10 B
MOLYBDENUM	ND (1.5)	ND (2.2)	ND (1.8)	4.9	1.4	ND (1.2)	ND (1.2)
NICKEL	55.8 B	55.1 B	56.3 B	86.4 B	59.8 B	44.3 B	ND (24.3)
POTASSIUM	70,500	70,600	18,000	18,200	18,100	19,800	16,000
SODIUM	2,770,000	2,780,000	2,290,000	2,140,000	2,220,000	2,470,000	2,060,000
THALLIUM	11.4 δ	11.9 δ	ND (1.9)	ND (9.5)	ND (1.9)	50.7 δ	ND (8.2)
VANADIUM	ND (1.1)	ND (1.1)	ND (1.9)	6.6	3.1	ND (0.80)	ND (0.40)
ZINC	ND (3.1)	ND (3.1)	ND (13.8)	24.5	14.4	ND (10.5)	63.5
Semivolatile Organic Compound (ug/L)							
HEXACHLOROETHANE	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	100 *	ND (10)
TPH-Extractable (ug/L)							
TPH-DIESEL	63	82	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
TPH-MOTOR OIL	400	740	ND (100)	ND (100)	74	ND (100)	ND (100)
Total Recoverable Petroleum Hydrocarbons (ug/L)							
TRPH	ND (1,000)	500	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)
Anion (ug/L)							
CHLORIDE	NA	NA	NA	NA	NA	NA	NA
FLUORIDE	NA	NA	NA	NA	NA	NA	NA
SULFATE	NA	NA	NA	NA	NA	NA	NA

TABLE 4.28-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR36MW16A	IR36MW16A	IR36MW16A	IR36MW16A	IR36MW16A	IR67MW04A	IR67MW04A
Sample Number	9439X498	9439X499	9605W054	9610J906	9610J907	9544W139	9602J792
Sample Date	09/27/94	09/27/94	01/31/96	03/05/96	03/05/96	10/31/95	01/11/96
pH (pH units)							
PH	6.8	6.7	6.8	6.7	6.7	6.7	6.7
Salinity (ppt)							
SALINITY	NA	NA	NA	NA	NA	NA	NA

TABLE 4.28-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67MW04A	IR67MW04A
Sample Number	9607J877	9615Z039
Sample Date	02/15/96	04/08/96
Metal (ug/L)		
ALUMINUM	ND (19.1)	NA
ANTIMONY	ND (1.6)	NA
ARSENIC	ND (1.4)	NA
BARIUM	76.1	NA
CADMIUM	ND (0.30)	NA
CALCIUM	493,000	NA
COBALT	9.2	NA
COPPER	ND (0.50)	NA
IRON	17.8	NA
MAGNESIUM	2,070,000	NA
MANGANESE	21,700 *	NA
MERCURY	ND (0.10)	NA
MOLYBDENUM	ND (0.60)	NA
NICKEL	24.5 B	NA
POTASSIUM	21,900	NA
SODIUM	3,380,000	NA
THALLIUM	ND (1.9)	NA
VANADIUM	ND (0.40)	NA
ZINC	79.6	NA
Semivolatile Organic Compound (ug/L)		
HEXACHLOROETHANE	ND (10)	NA
TPH-Extractable (ug/L)		
TPH-DIESEL	ND (100)	NA
TPH-MOTOR OIL	150	NA
Total Recoverable Petroleum Hydrocarbons (ug/L)		
TRPH	ND (1,000)	NA
Anion (ug/L)		
CHLORIDE	NA	10,200,000
FLUORIDE	NA	130
SULFATE	NA	1,420,000

TABLE 4.28-9 (Continued)

MONITORING WELL GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67MW04A	IR67MW04A
Sample Number	9607J877	96152039
Sample Date	02/15/96	04/08/96
pH (pH units)		
PH	6.5	6.8
Salinity (ppt)		
SALINITY	NA	14.7

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
ppt Parts per thousand
µg/L Microgram per liter

* Detected concentration greater than U.S. Environmental Protection Agency Region IX preliminary remediation goals (PRG) for tap water
ß Detected concentration greater than National Ambient Water Quality Criteria (NAWQC) based on 4-day average study of saltwater aquatic life
δ Detected concentration greater than maximum contaminant level (MCL)
U.S. Environmental Protection Agency Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

Detected concentration greater than at least one screening criterion.

TABLE 4.28-10

SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL TESTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

STATION NO.	SAMPLE NO.	ANION	ASBESTOS	CHROM	CYAN	DIOXIN	METAL	O&G	PAH	PCTMST	PEST	PH	PHYS	SALIN	SOLIDS	SVOC	TMICROB	TOC	TPHEXT	TPHPRG	TRPH	VOC
IR67B001	9534B016																		✓	✓		✓
IR67B002	9534B012																		✓	✓		✓
IR67B005	9534B007																		✓	✓		✓
IR67B005	9534B008																		✓	✓		✓
IR67MW04A	9534B010																		✓	✓		✓

Notes:

CHROM	CHROMIUM VI
CYAN	Cyanide
DIOXIN	Dioxins and Furans
O&G	Total oil and grease
PAH	Polynuclear aromatic hydrocarbons
PCTMST	Percent moisture
PEST	Pesticides/polychlorinated biphenyls
PHYS	Physical characteristic
SALIN	Salinity
SVOC	Semivolatile organic compounds
SOLIDS	Total dissolved solids
TOC	Total organic carbon
TMICROB	Coliform
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compounds

TABLE 4.28-11

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Analysis Code	Analyte	Detected Results[a]				Detection Limit Average	Detection frequency[b]							
		Minimum	Maximum	Average	Units		Samples Analyzed[c]	Total Detects[d]	Tap Water PRG Value	Above[e] PRG	MCL Value[f]	Above[g] MCL	NAWQC Value	Above[h] NAWQC
TPHEXT	TPH-DIESEL	160	410	260	UG/L	100	4	4	100	4i				
	TPH-MOTOR OIL	87	390	190	UG/L	100	4	4	100	3i				

TABLE 4.28-11 (Continued)

STATISTICAL SUMMARY OF HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Notes:

CYAN	Cyanide
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NAWQC	National Ambient Water Quality Criteria
O&G	Total oil and grease
PCTMST	Percent moisture
PEST	Pesticide/polychlorinated biphenyl
PPT	Parts per thousand
PRG	Preliminary remediation goal
SALIN	Salinity
SVOC	Semivolatile organic compound
TMICROB	Coliform
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractable
TPHPRG	Total petroleum hydrocarbons-purgeable
TRPH	Total recoverable petroleum hydrocarbons
UG/L	Microgram per liter
VOC	Volatile organic compound

a Organic results of less than 10 are reported to one significant figure, and results of greater than or equal to 10 are reported to two significant figures. Inorganic results of less than 10 are reported to two significant figures, and results of greater than or equal to 10 are reported to three significant figures. Values that are not nondetects are compared to screening criteria before the significant figure rule is applied. Both the value and the screening criteria are then rounded for reporting purposes.

b Blank boxes indicate that screening critera have not been established for these analytes.

c Total number of samples analyzed

d Total number of samples showing concentrations greater than detection limit

e Total number of samples showing concentrations greater than tap water PRG
California-modified PRGs were used for the following analytes: 1,2-Dibromo-3-chloropropane, benzo[a]pyrene, benzo[k]fluoranthene, cadmium, chromium VI, chrysene, lead, nickel, and tetrachloroethylene (PCE).
For the analytes listed below, Region IX PRGs are not available; therefore, PRGs for similar chemicals were used as follows:

Analyte:	Similar Analyte:
2-Methylnapthalene	Naphthalene
Acenaphthylene	Acenaphthene
Alpha-chlordane	Chlordane
Aroclor-1260	Polychlorinated biphenyls
Benzo(g,h,i)perylene	Naphthalene
Delta BHC	HCH-technical
Endosulfan I	Endosulfan
Endosulfan sulfate	Endosulfan
Endrin aldehyde	Endrin
Endrin ketone	Endrin
Gamma-chlordane	Chlordane
Phenanthrene	Naphthalene

f EPA Title 40 Code of Federal Regulations or California Code of Regulations Title 22 MCL used, whichever is more stringent

g Total number of samples showing concentrations greater than MCL

h Total number of samples showing concentrations greater than NAWQC;
NAWQC based on 4-day average study of saltwater aquatic life

i Total number of samples showing concentrations greater than TPH, TRPH, or O&G screening level, not PRG value

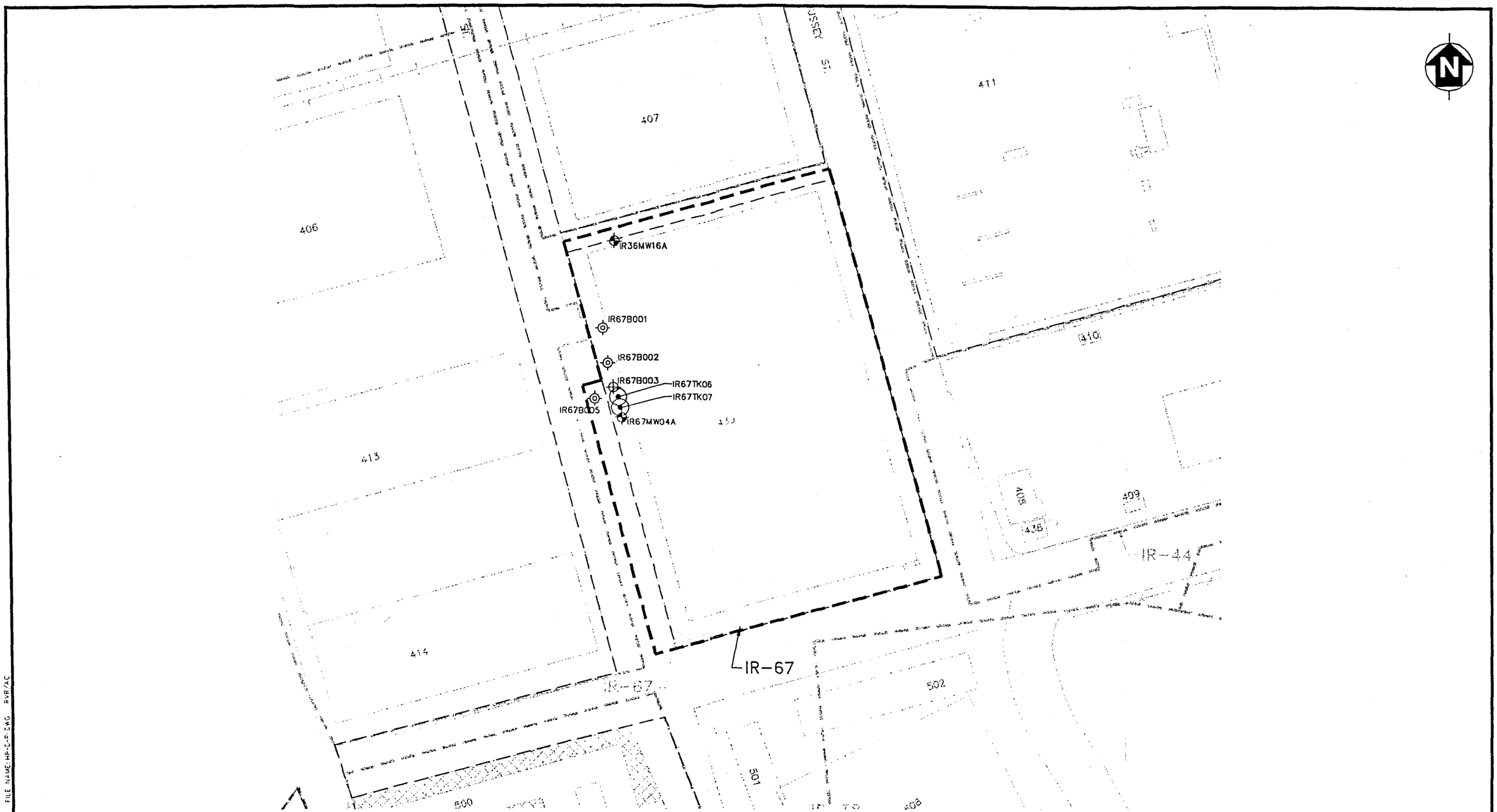
TABLE 4.28-12

HYDROPUNCH GROUNDWATER ANALYTICAL RESULTS - IR-67
HUNTERS POINT SHIPYARD, PARCEL D REMEDIAL INVESTIGATION

Station Number	IR67B001	IR67B002	IR67B005	IR67B005	IR67MW04A
Sample Number	9534B016	9534B012	9534B007	9534B008	9534B010
Sample Date	08/22/95	08/22/95	08/21/95	08/21/95	08/22/95
TPH-Extractable (ug/L)					
TPH-DIESEL	160	170	290	280	410
TPH-MOTOR OIL	120	87	170	180	390

Notes:

NA Not analyzed
ND() Not detected (detection limit in parentheses)
µg/L Microgram per liter



EXPLANATION:

- ▲ SURFACE OR NEAR SURFACE SOIL SAMPLE
- SOIL BORING
- A-AQUIFER MONITORING WELL
- BEDROCK AQUIFER MONITORING WELL
- TEST PIT
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- FENCE
- RAILROAD TRACKS
- 0.5 ACRE EXPOSURE AREA BOUNDARY
- DATA SET BOUNDARY
- UNPAVED AREA

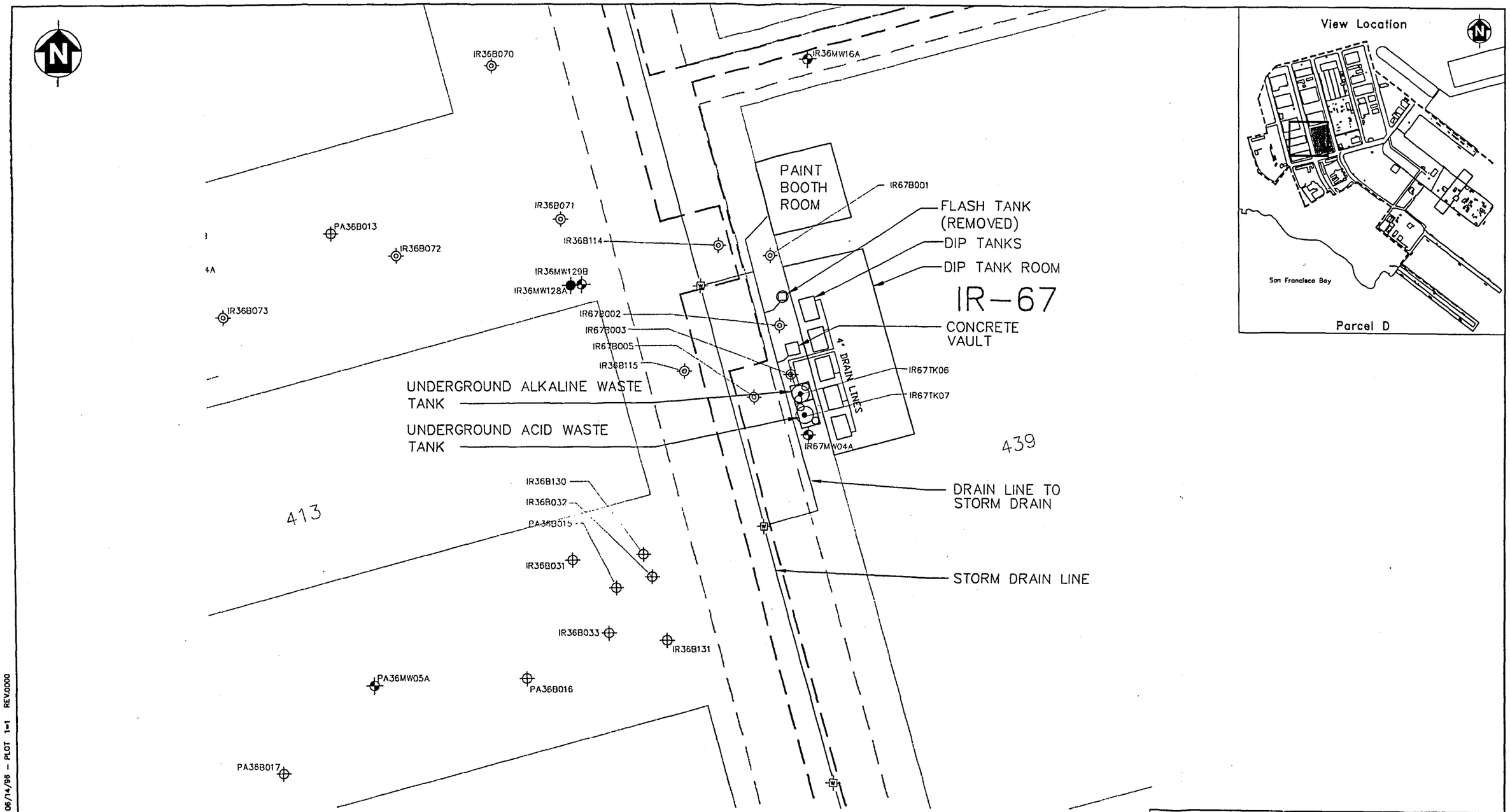
50 0 50 100
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ENGINEERING FIELD ACTIVITY WEST
SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.28-1
PARCEL D
IR-67 SITE BOUNDARY
SOIL AND GROUNDWATER SAMPLE LOCATIONS

DATE: 09/20/96 - 069-0058050105 FILE NAME: HP-D-P-DWG RVR/AC



LEGEND

- SOIL BORING (WITH HYDROPUNCH OR GRAB GROUNDWATER SAMPLE COLLECTED)
- A-AQUIFER MONITORING WELL
- SOIL BORING
- B-AQUIFER MONITORING WELL
- UNDERGROUND STORAGE TANK SAMPLE
- STORM DRAIN
- IR SITE BOUNDARY
- DATA SET BOUNDARY (EXTENDED IR SITE BOUNDARY)

25 0 25 50
SCALE IN FEET

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

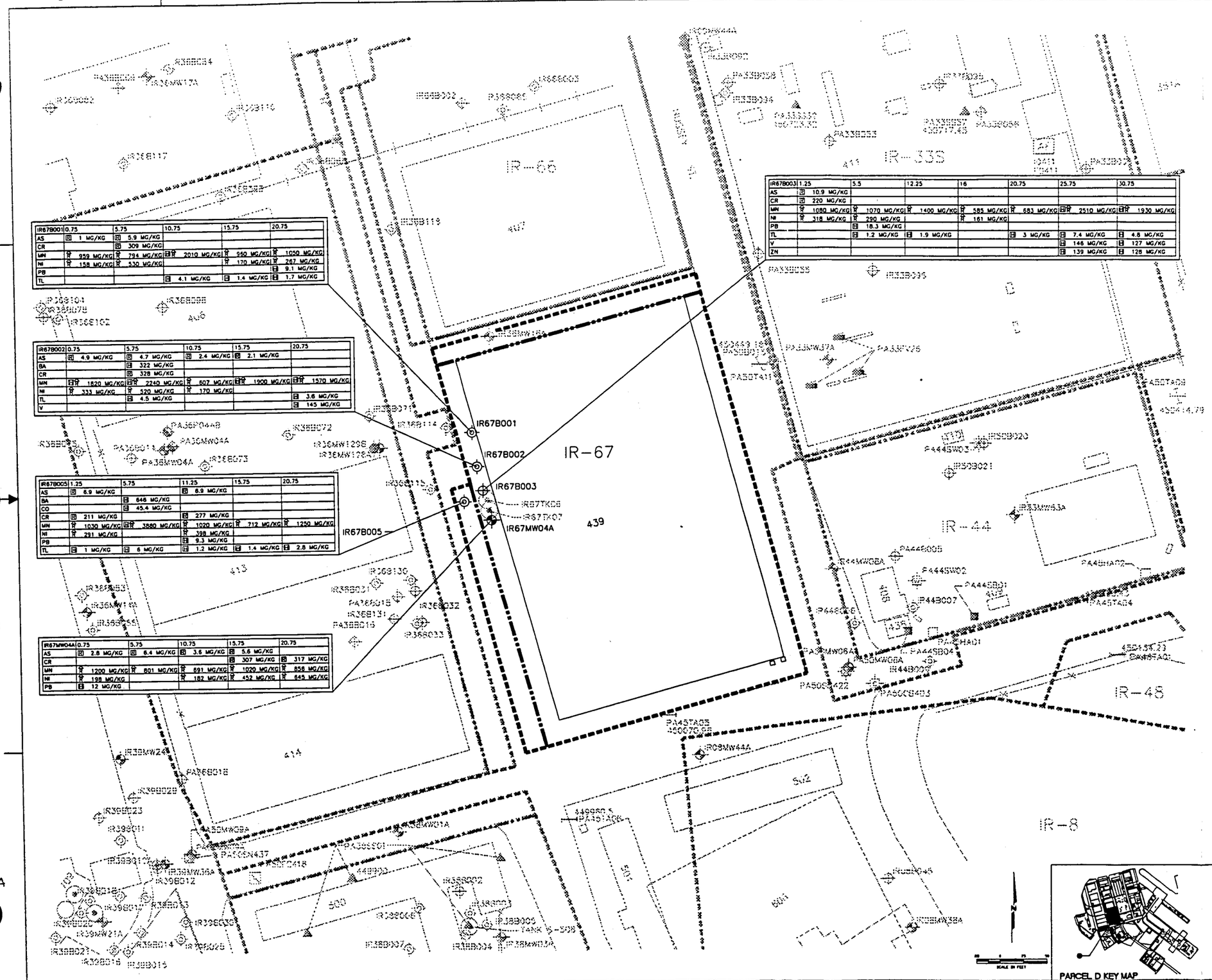
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.28-1A

DETAIL AREA FOR IR-67

PARCEL D REMEDIAL INVESTIGATION

JCE(UA)(200-09)67TG001.DWG - 06/14/96 - PLOT 1=1 REV.0000



IR67B001	0.75	5.75	10.75	15.75	20.75
AS	[H] 1 MG/KG	[H] 5.9 MG/KG			
CR		[H] 309 MG/KG			
MN	[R] 959 MG/KG	[R] 794 MG/KG	[H][R] 2010 MG/KG	[R] 950 MG/KG	[R] 1050 MG/KG
NI	[R] 158 MG/KG	[R] 530 MG/KG		[R] 170 MG/KG	[R] 267 MG/KG
PB					[E] 9.1 MG/KG
TL			[E] 4.1 MG/KG	[E] 1.4 MG/KG	[E] 1.7 MG/KG

IR67B002	0.75	5.75	10.75	15.75	20.75
AS	[H] 4.9 MG/KG	[H] 4.7 MG/KG	[H] 2.4 MG/KG	[H] 2.1 MG/KG	
BA		[E] 322 MG/KG			
CR		[H] 328 MG/KG			
MN	[H][R] 1820 MG/KG	[H][R] 2240 MG/KG	[R] 607 MG/KG	[H][R] 1900 MG/KG	[H][R] 1570 MG/KG
NI	[R] 333 MG/KG	[R] 520 MG/KG	[R] 170 MG/KG		
TL		[E] 4.5 MG/KG			[E] 3.6 MG/KG
V					[E] 145 MG/KG

IR67B005	1.25	5.75	11.25	15.75	20.75
AS	[H] 6.9 MG/KG		[H] 6.9 MG/KG		
BA		[E] 646 MG/KG			
CO		[E] 45.4 MG/KG			
CR	[H] 211 MG/KG		[H] 277 MG/KG		
MN	[R] 1030 MG/KG	[H][R] 3880 MG/KG	[R] 1020 MG/KG	[R] 712 MG/KG	[R] 1250 MG/KG
NI	[R] 291 MG/KG		[R] 398 MG/KG		
PB			[E] 9.3 MG/KG		
TL	[E] 1 MG/KG	[E] 6 MG/KG	[E] 1.2 MG/KG	[E] 1.4 MG/KG	[E] 2.8 MG/KG

IR67MW04A	0.75	5.75	10.75	15.75	20.75
AS	[H] 2.8 MG/KG	[H] 6.4 MG/KG	[H] 3.6 MG/KG	[H] 5.6 MG/KG	
CR				[H] 307 MG/KG	[H] 317 MG/KG
MN	[R] 1200 MG/KG	[R] 801 MG/KG	[R] 691 MG/KG	[R] 1020 MG/KG	[R] 858 MG/KG
NI	[R] 198 MG/KG		[R] 182 MG/KG	[R] 452 MG/KG	[R] 845 MG/KG
PB	[E] 12 MG/KG				

IR67B003	1.25	5.5	12.25	16	20.75	25.75	30.75
AS	[H] 10.9 MG/KG						
CR	[H] 220 MG/KG						
MN	[R] 1080 MG/KG	[R] 1070 MG/KG	[R] 1400 MG/KG	[R] 585 MG/KG	[R] 683 MG/KG	[H][R] 2510 MG/KG	[H][R] 1930 MG/KG
NI	[R] 318 MG/KG	[R] 290 MG/KG		[R] 161 MG/KG			
PB		[E] 18.3 MG/KG					
TL		[E] 1.2 MG/KG	[E] 1.9 MG/KG		[E] 3 MG/KG	[E] 7.4 MG/KG	[E] 4.8 MG/KG
V						[E] 146 MG/KG	[E] 127 MG/KG
ZN						[E] 139 MG/KG	[E] 128 MG/KG

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDRY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
SOIL SAMPLE DEPTH (feet bgs)

IR67B045	2.75
TCE	34
As	0.0028

ANALYTE

CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (mg/kg) FOR INORGANICS, TPH-g, TPH-d, TPH-mo, TOG, AND TRPH, AND IN MICROGRAMS PER KILOGRAM (µg/kg) FOR OTHER ORGANICS.

- [H] EXCEEDS CARCINOGENIC RESIDENTIAL PRG
- [R] EXCEEDS NON-CARCINOGENIC RESIDENTIAL PRG
- [E] EXCEEDS HPAL
- [E] EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE ORGANICS HITS EXCEEDING RESIDENTIAL PRG REFERENCE VALUES AND INORGANICS HITS EXCEEDING HPALs OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW HPAL, REFERENCE VALUES FOR INORGANICS OR BELOW RESIDENTIAL PRG REFERENCE VALUES FOR ORGANICS AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

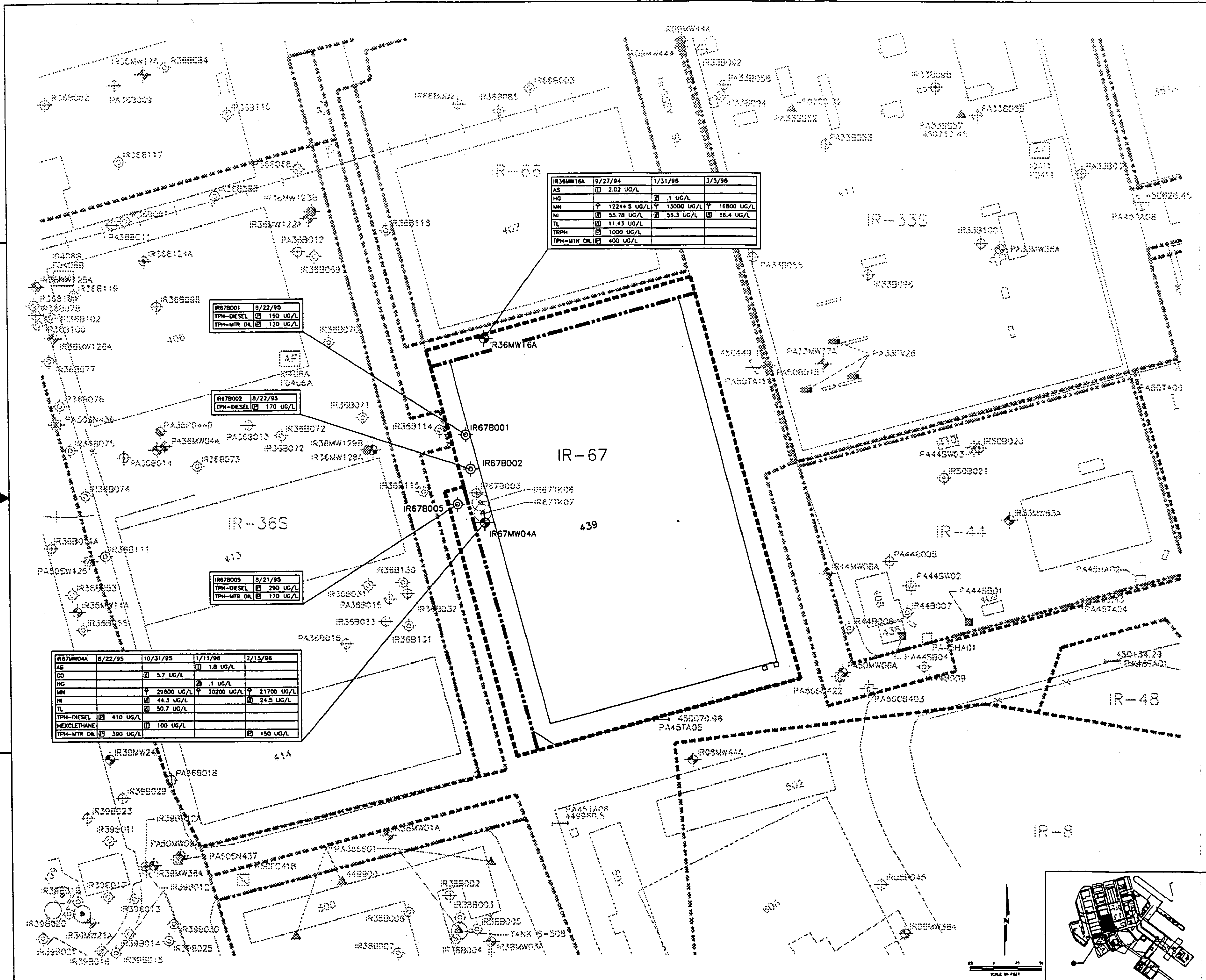
HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.28-2 SHT 1 OF 1

IR-67 SOIL RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-67 4.28-2 | SH 1 | REV 1

FILE NAME: 6742821_.DWG



IR36MW16A	9/27/94	1/31/96	3/5/96
AS	2.02 UG/L		
HG		.1 UG/L	
MN	12244.5 UG/L	13000 UG/L	16800 UG/L
NI	55.78 UG/L	56.3 UG/L	86.4 UG/L
TL	11.43 UG/L		
TRPH	1000 UG/L		
TPH-MTR OIL	400 UG/L		

IR67B001	8/22/95
TPH-DIESEL	160 UG/L
TPH-MTR OIL	120 UG/L

IR67B002	8/22/95
TPH-DIESEL	170 UG/L

IR67B005	8/21/95
TPH-DIESEL	290 UG/L
TPH-MTR OIL	170 UG/L

IR67MW04A	8/22/95	10/31/95	1/11/96	2/15/96
AS			1.8 UG/L	
CD		5.7 UG/L		
HG			.1 UG/L	
MN		29600 UG/L	20200 UG/L	21700 UG/L
NI		44.3 UG/L		24.5 UG/L
TL		50.7 UG/L		
TPH-DIESEL	410 UG/L			
HEXCLETHANE		100 UG/L		
TPH-MTR OIL	390 UG/L			150 UG/L

LEGEND:

- SOIL BORING
- SOIL BORING/HYDROPUNCH
- A-AQUIFER MONITORING WELL
- B-AQUIFER MONITORING WELL
- BEDROCK MONITORING WELL
- PIEZOMETER
- SURFACE OR NEAR SURFACE SOIL SAMPLE
- INTERTIDAL SEDIMENT SAMPLE
- SANDBLAST MATERIAL
- TEST PIT; SYMBOL DOES NOT REPRESENT TRUE LENGTH OF TEST PIT
- STORM DRAIN SEDIMENT SAMPLE
- CATCH BASIN
- FLOOD CONTROL GATE
- SANITARY SEWER
- STEAMLINE INSPECTION
- STEAMLINE INSPECTION AND BORESCOPE
- SUMP SAMPLE
- ASBESTOS SAMPLE
- TIDAL STATION
- RAINFALL STATION
- FLOOR SCRAPINGS
- HAND AUGER
- WIPE SAMPLE
- AIR FLUX SAMPLE
- FLOOR VAULT
- DRY BOREHOLE
- EXPLORATORY EXCAVATION
- FLOOR DRAIN
- EMCON SOIL BORING
- EMCON A-AQUIFER MONITORING WELL
- EMCON BEDROCK MONITORING WELL
- DAMES & MOORE SOIL BORING
- 159 EXISTING BUILDING
- 155 LOCATION OF FORMER BUILDING
- UNDERGROUND STORAGE TANK IN HPA TANK PROGRAM
- EXTENDED IR SITE BOUNDARY
- IR SITE BOUNDARY
- PARCEL BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

SAMPLE LOCATION
DATE OF GROUNDWATER SAMPLE, G=GRAB, OR HYDROPUNCH SAMPLE DEPTH.

IR10MW28A	6/15/92
TCE	38
As	0.0028

ANALYTE
CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)
EXCEEDS CARCINOGENIC TAP WATER PRG
EXCEEDS NON-CARCINOGENIC TAP WATER PRG
EXCEEDS NAWQC
EXCEEDS MCL
EXCEEDS PETROLEUM SCREENING CRITERIA

POSTED DATA ARE INORGANICS AND ORGANICS HITS EXCEEDING EITHER MCL, TAP WATER PRG, NAWQC REFERENCE VALUES OR PETROLEUM SCREENING CRITERIA.

NOTE: STATION LABELS WITHOUT DATA BOXES INDICATE EITHER THAT NO CHEMICALS WERE DETECTED OR THAT DETECTED CHEMICALS WERE BELOW MCL, TAP WATER PRG, NAWQC REFERENCE VALUES AND PETROLEUM SCREENING CRITERIA.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

FIGURE 4.28-3 SHT 1 OF 1

IR-67 GROUNDWATER RESULTS
EXCEEDING SCREENING CRITERIA
PARCEL D RI REPORT

DWG NO. IR-67 4.28-3 SH 1 REV —

FILE NAME: 6742831_.DWG

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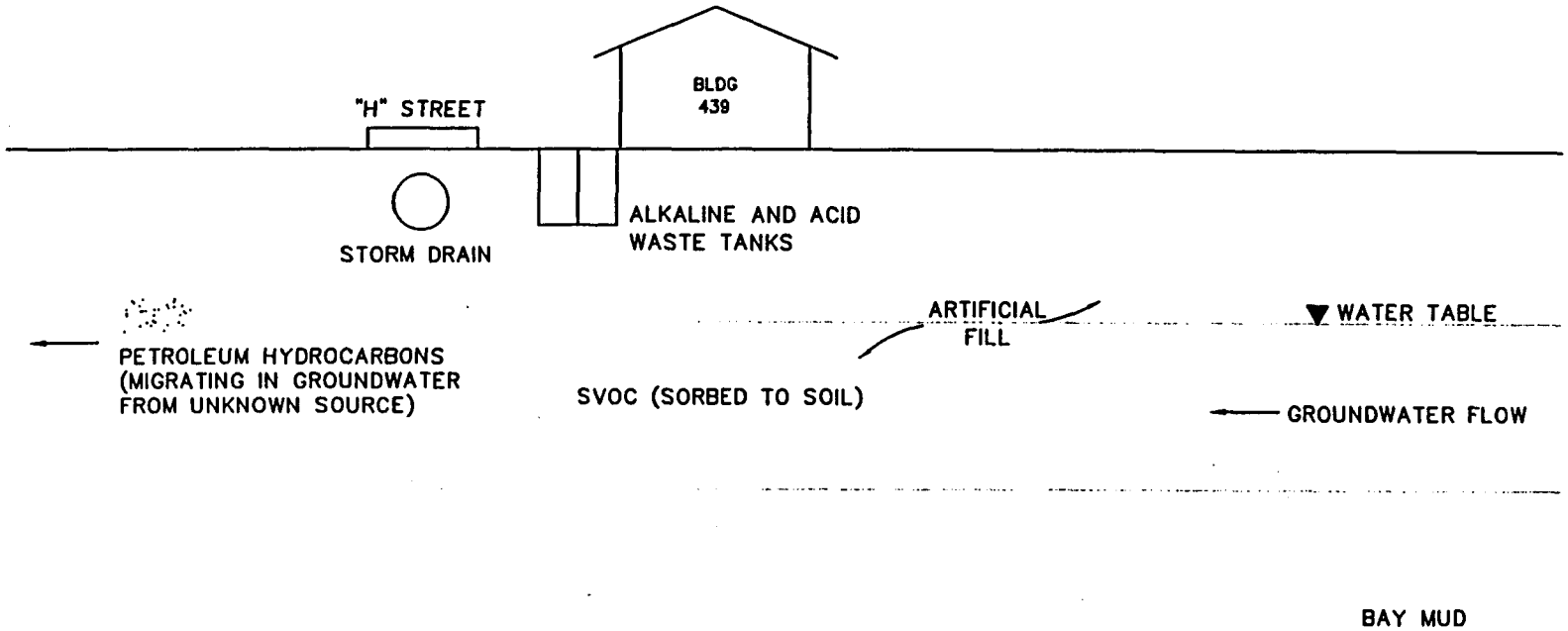

LEGEND

MINOR MIGRATION ROUTE

SVOC

PETROLEUM HYDROCARBONS

NOTE

A COMPLETE DISCUSSION OF CONTAMINANT NATURE AND EXTENT AND FATE AND TRANSPORT IS INCLUDED IN SECTIONS 4.28.4 AND 4.28.5.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ENGINEERING FIELD ACTIVITY WEST

SAN BRUNO, CALIFORNIA

HUNTERS POINT SHIPYARD — SAN FRANCISCO, CALIFORNIA

Figure 4.28.5-1
Schematic Cross Section Showing Migration of Main Contaminants at IR-67
Parcel D Remedial Investigation