Final

Construction Summary Report for Parcel B

Hunters Point Shipyard
San Francisco, California

July 25, 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
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PREPARED FOR:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

Project Manager: _____ Date: 7/25/08
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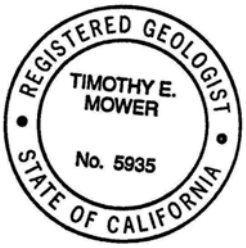

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IR-07	
7-1A	4-4'-DDE
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7-1C	Arsenic
7-1D	Benzo(a)anthracene
7-1E	Benzo(a)pyrene
7-1F	Benzo(b)fluoranthene
7-1G	Benzo(k)fluoranthene
7-1H	Beryllium
7-1I	Copper
7-1J	Lead
7-1K	Total TPH
7-1L	Zinc
7-2	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Aldrin, Antimony, Benzo(a)anthracene, Beryllium, Chrysene
7-3A	Aroclor-1260
7-3B	Benzo(a)anthracene
7-3C	Benzo(a)pyrene
7-3D	Benzo(b)fluoranthene
7-3E	Benzo(k)fluoranthene
7-3F	Beryllium
7-3G	Chrysene
7-3H	Copper
7-3I	Dibenz(a,h)anthracene
7-3J	Indeno(1,2,3-cd)pyrene
7-3K	Lead
7-3L	Zinc
7-4A	Antimony
7-4B	Aroclor-1254
7-4C	Aroclor-1260
7-4D	Arsenic
7-4E	Benzo(a)anthracene
7-4F	Benzo(a)pyrene
7-4G	Benzo(b)fluoranthene
7-4H	Benzo(k)fluoranthene

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Figure	Chemicals of Potential Concern
7-4I	Bis(2-ethylhexyl)phthalate
7-4J	Cadmium
7-4K	Copper
7-4L	Indeno(1,2,3-cd)pyrene
7-4M	Lead
7-4N	Manganese
7-4O	Mercury
7-4P	Total TPH
7-4Q	Zinc
7-5A	Aroclor-1254
7-5B	Aroclor-1260
7-5C	Benzo(a)anthracene
7-5D	Benzo(a)pyrene
7-5E	Benzo(b)fluoranthene
7-5F	Benzo(k)fluoranthene
7-5G	Beryllium
7-5H	Chrysene
7-5I	Copper
7-5J	Indeno(1,2,3-cd)pyrene
7-5K	Lead
7-5L	Mercury
7-5M	Total TPH
7-5N	Zinc
B0536	Aroclor-1260, Beryllium, Total TPH
B0628	Aroclor-1260, Beryllium
B0632	Arsenic, Beryllium, Total TPH
B0636	Arsenic, Lead
B0933	Aroclor-1254
B1036A	Aldrin, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene,
B1036B	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Beryllium, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Total TPH
B1128	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, n-Nitroso-di-n-propylamine
B1132	Copper, Total TPH
B1227A	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene

EXCAVATION SUMMARY FIGURES (Continued)

Figure	Chemicals of Potential Concern
B1227B	Beryllium, Chrysene, Dibenz(a,h)anthracene, Total TPH
B1324	Antimony, Benzo(a)anthracene, Benzo(b)fluoranthene, Chrysene, Total TPH
B1422	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Beryllium, Chrysene, Indeno(1,2,3-cd)pyrene
IR-10	
10-1A	Manganese
10-1B	Total TPH
10-1C	Trichloroethene
10-2A	Arsenic
10-2B	Beryllium
10-2C	Manganese
10-2D	Trichloroethene
10-4	All
10-5A	Arsenic, Copper, Lead
10-5B	Manganese
B2725	Trichloroethene
B2727	All
B2925	All
B2926	All
B3125	All
B3324	All
B3422A	Aroclor-1260
B3422B	Benzo(a)pyrene, Benzo(b)fluoranthene
B3422C	Benzo(k)fluoranthene, Copper, Dibenz(a,h)anthracene, Diesel Range Organics, Indeno(1,2,3-cd)pyrene
B3422D	Lead
B3423	All
B3425A	Beryllium
B3425B	Manganese
B3622A	Diesel Range Organics
B3622B	Aroclor-1260
B3622C	Manganese
B3623	All
B3625	All

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Figure	Chemicals of Potential Concern
IR-18	
18-1A	Benzo(k)fluoranthene, Beryllium, Chrysene
18-1B	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene
18-2A	Aroclor-1254
18-2B	Aroclor-1260
18-2C	Benzo(a)anthracene
18-2D	Benzo(a)pyrene
18-2E	Benzo(b)fluoranthene
18-2F	Benzo(k)fluoranthene
18-2G	Bis(2-ethylhexyl)phthalate
18-2H	Chrysene
18-2I	Dibenz(a,h)anthracene
18-2J	Indeno(1,2,3-cd)pyrene
18-2K	Lead
18-2L	Total TPH
18-2M	Zinc
18-3A	Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Lead
18-3B	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene,
18-4A	Aroclor-1254, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
18-4B	Aroclor-1260, Copper
B0136	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
B0146A	Lead
B0146B	Zinc
B0241	Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene
B0337	Aroclor-1260, Lead
B0638	4,4'-DDD, 4,4'-DDT, Benzo(a)pyrene, Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene
B1138	Beryllium, Total TPH
IR-20	
20-1A	Arsenic, Copper
20-1B	Manganese

EXCAVATION SUMMARY FIGURES (Continued)

Figure	Chemicals of Potential Concern
20-2A	Aroclor-1260
20-2B	Mercury
20-3	All
B4217A	Aluminum, Diesel Range Organics, Gasoline Range Organics
B4217B	Manganese
B4219	All
B4419	All
B4420	All
B4519A	Aluminum, Manganese
B4519B	Aroclor-1260
IR-23	
23-1	All
23-2A	Beryllium
23-2B	Manganese
23-3A	Aroclor-1260, Copper, Diesel Range Organics, Gasoline Range Organics
23-3B	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene
B1525	All
B2127	All
EE-01	All
EE-02A	Aroclor-1260
EE-02B	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Beryllium, Chrysene, Indeno(1,2,3-cd)pyrene, Vanadium
EE-03A	Arsenic
EE-03B	Diesel Range Organics, Motor Oil Range Organics
EE-03C	Copper, Lead
EE-03D	Manganese
IR-24	
24-1A	Arsenic, Diesel Range Organics
24-1B	Manganese
24-2	All
24-3	All
24-4	All
24-5	All

EXCAVATION SUMMARY FIGURES (Continued)

Figure	Chemicals of Potential Concern
24-6A	Arsenic, Barium, Beryllium
24-6B	Copper
24-6C	Manganese
24-8A	Copper
24-8B	Arsenic, Beryllium
24-8C	Benzo(a)anthracene, Benzo(a)pyrene
24-8D	Diesel Range Organics
24-8E	Manganese
24-9A	Diesel Range Organics, Gasoline Range Organics, Trichloroethene
24-9B	Manganese
B2414A	Aroclor-1260, Diesel Range Organics
B2414B	Mercury
B2614	All
B2616	All
B2715A	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene
B2715B	Copper, Zinc
B2915	All
B2918	All
B3114A	Benzo(a)pyrene
B3114B	Benzo(b)fluoranthene, Benzo(k)fluoranthene
B3415	All
B3514	All
B3614	All
B3718A	Aluminum, Chrysene, Diesel Range Organics
B3718B	Cadmium
B3718C	Manganese
B3914A	Chrysene, Copper
B3914B	Manganese
B3916	All
B4017	All
B4018A	Aroclor-1260
B4018B	Benzo(a)pyrene
B4018C	Lead
B4113A	Benzo(a)anthracene
B4113B	Benzo(a)pyrene
B4113C	Benzo(b)fluoranthene
B4113D	Chrysene

EXCAVATION SUMMARY FIGURES (Continued)

Figure	**Chemicals of Potential Concern**
B4114	All
IR-26	
26-1 (EE-04A)	All
26-2 (EE-04B)	All
B4315	All
B4417	All
B4715	All
B4815	All
B4818A	Benzo(a)anthracene
B4818B	Benzo(a)pyrene
B4818C	Benzo(b)fluoranthene
B4818D	Benzo(k)fluoranthene
B4818E	Chrysene
B4818F	Copper
B4818G	Dibenzo(a,h)anthracene
B4818H	Indeno(1,2,3-cd)pyrene
B4818I	Lead
B4818J	Mercury
B4818K	Zinc
EE-04C	All
EE-05A	Lead
EE-05B	Manganese
EE-05C	Arsenic, Mercury
EE-05D	Chrysene, Dibenz(a,h)anthracene
EE-05E	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene
EE-05F	Copper
EE-05G	Zinc
EE-05H	Alpha-Chlordane, Gamma-Chlordane
IR-42	
42-1	All
B3229	All
B3229A	All

EXCAVATION SUMMARY FIGURES (Continued)

Figure	**Chemicals of Potential Concern**
Fuel Lines	
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Fuel Line C Figure B	Aroclor-1260, Arsenic, Beryllium, Diesel Range Organics, Gasoline Range Organics, Motor Oil Range Organics, Zinc
Fuel Line C Figure C	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
Fuel Line C Figure D	Manganese
Fuel Line F Figure A	Aroclor-1260, Beryllium, Chrysene, Dibenz(a,h)anthracene, Diesel Range Organics, Gasoline Range Organics, Motor Oil Range Organics, Zinc
Fuel Line F Figure B	Copper
Fuel Line F Figure C	Arsenic
Fuel Line F Figure D	Benzo(a)anthracene, Benzo(a)pyrene
Fuel Line F Figure E	Benzo(b)fluoranthene
Fuel Line F Figure F	Benzo(k)fluoranthene
Fuel Line F Figure G	Indeno(1,2,3-cd)pyrene

EXCAVATION SUMMARY FIGURES (Continued)

Figure	**Chemicals of Potential Concern**
Fuel Line F Figure H	Manganese
IR-60	
60-1A	Arsenic, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
60-1B	Benzo(b)fluoranthene
60-1C	Manganese
60-2A	Arsenic, Cadmium, Diesel Range Organics, Zinc
60-2B	Copper
B1816	All
IR-61	
B2225	All
B2425	All
IR-62	
B2030	All
Industrial Drain Line	
IDL-A	Benzo(a)pyrene
IDL-B	Benzo(b)fluoranthene
IDL-C	Benzo(k)fluoranthene
IDL-D	Cadmium
IDL-E	Copper
IDL-F	Lead
PAH-Only Sites	
PAH Sample Locations	All

Notes:

DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
IR	Installation Restoration
PAH	Polynuclear aromatic hydrocarbon
TPH	Total petroleum hydrocarbons

bgs	Below ground surface
BCT	Base Realignment and Closure Cleanup Team
BRAC	Base Realignment and Closure
CAP	Corrective action plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Chemical of potential concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyltrichloroethene
DDT	Dichlorodiphenyltrichloroethane
DTSC	Department of Toxic Substances Control
EE	Exploratory excavation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of significant differences
FS	Feasibility study
ft^2	Square feet
HI	Hazard index
HPAL	Hunters Point ambient level
HPS	Hunters Point Shipyard
IR	Installation Restoration
IRP	Installation Restoration Program
IT	IT Corporation
mg/kg	Milligram per kilogram
MK	Morrison Knudsen Corporation
msl	Mean sea level
PA	Preliminary assessment
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
RA	Remedial action
RD	Remedial design
RI	Remedial investigation
ROD	Record of decision

SFRA	San Francisco Redevelopment Agency
SI	Site inspection
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TACAN	Tactical air navigation
TCE	Trichloroethene
Tetra Tech	Tetra Tech EM Inc.
TMSRA	Technical Memorandum in Support of a Record of Decision Amendment
TPH	Total petroleum hydrocarbons
TPH-p	Total petroleum hydrocarbons-purgeable
Triple A	Triple A Machine Shop
TSCA	Toxic Substances Control Act
VOC	Volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board
yd^3	Cubic yard

EXECUTIVE SUMMARY

This construction summary report presents the results of the soil remedial action (RA) undertaken by the U.S. Department of the Navy from 1998 through 2001 at 106 excavation sites at Parcel B at Hunters Point Shipyard (HPS) in San Francisco, California. The soil investigations and excavations completed as part of this RA were based on the human health risk-based screening criteria established in the record of decision (ROD) for Parcel B (Navy 1997) and the two ROD explanation of significant differences (ESD) documents (Navy 1998, 2000).

Excavations were conducted from 1998 to 1999 at 83 remedial areas in Parcel B, where hazardous substances were detected during the remedial investigation (RI) at levels associated with human health risks exceeding ROD soil cleanup standards. Excavation activities were paused in September 1999 while the Navy updated the cleanup levels presented in the 1997 ROD (see Section 2.0 for more discussion). Additional excavation activities were conducted in 2000 and 2001 at 46 remedial areas, 38 of which had been suspended in 1999. The 2000 to 2001 RA activities used the revised cleanup levels contained in the May 2000 ESD as cleanup criteria. The 2000 ESD cleanup levels represent U.S. Environmental Protection Agency (EPA) residential preliminary remediation goals (PRG), modified to incorporate a produce uptake pathway, except where these PRGs would be lower than Hunters Point ambient levels (HPAL) or laboratory practical quantitation limits. In those cases, HPALs or practical quantitation limits are the cleanup levels.

This report includes discussions of eight sites that were identified during the remedial design (RD) for excavation based on the 1997 ROD cleanup levels. However, the chemical concentrations detected at these sites did not exceed the 2000 ESD cleanup levels, and these sites were not excavated. These eight sites are termed “never opened” in this report and are included for completeness. Two other excavation areas (10-1 and 10-2) were also never opened because of conflicts with ongoing work for treatability studies at Installation Restoration (IR) Site 10.

This report also includes discussion of exploratory excavations (EE-01 through EE-05) at Parcel B conducted between July 1996 and January 1997. These exploratory excavations were completed to address risks related to chemicals in soil that were identified in an action memorandum (PRC 1996b) that followed the RI. Table 1-1 in Section 1.0 contains a detailed list of all the excavations discussed in this report.

The Navy revised the boundary between Parcels B and C in 2002 to consolidate areas of similar contamination and potential remedial action (Navy 2002). This change moved Installation Restoration Site 06 to Parcel C. Data from excavations completed in the transferred area are addressed in the feasibility study report for Parcel C (SulTech 2008).

1998 TO 1999 REMEDIAL ACTION

The Navy excavated about 54,400 cubic yards of soil from 83 areas at Parcel B between July 1998 and September 1999. The excavation strategy during the 1998 to 1999 RA incorporated excavation and subsequent screening-level sampling. If screening samples exceeded the 1997 ROD soil cleanup levels, excavation continued followed by repeated sampling. If the screening samples did not exceed the soil cleanup level, the Navy collected confirmation samples. The confirmation sampling for the 1998 to 1999 RA activities was conducted according to the RD confirmation sampling and analysis plan. The strategy for excavation sampling was based on the concept of random, systematic random, and judgmental sampling and EPA's "Methods for Evaluating the Attainment of Cleanup Standards" guidance (EPA 1989). The sampling approach used composite samples collected from subdivisions of an excavation sidewall and bottom to identify the remaining concentrations of chemicals of potential concern (COPC). In general, the bottom of an excavation was characterized by a composite sample collected for every 500 square feet (ft^2) of excavation bottom. Excavation sidewalls were characterized by one 3-point composite sample per 50 linear feet of excavation sidewall.

Fuel and steam lines also were removed during activities conducted from 1998 to 1999. Most of the lines were contained in belowground, concrete enclosures (termed utilidors), although some short segments were directly buried. Lines were emptied of liquids, cut, removed, and disposed of or recycled. Lines that were inaccessible (such as those beneath buildings) were rinsed, plugged, capped, and left in place.

The chemicals identified for analysis at each excavation were selected according to the list of COPCs presented for each excavation in the RD. In addition, if a screening-level sample result exceeded the ROD cleanup level, that COPC was added to those already identified in the RD.

2000 TO 2001 REMEDIAL ACTION

The Navy excavated about 47,200 cubic yards of soil from 46 areas at Parcel B between May 2000 and December 2001. The confirmation sampling for the 2000 to 2001 RA activities was conducted according to the RD amendment (Tetra Tech 2001b) using the 2000 ESD cleanup levels. Similar to the 1998 to 1999 activities, the sampling strategy was based on the concept of random, systematic random, and judgmental sampling. However, instead of only post-excavation sampling, the 2000 to 2001 activities involved a large amount of pre-excavation sampling using a GeoProbe direct-push rig to delineate the extent of contamination before excavation resumed. The sampling approach used random and bias discrete samples for excavation sidewalls and composite samples collected from subdivisions of an excavation bottom to identify the remaining concentrations of COPCs.

Excavation sidewall and bottom sampling followed the detailed approach described in the RD amendment. In general, random discrete samples were collected every 17 feet along an excavation sidewall. Excavation bottom sampling followed a similar approach to that implemented during the 1998 to 1999 RA. In general, a 5-point bottom composite sample was collected for every 500 ft^2 of excavation bottom.

SUMMARY

The Navy completed excavation activities at Parcel B from 1998 to 1999 and 2000 to 2001 to meet the soil cleanup requirements contained in the October 1997 ROD and subsequent August 1998 and May 2000 ESDs. The Navy removed about 101,600 cubic yards of contaminated soil from 106 excavation areas at Parcel B and backfilled these excavations with clean material. The Navy met the cleanup requirements contained in the ROD and ESDs at 93 of these excavation sites. The ubiquitous distribution of metals in soil, especially arsenic and manganese, led to the reevaluation of the remedy for soil at Parcel B. The Technical Memorandum in Support of a ROD Amendment (TMSRA) (ChaduxTt 2007) presents information supporting the reevaluation of the remedy, including risks from soil remaining at Parcel B and other remediation alternatives (such as covers) to address these risks.

1.0 INTRODUCTION

This construction summary report presents the results of the soil remedial action (RA) undertaken by the U.S. Department of the Navy in 1998 through 2001 at 106 excavation sites at Parcel B at Hunters Point Shipyard (HPS) in San Francisco, California (Table 1-1). The soil investigations and excavations completed as part of this RA were based on the human health risk-based screening criteria established in the record of decision (ROD) for Parcel B (Navy 1997) and the two ROD explanation of significant differences (ESD) documents (Navy 1998 and 2000). Since the RA was conducted, the Navy has reevaluated the remedy at Parcel B and reassessed risks to human health and the environment. The Technical Memorandum in Support of a Record of Decision Amendment (TMSRA) (ChaduxTt 2007) presents information to support the reevaluation of the remedy, including risks from soil remaining at Parcel B after the excavations described in this report.

Excavations were conducted in 1998 and 1999 at 83 remedial areas in Parcel B, where chemicals were detected during the remedial investigation (RI) (PRC Environmental Management, Inc. [PRC] 1996a) at levels associated with human health risks exceeding ROD soil cleanup standards. Excavation activities were paused in September 1999 while the Navy updated the cleanup levels presented in the 1997 ROD (see Section 2.0 for more discussion). Additional excavation activities were conducted from 2000 through 2001 at 46 remedial areas, 38 of which had been suspended in 1999. The 2000 to 2001 RA activities used the revised cleanup levels contained in the May 2000 ESD as cleanup criteria. The 2000 ESD cleanup levels represent U.S. Environmental Protection Agency (EPA) residential preliminary remediation goals (PRG), modified to incorporate a produce uptake pathway, except where these PRGs would be lower than Hunters Point ambient levels (HPAL) or laboratory practical quatitation limits. In those cases, HPALs or practical quantitation limits are the cleanup levels. These cleanup levels are presented in Table 2-1 and are discussed more fully in Section 2.0.

This report includes discussions of eight sites that were identified during the RI for excavation based on the 1997 ROD cleanup levels. However, the chemical concentrations detected at these sites did not exceed the 2000 ESD cleanup levels, and these sites were not excavated. These eight sites are termed “never opened” in this report and are included for completeness. Two other excavations (10-1 and 10-2) were also never opened because of conflicts with ongoing work for treatability studies at Installation Restoration (IR) Site 10. This report also includes discussion of exploratory excavations (EE-01 through EE-05) at Parcel B conducted between July 1996 and January 1997. These exploratory excavations were completed to address risks related to chemicals in soil that were identified in an action memorandum (PRC 1996b) that followed the RI.

This report contains six sections including this introduction that provides a general history and description of HPS and Parcel B. Section 2.0 provides background information on the remedy for soils at Parcel B, including the ROD requirements and a discussion of the ESD documents prepared in 1998 and 2000 that modified the ROD. Section 3.0 summarizes the general actions taken for soil at Parcel B. Section 4.0 presents the specific results of actions conducted at each excavation, including the delineation of contamination, and contains a summary of sampling and

construction activities. Section 5.0 discusses conclusions based on the results of construction activities and sampling. Section 6.0 provides a list of references used in preparing this report. Figures and tables follow the text of the section where they are mentioned. Report sections are tabbed for easy access. Appendices A through H are provided on compact disks accompanying the text.

1.1 HISTORY

HPS operated as a commercial dry dock facility from about 1867 until 1940 when the Navy acquired title to the land and began developing it for various shipyard activities. From 1945 to 1974, the Navy used the shipyard primarily as a maintenance and repair facility. The Navy discontinued activities at HPS in 1974 and the shipyard remained relatively unused until 1976. In 1976, the Navy leased most of HPS, including all of the area now known as Parcel B, to the Triple A Machine Shop (Triple A). Triple A operated a commercial ship repair facility from July 1976 to June 1986, but did not vacate the property until March 1987. During the lease period, Triple A used dry docks, berths, machine shops, power plants, various offices, and warehouses to repair commercial and Navy vessels. Triple A also subleased portions of the property to various other businesses. The Navy resumed occupancy of HPS in 1986.

Because of the presence of hazardous materials and groundwater contamination from past shipyard operations at HPS, the property was entered on the National Priorities List in 1989 as a Superfund site pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. In 1991, HPS was designated for closure under the U.S. Department of Defense Base Realignment and Closure (BRAC) Program, with the intent of transferring the property and facilities to neighboring communities as expeditiously as possible and with minimal adverse effect on the local economy. In 1992, the Navy divided the HPS facility into five contiguous geographic parcels (A through E) to expedite the remedial investigation (RI) and feasibility study (FS) program. A sixth parcel, the offshore area (Parcel F), was added in 1996. In September 2004, the Navy designated the landfill area in Parcel E as a separate parcel, Parcel E-2. In addition, the Navy transferred Parcel A to the San Francisco Redevelopment Agency (SFRA) in December 2004. Environmental investigation and restoration activities at HPS are coordinated under a federal facility agreement between the Navy, EPA, and the State of California (including the Department of Toxic Substances Control [DTSC] and San Francisco Bay Regional Water Quality Control Board [Water Board]).

The Navy, as part of the IR Program, has been identifying and evaluating past hazardous waste sites and controlling the spread of contaminants from these sites at HPS since 1984. The Navy investigated areas at Parcel B that were identified as potential source areas for hazardous substances in soil in accordance with CERCLA. A preliminary assessment and site inspection (PA/SI) was conducted at all sites; as necessary, sites were further investigated during the RI. The sites at Parcel B are referred to as either SI or IR sites. Sites designated as SI sites were investigated through the SI phase, when the Navy, with regulatory agency concurrence, concluded that no additional investigations were required. IR sites were investigated through the RI phase. Sites addressed by the soil remedial actions described in this report include: IR-07,

IR-10, IR-18, IR-20, IR-23, IR-24, IR-26, IR-42, IR-60, IR-61, and IR-62, as well as portions of IR-46 (fuel lines) and SI-45 (steam lines).

Historically, the dominant land use of Parcel B has been for office and commercial buildings and light industrial production. The Navy also conducted industrial activities at Parcel B, such as fuel distribution, sandblasting, painting, machining, acid mixing, and metal fabrication. Most of Parcel B is covered with concrete or asphalt and buildings. The western portion of Parcel B, including IR-07 and IR-18, is unimproved and covered only with soil and minor vegetation.

Based on the City of San Francisco's "Hunters Point Shipyard Redevelopment Plan" (SFRA 1997), Parcel B will be zoned to accommodate mixed uses, including a mixed residential/retail complex, a research and development area, and open space.

1.2 PARCEL B DESCRIPTION

HPS is located in southeast San Francisco, California, on a peninsula that extends east into San Francisco Bay (Figure 1-1). Parcel B occupies about 59 acres of shoreline and lowland coast in the northeastern portion of HPS. Parcel B is bounded by Parcel C to the south, San Francisco Bay to the north and east, and the City of San Francisco Bayview-Hunters Point district to the west. The excavation sites discussed in this report are distributed throughout Parcel B (Figure 1-2).

The original cliffs of Hunters Point were quarried and used to fill the bay, thereby creating surrounding lowland areas for further development. Approximately 400 acres of the dry land portion of HPS were filled to create a level plain from 12 to 15 feet above mean sea level (msl). The area was filled in stages beginning in 1940 and completed by the early 1960s.

1.2.1 Geology

The peninsula on which HPS was built is within a northwest trending belt of Franciscan Complex bedrock. This belt extends southeast to northwest, diagonally from Hunters Point through the City of San Francisco, to the south abutment of the Golden Gate Bridge at Fort Point. Rocks within this area are intensely deformed and sheared, and form a serpentinite and mélange belt. Six geologic units underlie HPS. The youngest unit is of Quaternary age and the oldest is Franciscan Complex bedrock of Jurassic-Cretaceous age (Tetra Tech 1998). In general, the stratigraphic sequence of these geologic units, from youngest (shallowest) to oldest (deepest), is as follows: (1) Artificial Fill; (2) Colluvium/Alluvium (slope debris, ravine fill and alluvial deposits); (3) Undifferentiated Upper Sand Deposits; (4) Bay Mud Deposits; (5) Undifferentiated Sedimentary Deposits; and (6) Franciscan Complex bedrock.

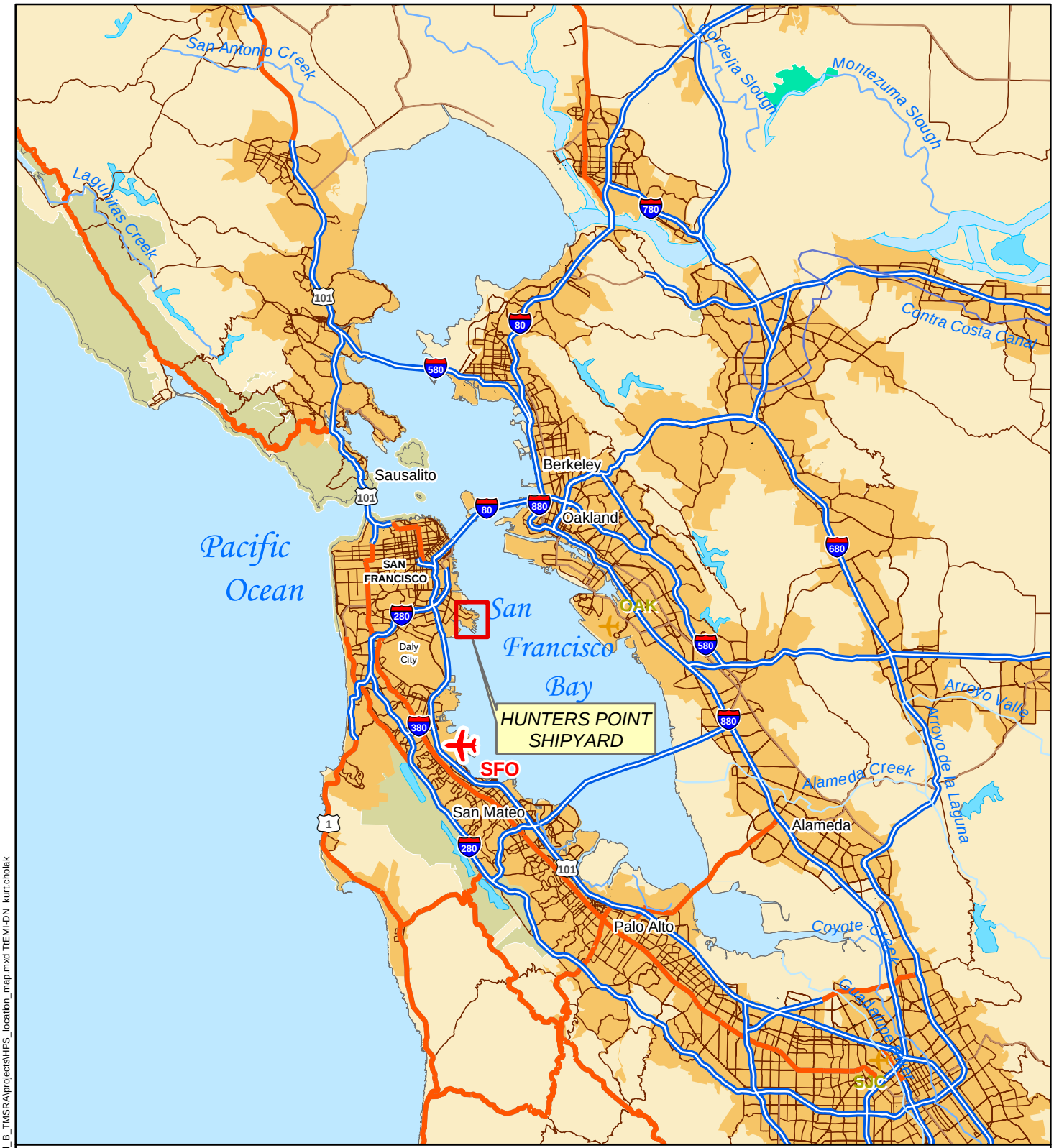
The majority of Parcel B consists of bedrock-derived Artificial Fill. The lithology of the fill is primarily sand, silt, and clay, with lesser amounts of gravel and boulders. The thickness of the Artificial Fill ranges from less than 1 foot to 80 feet and generally increases from south to north. Industrial fill (consisting mostly of building demolition debris) occurs locally within the

Artificial Fill. Industrial fill occurs discontinuously in the western portion of Parcel B, especially at IR-07 and a portion of IR-18. In low-lying areas of the northwestern portion of Parcel B, the Artificial Fill is typically underlain by Bay Mud Deposits. The Bay Mud Deposits are generally absent in the southern portion of Parcel B near the 1935 shoreline. In these areas, the Artificial Fill directly overlies bedrock or Undifferentiated Sedimentary Deposits. Undifferentiated Sedimentary Deposits are present locally in some areas of Parcel B, such as at IR-07 and IR-18. The depth to Franciscan Complex bedrock from the ground surface in Parcel B varies from less than 1 foot in the southern portion of the parcel to greater than 80 feet in the northern portion of the parcel. Nearly all the activities described in this report are associated with the Artificial Fill and the locally interspersed industrial fill.

1.2.2 Hydrogeology

Four hydrogeologic units have been identified at HPS: the A-aquifer, the aquitard zone, the B-aquifer, and the bedrock water-bearing zone. The uppermost aquifer, the A-aquifer, is of greatest concern for the activities discussed in this report. The A-aquifer consists primarily of saturated Artificial Fill and, to a lesser extent, Undifferentiated Upper Sand Deposits and permeable zones within the Bay Mud. The A-aquifer overlies the aquitard zone in most areas (except in areas near the 1935 shoreline where the A-aquifer directly overlies bedrock). The thickness of the A-aquifer is highly variable but typically ranges from 10 to 50 feet (Tetra Tech 2002c).

Groundwater in the A-aquifer is generally unconfined but may be semiconfined where isolated lenses of fine-grained materials exist. Depth to groundwater in the A-aquifer at Parcel B ranges from 2 to 15 feet below ground surface (bgs). Consequently, groundwater was occasionally observed in deeper excavations, especially on the northern side of Parcel B near the current shoreline where the depth to groundwater is shallow. Groundwater flow in the A-aquifer at Parcel B is generally radially outward from the bedrock ridge on former Parcel A toward San Francisco Bay to the north and northeast.



Location Map

N

5 2.5 0 5

Miles

ChaduxTt JV
Consulting Engineers and Scientists

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 1-1
HUNTERS POINT SHIPYARD
LOCATION MAP

Construction Summary Report for Parcel B

2008-04-11 O:\Hunters_Point\Projects\Parcel_B\Parcel_B_TMSRA\projects\HPS_location_map.mxd TtEMI-DN kurt.cholak

Legend

Completed RA 2000 to 2001 Excavation	1948 Shoreline at IR-07 and IR-18
Completed RA 1998 to 1999 Excavation	Industrial Drain Line
"Never Opened" Excavation (See text and Table 1-1 for explanation)	IR Boundary
Completed 1996 to 1997 Exploratory Excavation	Road
Non-Navy Property	Railroad
Building	Parcel Boundary
San Francisco Bay	

N

120 0 120

Scale in Feet

ChaduxTt JV
Consulting Engineers and Scientists

Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 1-2

EXCAVATION LOCATION MAP

Construction Summary Report for Parcel B

TABLE 1-1: EXCAVATION ACTIVITY SUMMARY
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Excavation	IR SITE	Excavated in 1996	Excavated in 1998-1999	Excavated in 2000-2001	Never Opened
7-1	7		x	x	
7-2	7		x		
7-3	7		x	x	
7-4	7		x	x	
7-5	7		x	x	
B0536	7		x		
B0628	7		x		
B0632	7		x		
B0636	7		x		
B0933	7		x		
B1036	7		x		
B1128	7		x	x	
B1132	7		x		
B1227	7		x	x	
B1324	7		x		
B1422	7		x		
10-1	10				x
10-2	10				x
10-4	10				x
10-5	10			x	
B2725	10		x		
B2727	10				x
B2925	10		x		
B2926	10				x
B3125	10		x		
B3324	10			x	
B3422	10		x	x	
B3423	10				x
B3425	10		x		
B3622	10		x	x	
B3623	10				x
B3625	10		x		
18-1	18		x	x	

TABLE 1-1: EXCAVATION ACTIVITY SUMMARY (CONTINUED)
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Excavation	IR SITE	Excavated in 1996	Excavated in 1998-1999	Excavated in 2000-2001	Never Opened
18-2	18		x	x	
18-3	18		x		
18-4	18		x	x	
B0136	18		x		
B0146	18			x	
B0241	18		x		
B0337	18		x		
B0638	18		x		
B1138	18		x		
20-1	20		x		
20-2	20		x	x	
20-3	20		x		
B4217	20		x	x	
B4219	20				x
B4419	20		x		
B4420	20		x	x	
B4519	20		x	x	
23-1	23		x	x	
23-2	23		x	x	
23-3	23		x	x	
B1525	23		x		
B2127	23		x		
EE-01	23	x			
EE-02	23		x	x	
EE-03	23	x			
24-1	24		x		
24-2	24		x	x	
24-3	24		x	x	
24-4	24			x	
24-5	24		x		
24-6	24		x	x	
24-8	24		x	x	
24-9	24		x		

TABLE 1-1: EXCAVATION ACTIVITY SUMMARY (CONTINUED)
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Excavation	IR SITE	Excavated in 1996	Excavated in 1998-1999	Excavated in 2000-2001	Never Opened
B2414	24		x	x	
B2614	24		x		
B2616	24		x	x	
B2715	24			x	
B2915	24		x	x	
B2918	24		x		
B3114	24		x	x	
B3415	24		x		
B3514	24		x		
B3614	24		x	x	
B3718	24		x	x	
B3914	24		x	x	
B3916	24		x		
B4017	24		x		
B4018	24		x	x	
B4113	24		x	x	
B4114	24		x		
26-1 (EE-04A)	26	x			
26-2 (EE-04B)	26	x			
B4315	26		x		
B4417	26		x		
B4715	26		x		
B4815	26		x		
B4818	26			x	
EE-04C	26	x			
EE-05	26	x		x	
42-1	42		x		
B3229	42				x
B3229A	42				x
Fuel Line A	46		x	x	
Fuel Line B	46		x	x	
Fuel Line C	46		x	x	
Fuel Line F	46		x	x	

TABLE 1-1: EXCAVATION ACTIVITY SUMMARY (CONTINUED)

CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Excavation	IR SITE	Excavated in 1996	Excavated in 1998-1999	Excavated in 2000-2001	Never Opened
60-1	60		x	x	
60-2	60		x	x	
B1816	60		x		
B2225	61		x		
B2425	61		x		
B2030	62		x		
Industrial Drain Line	7,10,23,24			x	
TOTAL	106	6	83	46	10

Notes:

IR Installation Restoration

Explanation of Totals

Six excavations were begun in 1996; five of these were completed in 1996; one was completed in 2000-2001.

Eighty-three excavations were begun in 1998-1999; 45 of these were completed in 1998-1999; remaining 38 were completed in 2000-2001.

Forty-six excavations were active in 2000-2001; 1 was carried forward from 1996, 38 were carried forward from 1998-1999, and 7 new excavations were begun in 2000-2001; all 45 were completed in 2000-2001.

Ten sites were never opened. Eight of these sites were identified for excavation based on the 1997 record of decision cleanup levels. However, these eight sites did not require excavation based on the 2000 explanation of significant differences cleanup levels and so these sites were never excavated. The remaining two sites were delineated but never opened because of conflicts with ongoing work for treatability studies.

One hundred six total excavations = 5 completed 1996 + 45 completed 1998-1999 + 46 completed 2000-2001 + 10 never opened.

2.0 REMEDY BACKGROUND

This section discusses the cleanup requirements described by the ROD and the two subsequent ESD documents.

2.1 RECORD OF DECISION REQUIREMENTS

The Navy and the regulatory agencies signed the ROD for Parcel B, dated October 7, 1997, on October 9, 1997 (Navy 1997). The ROD addresses both soil and groundwater contaminated by CERCLA hazardous substances at Parcel B. This report focuses only on soil cleanup actions taken in compliance with the ROD. Groundwater remedial actions are summarized in the remedial action monitoring plan (Tetra Tech 2002a), a technical evaluation memorandum (Tetra Tech 2001d), quarterly groundwater sampling reports (for example, Tetra Tech 2002b), and the TMSRA (ChaduxTt 2007). The ROD also addresses remediation of areas where CERCLA hazardous substances are commingled with petroleum hydrocarbons. Areas containing only petroleum hydrocarbons, which are not hazardous substances as defined by CERCLA, are addressed in a separate petroleum hydrocarbon corrective action plan (CAP) under oversight of the Water Board (Tetra Tech 2001a).

The Navy selected excavation and off-site disposal as the remedy for Parcel B contaminated soil. The major components of the soil portion of the remedy, as described in the ROD, include:

- Excavation of contaminated soil to the groundwater table or 10^{-6} cancer risk (residential) (later modified by ESD, see Section 2.2)
- Off-site disposal of contaminated soil (with treatment at the off-site landfill, if necessary to meet land disposal restrictions)
- Placement of clean backfill in the excavated areas
- Deed notification indicating that soil below the groundwater table in remediated areas may be contaminated
- Institutional controls governing the handling of residual contaminated soil

2.2 EXPLANATION OF SIGNIFICANT DIFFERENCES CHANGES

The October 1997 ROD for Parcel B had two subsequent changes made to the soil portion of the selected remedy. These changes are described in the ESDs dated August 24, 1998 and May 4, 2000.

2.2.1 ESD 1998

The Navy and the regulatory agencies signed the first ESD to the Parcel B ROD, dated August 24, 1998, on October 28, 1998 (Navy 1998).

In the Parcel B ROD, the selected remedy for contaminated soils was excavation to the groundwater table followed by off-site disposal. During preparation of the ROD, groundwater was believed to typically occur at 10 feet bgs. However, in early 1998, measurements at the site indicated that the depth to groundwater beneath Parcel B could be as shallow as 2.3 feet bgs. Future construction workers would not be protected if falling groundwater levels allowed residual contaminated soils, previously believed to be remediated, to be exposed. The August 1998 ESD revised the selected remedy to require excavation of contaminated soils to a 10^{-6} cancer risk (residential) or to a maximum depth of 10 feet bgs, instead of to the groundwater table, to ensure the remedy is protective of human health in both the short and long term.

2.2.2 ESD 2000

The Navy and the regulatory agencies signed the second ESD to the Parcel B ROD, dated May 4, 2000, on May 9, 2000 (Navy 2000).

The May 2000 ESD updated the soil cleanup levels presented in Table 8 of the Parcel B ROD to incorporate (1) EPA's 1999 PRGs, including adjustments by the Navy to incorporate the produce uptake pathway, and (2) revised nickel ambient levels. The basis for these changes is presented below.

Change in EPA PRGs

When the cleanup levels presented in Table 8 of the ROD were developed in 1995, they were consistent with EPA and state human health risk assessment guidance. Specifically, the cleanup levels correspond to:

- A human health risk level of 10^{-6} (one in one million) or less for carcinogens, except where ambient levels exceed 10^{-6}.
- A hazard index (HI) of 1 or less for noncarcinogens, except where ambient levels exceed an HI of 1 because of fill material.
- Lead levels of less than 221 milligrams per kilogram (mg/kg).

The cleanup levels assume residential contact with soils, including the consumption of homegrown produce. Since 1995, EPA has updated the guidance for risk assessment input parameters for several classes of chemicals. Applying the revised guidance (1999 PRGs with adjustments to incorporate the produce uptake pathway, as appropriate) resulted in revised

chemical-specific cleanup levels. Attachment A to the May 2000 ESD presented the original and revised cleanup values. Table 2-1 of this report summarizes the cleanup levels presented in the May 2000 ESD (Navy 2000).

Change in Nickel Ambient Values

Nickel concentrations in soil samples collected from remediation areas excavated in the early phases of the RA in 1998 often exceeded the soil cleanup level based on the HPAL. The HPAL for nickel used in the 1997 ROD was based on a regression against magnesium. The Navy reviewed the approach used to calculate the HPAL for nickel and, with support from DTSC, formulated a nickel-cobalt regression to more accurately calculate nickel ambient levels. This approach was presented in the Nickel Screening and Implementation Plan technical memorandum dated August 4, 1999 (Tetra Tech 1999). The May 2000 ESD incorporated the nickel-cobalt regression for calculating the soil cleanup level for nickel at each sample location (Navy 2000).

TABLE 2-1: SOIL CLEANUP LEVELS
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Chemical	1997 ROD Cleanup Goal (mg/kg)	2000 ESD Cleanup Goal (mg/kg)
1,1,1-Trichloroethane	12	770
1,1,2-Trichloroethane	0.030	0.84
1,1-Dichloroethene	0.007	0.054
1,2,4-Trichlorobenzene	28	650
1,2-Dichlorobenzene	160	370
1,2-Dichloroethane	0.019	0.35
1,2-Dichloroethene (Total)	9.1	43
1,4-Dichlorobenzene	0.33	1.9
2,4-Dimethylphenol	28	29
2-Butanone (Methyl ethyl ketone)	62	7,300
2-Methylnaphthalene	140	56
4,4'-DDD	0.17	2.1
4,4'-DDE	0.16	1.6
4,4'-DDT	0.040	1.2
4-Methyl-2-pentanone (Methyl isobutyl ketone)	27	790
Acenaphthene	140	3,700
Acenaphthylene	130	3,700
Aldrin	0.0017	0.024
alpha-Chlordane	0.28	0.32
Aluminum	74,000	73,000
Anthracene	970	22,000
Antimony	10	10
Arsenic	11	11
Barium	2,700	2,700
Benzene	0.035	0.18
Benzo(a)anthracene	0.12	0.37
Benzo(a)pyrene	0.33	0.33
Benzo(b)fluoranthene	0.030	0.34
Benzo(g,h,i)perylene	360	1,600
Benzo(k)fluoranthene	0.33	0.34
Benzoic acid	2,200	2,200
Beryllium	0.8	140
Bis(2-ethylhexyl)phthalate	--	27
Bromoform	0.081	0.49
Cadmium	3.1	3.5
Carbazole	0.64	0.64
Carbon disulfide	13	360
Carbon tetrachloride	0.074	0.086

TABLE 2-1: SOIL CLEANUP LEVELS (CONTINUED)
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Chemical	1997 ROD Cleanup Goal (mg/kg)	2000 ESD Cleanup Goal (mg/kg)
Chlorobenzene	22	150
Chloroform	0.051	0.24
Chromium III	59,000[a]	90,000[a]
Chromium VI	0.05	0.96
Chrysene	0.33	3.3
cis-1,2-Dichloroethene	8.8	43
Cobalt	3,100[a]	3,200[a]
Copper	160	160
Cyanide	2	2
Dibenz(a,h)anthracene	0.33	0.33
Dibenzofuran	13	290
Diethylphthalate	650	660
Endosulfan I	17	17
Endosulfan II	15	15
Endosulfan sulfate	16	16
Endrin aldehyde	2.1	17
Endrin ketone	2.1	17
Ethylbenzene	230	230
Fluoranthene	160	2,000
Fluorene	110	2,600
gamma-Chlordane	0.0017	0.29
Heptachlor	0.003	0.065
Heptachlor epoxide	0.00038	0.0017
Indeno(1,2,3-cd)pyrene	0.33	0.35
Lead	220	220
Manganese	2,300	1,400
Mercury	2.3	2.3
Methoxychlor	26	280
Molybdenum	47	79
N-Nitroso-di-N-Propylamine	0.33	0.33
N-Nitrosodiphenylamine	1.1	1.1
Naphthalene	69	56
Nickel	310[b]	320[b]
Pentachlorophenol	0.8	2.6
Phenanthrene	130	15,000
Phenol	140	140
Polychlorinated biphenyls[c]	0.016	0.21
Pyrene	120	2,300

TABLE 2-1: SOIL CLEANUP LEVELS (CONTINUED)

CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Chemical	1997 ROD Cleanup Goal (mg/kg)	2000 ESD Cleanup Goal (mg/kg)
Selenium	140	140
Silver	51	51
Styrene	310	1,700
Tetrachloroethene	0.16	0.94
Thallium	6.0	6.1
Toluene	230	520
Total petroleum hydrocarbons	--[d]	--[d]
trans-1,2-Dichloroethene	23	63
Trichloroethene	0.27	1.7
Vanadium	450	450
Vinyl acetate	62	430
Vinyl chloride	0.01	0.022
Xylene (total)	890	210
Zinc	370	370

Notes:

a Listed value or the HPAL, whichever is greater. HPAL calculated on a sample-by-sample basis using a magnesium regression.

b Listed value or the HPAL, whichever is greater. HPAL calculated on a sample-by-sample basis using a magnesium regression or, if magnesium is weathered, by using a cobalt regression (Tetra Tech 1999).

c Cleanup goal applies individually to Aroclors-1242, -1254, and -1260.

d Fuel-related compounds were addressed during the remedial action where they were commingled with chemicals identified as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act to enhance the efficiency of the cleanup at Parcel B. The cleanup goal for total TPH was 3,500 mg/kg and was based on the TPH corrective action plan, not the 1997 ROD or the 2000 ESD. Total TPH is the sum of gasoline, diesel, and motor oil range fractions. The total TPH goal is intended to be protective of groundwater but is not intended to be protective of human health.

-- Not available or calculated

4,4'-DDD 4,4'-Dichlorodiphenyldichloroethane

4,4'-DDE 4,4'-Dichlorodiphenyldichloroethene

4,4'-DDT 4,4'-Dichlorodiphenyltrichloroethane

ESD Explanation of significant differences

HPAL Hunters Point ambient level

mg/kg Milligrams per kilogram

ROD Record of decision

TPH Total petroleum hydrocarbons

3.0 SOIL ACTIONS

This section summarizes the general remedial actions for soil that the Navy completed at Parcel B. Activities occurred in three phases: (1) exploratory excavations before the 1997 ROD and subsequent remedial actions, (2) 1998 to 1999 RA excavations, and (3) 2000 to 2001 RA excavations.

3.1 1996 TO 1997 EXPLORATORY EXCAVATIONS

The Navy conducted exploratory excavations (EE) at 18 sites at HPS between July 1996 and January 1997. These excavations included removal actions at five areas (EE-01 through EE-05) at Parcel B that are included in this report. The goal of the removals was to reduce the risk to human health and the environment. The Navy used HPAL and EPA PRG values as screening criteria during the removals. Commingled fuel-related compounds were compared to screening values of 100 mg/kg for total petroleum hydrocarbons (TPH) purgeable as gasoline and 1,000 mg/kg for TPH extractable as diesel or motor oil. Discrete confirmation samples from the sidewalls and bottom of each EE excavation were collected to characterize the remaining soil.

Of the five areas, three were included for additional investigation under RA activities and two were not. Samples from EE-05 indicated chemical concentrations exceeding the screening criteria remained. Elevated detection limits for polynuclear aromatic hydrocarbons (PAH) at EE-02 and EE-04 were caused by matrix interferences. These three areas were included for additional investigation. At the remaining two EE areas (EE-01 and EE-03), the objective of removing contaminants of concern to below screening levels was achieved (IT Corporation [IT] 1999a) and these areas were not included for additional investigation. Areas EE-02, EE-04A (also called Excavation 26-1), EE-04B (26-2), and EE-05 were included in work planned for the 1998 to 1999 RA.

3.2 1998 TO 1999 REMEDIAL ACTION EXCAVATIONS

The Navy excavated soil from 83 areas at Parcel B between July 1998 and September 1999. This action was taken in accordance with the 1997 ROD and used the soil cleanup levels in the ROD as evaluation criteria during the removals. Commingled fuel-related compounds were compared to screening values of 10 mg/kg for TPH purgeable as gasoline; 100 mg/kg for TPH extractable as diesel; or 1,000 mg/kg for TPH extractable as motor oil. The RA activities were based on the results of the human health risk assessment conducted for the Parcel B RI. Excavation areas for the RA are classified as either remediation areas or de minimis areas. Remediation areas generally contain hazardous substances at relatively high concentrations. Excavations at remediation areas are numbered in sequence within an IR site (for example, 24-1, 24-2, etc.). De minimis areas typically contain isolated detections of hazardous substances at levels near the cleanup criteria. These excavation areas are identified according to their locations within the risk grid used during the Parcel B RI risk assessment and are preceded by the letter B, designating Parcel B (for example, B2616 or B4715).

3.2.1 Sampling Strategy

Two main categories of samples were collected during the 1998 to 1999 RA activities: (1) screening samples collected by the remedial action contractor, Shaw Environment and Infrastructure (formerly IT Corporation), and (2) confirmation samples collected by Tetra Tech. Screening-level samples were collected during and at the completion of soil removal to help establish whether an excavation would meet the 1997 ROD soil cleanup levels. Screening-level soil samples also were collected in situ and from stockpiles to characterize soil for disposal. In situ screening samples were collected at a rate of three discrete samples per 50 linear feet of excavation wall and one 4-point composite sample per 500 square feet (ft^2) of excavation bottom. Screening-level data were not validated and generally had higher detection limits than confirmation sample data. If the screening-level data indicated that all chemical of potential concern (COPC) concentrations were less than the ROD cleanup levels, Tetra Tech collected confirmation samples. Confirmation sample data were validated and subjected to more rigorous analytical procedures to achieve lower detection limits. The confirmation sample data were used to evaluate whether an excavation met the ROD cleanup levels. Both screening-level and confirmation samples were analyzed by an off-site laboratory approved by the Navy and certified by the State of California. Confirmation sample data are used throughout this report on figures and tables. Screening-level data are presented only in Appendix A as support information that is useful in understanding the approximate distribution of COPCs at an excavation.

The confirmation sampling for the 1998 to 1999 RA activities was conducted according to the RD confirmation sampling and analysis plan (Tetra Tech and MK 1999). The strategy for excavation sampling was based on the concept of random, systematic random, and judgmental sampling (Gilbert 1987) and EPA's "Methods for Evaluating the Attainment of Cleanup Standards" guidance (EPA 1989). The sampling approach used composite samples collected from subdivisions of an excavation sidewall and bottom to identify the remaining concentrations of COPCs. In general, the bottom of an excavation was characterized by a composite sample collected for approximately every 500 ft^2 of excavation bottom. The bottom composite sample consisted of five discrete samples (a "5-point" composite sample). The complete details of the bottom sampling protocol are described in the RD confirmation sampling and analysis plan.

Excavation sidewalls were subdivided into a "shallow" section from the surface to 7 feet bgs and a "deep" section extending below 7 feet to a maximum depth of 10 feet bgs. One 3-point composite sample was collected per 50 linear feet of excavation sidewall from the "shallow" zone. An additional sample, also collected at the rate of one per 50 linear feet of sidewall, was collected from the "deep" zone for excavations that were deeper than 7 feet. The locations of the bottom and sidewall discrete samples were selected based on a systematic random approach that is described in detail in the confirmation sampling and analysis plan (Tetra Tech and MK 1999).

The chemicals identified for analysis at each excavation were selected according to the list of COPCs presented for each excavation in the RD. In addition, if a screening-level sample result exceeded the ROD cleanup level, that COPC was added to those already identified in the RD.

3.2.2 Sampling Methods

Samples were collected directly from excavation sidewalls or bottoms, unless the excavation depth prevented safe entry. For those deeper excavations, samples were collected from the excavator bucket from freshly exposed surfaces.

Discrete samples were combined in a glass jar to make up the composite sample, except for soil samples requiring volatile organic compound (VOC) or TPH purgeable (TPH-p) as gasoline analysis. Soil samples requiring VOC or TPH-p analyses were collected in stainless-steel sleeves and sealed to minimize volatilization. Some VOC and TPH-p samples were collected using EnCore samplers. Locations for VOC and TPH-p samples were randomly selected from the group of locations where a discrete sample was collected from an excavation sidewall or bottom.

3.2.3 Excavation Process

The following sections describe the general process for excavations completed during the 1998 to 1999 RA. These activities followed the construction contractor's work plan (IT 1999b).

Preparation

Preparatory activities such as land and utility surveying, clearing and grubbing, collection of in situ screening samples, and groundwater monitoring well decommissioning were conducted at Parcel B prior to 1998 to 1999 excavation activities. Land surveyors marked the initial excavation boundaries. Utility location surveys were used to identify subsurface utilities and structures as well as to locate portions of the fuel and steam lines. Clearing and grubbing included cutting and removal of asphalt and concrete as well as removal of structures, vegetation, and other landscape features. In situ screening samples (discussed above) were collected before excavation began. As necessary, groundwater monitoring wells that presented obstacles to excavation activities were decommissioned in accordance with California Department of Water Resources guidelines. Appendix B contains the borehole logs and well construction diagrams for decommissioned groundwater monitoring wells.

Excavation

Each area laid out in the preparatory phase was excavated using standard construction techniques. Screening samples were used to guide the excavation process to identify where additional material removal was warranted. If the results of screening samples indicated COPC concentrations exceeded cleanup levels, the excavation was expanded to remove additional material. This subsequent excavation is termed an excavation "stepout" and typically extended about 5 feet from the original excavation sidewall. After the stepout excavation was completed, additional screening samples were collected and analyzed. This process continued (or was intended to continue) until all the concentrations of COPCs did not exceed the ROD soil cleanup levels. The initial samples collected from an excavation were analyzed for all the COPCs

identified in the RD. If any of the COPCs met the cleanup level in these initial samples, then samples collected from the subsequent stepout locations were not analyzed for those COPCs. Excavated material was either loaded directly onto trucks for off-site disposal or stockpiled on site for later transport and disposal.

In practice, the process of repeated excavation and sampling did not effectively identify the limits of contamination at many excavation areas. Consequently, RA activities were suspended in September 1999 while the Navy reassessed the ROD soil cleanup levels. This re-evaluation became a major component of the May 2000 ESD (Section 2.2.2).

Restoration

After the completion of excavation activities, each site was restored to conditions similar to pre-construction conditions. Site restoration included importing and placing clean fill material, compaction and testing, grading, and resurfacing. Clean soil was imported from sand and gravel quarries located within the bay area. Restoration activities followed the requirements presented in the RD. Excavations that did not meet the ROD soil cleanup levels were lined with plastic sheeting before they were backfilled. Appendix C contains compaction information and backfill quality certification.

Waste Disposal

All excavated material was profiled prior to off-site disposal. Screening-level soil sample data were used in conjunction with confirmation sampling data for waste profiling. Excavated material was loaded directly or from stockpiles into trucks or rail cars for transport off site. Excavated material was classified as Toxic Substances Control Act (TSCA) hazardous (Class I), California hazardous (Class I but non-TSCA), nonhazardous (Class II), or debris (Class III, municipal). Appendix D contains material management and disposal records.

Fuel and Steam Line Removals

Fuel and steam lines also were removed during activities conducted in 1998 to 1999. Most of the lines were contained in belowground, concrete enclosures (termed utilidors) although some short segments were directly buried. Lines were emptied of liquids, cut, removed, and disposed or recycled. Lines that were inaccessible (such as those beneath buildings) were rinsed, plugged, capped, and left in place.

3.3 2000 TO 2001 REMEDIAL ACTION EXCAVATIONS

The Navy excavated soil from 46 areas at Parcel B between May 2000 and August 2001. The 2000 to 2001 RA work carried on the activities started in 1998 to 1999 but used the revised soil cleanup levels presented in the May 2000 ESD (Section 2.2.2). Fuel-related compounds were addressed during the remedial action where they were commingled with chemicals identified as

hazardous substances under CERCLA to enhance the efficiency of the cleanup at Parcel B. The cleanup goal for total TPH was 3,500 mg/kg and was based on the TPH corrective action plan, and not the 1997 ROD or the 2000 ESD. Commingled fuel-related compounds were compared to a screening value of 3,500 mg/kg for the sum of TPH purgeable as gasoline, TPH extractable as diesel, and TPH extractable as motor oil concentrations. The 2000 to 2001 RA activities also addressed issues related to elevated detection limits for PAHs at locations throughout Parcel B; Section 4.15 addresses this topic in greater detail.

3.3.1 Sampling Strategy

The confirmation sampling for the 2000 to 2001 RA activities was conducted according to the RD amendment (Tetra Tech 2001b). Similar to the 1998 to 1999 activities, the sampling strategy was based on the concept of random, systematic random, and judgmental sampling. However, instead of only post-excavation sampling, the 2000 to 2001 activities involved a large amount of pre-excavation sampling using a Geoprobe direct-push rig to delineate the extent of contamination before excavation resumed. The sampling approach used random and bias discrete samples for excavation sidewalls and composite samples collected from subdivisions of an excavation bottom to identify the remaining concentrations of COPCs.

Excavation sidewall and bottom sampling followed the detailed approach described in the RD amendment. In general, random discrete samples were collected every 17 feet along an excavation sidewall. Additional bias discrete samples were collected according to the total sidewall length and the total excavation depth. More bias samples were collected from "deep" excavations that extended more than 7 feet bgs. Excavation bottom sampling followed a similar approach to that implemented during the 1998 to 1999 RA. In general, a 5-point bottom composite sample was collected for every 500 ft^2 of excavation bottom. The RD amendment contains a complete discussion of the sidewall and bottom sampling approach.

Chemicals identified for analysis at each excavation were selected according to the list of COPCs developed during the 1998 to 1999 RA. Similar to the 1998 to 1999 RA, if a screening-level sample (for example, a waste profile sample collected from a stockpile) result exceeded the 2000 ESD soil cleanup level, that COPC was added to those already identified in the RD amendment.

3.3.2 Sampling Methods

Sampling methods used during the 2000 to 2001 RA activities were similar to those used for the 1998 to 1999 RA work. Samples were collected directly from excavation sidewalls or bottoms, unless the excavation depth prevented safe entry. For those deeper excavations, samples were collected from the excavator bucket from freshly exposed surfaces.

Pre- and post-excavation discrete samples were collected in 6-inch acetate sleeves or glass jars, respectively. Discrete samples were combined in a resealable plastic bag (for example, a Ziploc bag) or a stainless-steel bowl to make up a composite sample, except for soil samples requiring

VOC or TPH-p analysis. Soil samples requiring VOC or TPH-p analyses were collected using EnCore samplers.

3.3.3 Excavation Process

The excavation process used in the 2000 to 2001 RA activities was similar to that used during the 1998 to 1999 RA work, with the exception that sampling to identify the limits of excavation was completed before excavation (termed pre-excavation confirmation sampling) rather than after it. Excavation activities followed the construction contractor's work plan (IT 1999b).

Preparatory activities including land surveying, utility locating, and groundwater monitoring well decommissioning were conducted at Parcel B prior to 2000 to 2001 excavation activities. Delineation sampling using a Geoprobe began along the appropriate sidewalls (that is, those containing samples that exceeded the May 2000 ESD soil cleanup levels) of 1998 to 1999 RA excavations, and continued in approximately 5-foot stepouts until the extent of contamination was identified at each excavation. The initial samples collected at an excavation were analyzed for all the COPCs identified in the RD amendment. If any of the COPCs met the cleanup levels, then samples collected from the subsequent stepout locations were not analyzed for those COPCs.

Each area delineated in the preparatory phase was excavated using standard construction techniques. Plastic liner materials placed at the completion of 1998 to 1999 RA activities also helped to guide the 2000 to 2001 soil removals. Bottom composite samples were collected after an excavation was completed. Occasionally, sidewall discrete samples were collected post excavation at locations where pre-excavation sampling was not possible (for example, because of poor recovery, sampler refusal, or subsurface utility lines). In addition, field crews collected discretionary samples when deemed prudent. These conditions included the presence of discolored soil, distinct odors, or debris. Excavated material was stockpiled on site for later transport and disposal.

After the completion of excavation activities, and confirmation that any post-excavation samples met the 2000 ESD soil cleanup levels, each site was restored to conditions similar to pre-construction conditions. Site restoration included importing and placing clean fill material, compaction and testing, grading, and resurfacing, following the requirement presented in the RD. Appendix C contains compaction information and backfill quality certification.

All excavated material was profiled prior to off-site disposal; profile information developed during the 1998 to 1999 RA was used for the 2000 to 2001 removals. Excavated material was loaded from stockpiles into trucks for transport off site. Appendix D contains material management and disposal records.

4.0 EXCAVATION SUMMARY

This section summarizes the remedial actions taken at each excavation area. Excavations are ordered by IR site and numerically within each IR site.

4.1 USING THE EXCAVATION SUMMARIES

Each tabbed section contains a set of information describing each excavation. The information set per tab includes a brief text summary of activities, one or more figures, and one or more data tables of validated sample results.

The text summary presents information on COPCs for each excavation, sampling activities, and construction statistics. In the summary of COPCs table, the columns are mutually exclusive. For example, only one of the first three columns will be checked for each COPC (one for "HHRA", "waste profile sample" or "field observation"). Likewise, only one of the following two columns (that is, "delineated 1998 to 1999 RA" or "delineated 2000 to 2001 RA") will be checked. In some cases, delineation of a COPC began in 1998 to 1999 but was completed in 2000 to 2001; in these cases, the "delineated 2000 to 2001 RA" column is checked to indicate when delineation was completed. If neither column is marked, no excavation was conducted and the reason is provided in the text following the table. COPCs identified in the column labeled "delineated 1998 to 1999 RA" were delineated based on the cleanup goals in the 1997 ROD. COPCs identified in the column labeled "delineated 2000 to 2001 RA" were delineated based on the cleanup goals in the 2000 ESD.

The construction statistics portion of the text includes a table that presents as-built parameters for the excavation that shows area, maximum depth, and in-place volume. The in-place volume may not equal the product of area and the maximum depth because the depth is not always constant throughout an excavation.

One or more figures illustrate the sampling and excavation activities at each site. More than one figure is presented when the delineation area for one COPC differs from other COPCs within an excavation. For example, an excavation that was expanded to address a sidewall sample that exceeded the soil cleanup level for copper would contain a figure showing the copper delineation as well as another figure illustrating the delineation of the other COPCs. When more than one figure is presented for an excavation, the figures are lettered in ascending alphabetical order. The following are general tips for understanding the figures.

- Red symbols represent samples that exceed the 2000 ESD or total TPH cleanup levels. Green symbols show samples that did not exceed cleanup goals. Cleanup criteria for total TPH were derived from the TPH corrective action plan, and not the 1997 ROD or the 2000 ESD.

- Symbols shown as circles or squares correspond to discrete bottom or sidewall samples, respectively; triangular symbols identify 3-point sidewall composite samples; star-shaped symbols represent 5-point bottom composite samples.

- Excavations opened in 1998 to 1999 often had sloping sidewalls, as indicated by the excavation contours. Excavations conducted in 2000 to 2001 had vertical sidewalls. However, excavation sidewall contours are not shown on the figures for complex excavations because the contours would obscure the data presentation.

One or more data tables at the end of each tabbed section contain validated confirmation sampling results. More than one table is presented when only a few samples from an excavation were analyzed for several parameters. For example, if five of 30 samples at an excavation were sampled for analysis of semivolatile organic compounds (SVOC), a separate table would be developed with only the SVOC data for the five samples.

Data values (beneath each sample number) are presented in **bold** text where the levels exceed the May 2000 ESD soil cleanup levels; ~~strikethrough~~ text indicates that the area where the sample was collected was removed by the excavation. The 1997 ROD cleanup level is included for reference and historical context. Analytes (in the "analyte" column) that were COPCs for an excavation are listed in **bold** text. Sample depth corresponds to the midpoint sampling depth (for example, a depth of 6.25 feet is listed for a sample collected from 6 to 6.5 feet bgs). A data qualifier, if needed, follows the sample result. Table 4-1, located at the end of this section, contains a complete list of data qualifier definitions. Data tables created for the draft report were not revised for this final version because the interactive database tool included in the TMSRA (ChaduxTt 2007) provides a more comprehensive and up-to-date presentation of the data. In general, changes to the data tables would include only revisions to bold or strikethrough text, and revision of the 109 data tables in this report would not add value in relation to the effort required. Footnotes were added to the data tables where necessary to identify general changes in the data; otherwise, the tables were not changed.

Appendix A contains screening-level data used for initial excavation activities conducted from 1998 to 1999 and for waste profiling for disposal. Data collected during the RI are not reproduced in data tables in this report. Data collected during the exploratory excavations work are contained in the data tables only for excavations that were reopened from 1998 to 2001 RA activities. Data from the RI and exploratory excavations activities are, however, posted on the figures for each excavation. Appendix E contains chain-of-custody forms and laboratory log-in receipts for confirmation samples. Appendix F presents a data quality assessment for the confirmation samples.

TABLE 4-1: DATA VALIDATION QUALIFIER DEFINITIONS
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Qualifier	Description
J0	Value is qualified as estimated because an internal standard area was outside QC criteria
J1	Value is qualified as estimated based on instrument or system performance
J2	Value is qualified as estimated based on poor matrix duplicate precision (high RPD)
J3	Value is qualified as estimated based on poor surrogate, blank spike, or matrix spike recoveries
J4	Value is qualified as estimated because the serial dilution did not meet QC requirements
J5	Value is qualified as estimated because the sample was analyzed or extracted past the holding time
J7	Value is qualified as estimated because the initial or continuing calibration did not meet QC criteria
J8	Value is qualified as estimated because the result was above the calibration range
J9 (inorganic)	Value is qualified as estimated because the interference check sample did not meet the QC criteria
J9 (organic)	Value is qualified as estimated because the RPD between columns was greater than 50 percent
R0	Nondetected value is qualified as rejected because an internal standard area was grossly outside the QC criteria
R1	Nondetected value is qualified as rejected because the sample was analyzed or extracted well past the holding time
R2	Nondetected value is qualified as rejected based on extremely poor surrogate, blank spike, or matrix spike recoveries
R3	Nondetected value is qualified as rejected based on extremely poor system performance
R7	Nondetected value is qualified as rejected because the initial or continuing calibration exceeded QC criteria
U1	Value is qualified as not detected based on contamination in the method blank
U2	Value is qualified as not detected based on contamination in the field blank
U4	Value is qualified as not detected because it is a common laboratory contaminant
UJ0	Nondetected value is qualified as estimated because an internal standard area was below QC criteria
UJ1	Nondetected value is qualified as estimated based on instrument or system performance
UJ2	Nondetected value is qualified as estimated based on poor precision in the matrix duplicate (high RPD)
UJ3	Nondetected value is qualified as estimated based on poor surrogate, blank spike, or matrix spike recoveries
UJ4	Nondetected value is qualified as estimated because the serial dilution did not meet QC requirements
UJ5	Nondetected value is qualified as estimated because the sample was analyzed or extracted past the holding time
UJ7	Nondetected value was estimated because the initial or continuing calibration did not meet QC criteria

TABLE 4-1: DATA VALIDATION QUALIFIER DEFINITIONS (CONTIUED)
CONSTRUCTION SUMMARY REPORT FOR PARCEL B, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Qualifier	Description
D	Result resembles a diesel pattern
G	Result resembles a gasoline pattern
H	Pattern is in the heavier hydrocarbon end of the analyte's range in the standard
J	Value is estimated
L	Pattern is in the lighter hydrocarbon end of the analyte's range in the standard
M	Result resembles a motor oil pattern
R	Value is rejected
U	Value is not detected
Y (PAH)	Due to coelution, both benzo(b)fluoranthene and benzo(k)fluoranthene were quantitated as benzo(b)fluoranthene, while benzo(k)fluoranthene was reported as nondetected
Y (TPH)	Pattern does not match calibration fuel pattern, but resembles a fuel pattern
Z	Individual peaks present but do not resemble any fuel pattern

Notes:

PAH Polynuclear aromatic hydrocarbon
QC Quality control
RPD Relative percent difference
TPH Total petroleum hydrocarbons

4.2 IR-07

The following excavation areas at IR-07 are included in this section:

- 7-1
- 7-2
- 7-3
- 7-4
- 7-5
- B0536
- B0628
- B0632
- B0636
- B0933
- B1036
- B1128
- B1132
- B1227
- B1324
- B1422

4.2.1 Excavation 7-1

Excavation 7-1 is located along the western boundary of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
4,4'-DDE	X			X	
4,4'-DDT	X			X	
Arsenic	X			X	
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluroanthene	X				X
Beryllium	X			X	
Copper	X				X
Lead	X				X
TPH	X				X
Zinc	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC because the sum of diesel, gasoline, and motor oil organics exceeded the cleanup goal (3,500 mg/kg). Table 7-1 shows the individual TPH fractions analyzed at Excavation 7-1.

COPC Chemical of potential concern
DDE Dichlorodiphenyldichloroethene
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 7-1. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Riprap near the shoreline prevented completion of the delineation sampling on the north side of the excavation. Tables 7-1 and 7-1 SVOA at the end of this section present the results for the confirmation samples. The 12 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 7-1A – 4,4'-Dichlorodiphenyltrichloroethene (DDE)
- Figure 7-1B – 4,4'- Dichlorodiphenyltrichloroethane (DDT)
- Figure 7-1C – Arsenic
- Figure 7-1D – Benzo(a)anthracene
- Figure 7-1E – Benzo(a)pyrene
- Figure 7-1F – Benzo(b)fluoranthene
- Figure 7-1G – Benzo(k)fluoranthene
- Figure 7-1H – Beryllium
- Figure 7-1I – Copper
- Figure 7-1J – Lead
- Figure 7-1K – Total TPH
- Figure 7-1L – Zinc

Summary of Sampling

The Navy collected 212 confirmation samples during the RAs in 1998 to 1999 and 2000 to 2001 to characterize Excavation 7-1. The Navy also collected 229 soil screening and waste profile samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
60,451	10	17,111	13,539	10	5,016

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 22,127 cubic yards (yd^3) of contaminated soil. Figure 7-1A presents the as-built boundary and documents the RA at Excavation 7-1. Appendix C contains documentation for the backfill operations.

4.2.2 Excavation 7-2

Excavation 7-2 is located in the east-central portion of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
4,4'-DDD		X		X	
4,4'-DDE		X		X	
4,4'-DDT		X		X	
Aldrin	X			X	
Antimony	X			X	
Benzo(a)anthracene	X			X	
Beryllium	X			X	
Chrysene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemical checked in this column as additional COPCs.

COPC Chemical of potential concern
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethene
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation 7-2. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 7-2 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 7-2 – 4,4'-Dichlorodiphenyldichloroethane (DDD), 4,4'-DDE, 4,4'-DDT, Aldrin, Antimony, Benzo(a)anthracene, Beryllium, Chrysene

Summary of Sampling

The Navy collected eight confirmation samples during the 1998 to 1999 RA to characterize Excavation 7-2. Results for antimony were rejected for four samples (see Table 7-2). These results were non-detections and were rejected based on low matrix recoveries. Resampling

would not be expected to improve the results and, consequently, no additional replacement samples were collected because matrix interference was the cause. The Navy also collected 12 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
490	6	109	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 109 yd^3 of contaminated soil. Figure 7-2 presents the as-built boundary and documents the RA at Excavation 7-2. Appendix C contains documentation for the backfill operations.

4.2.3 Excavation 7-3

Excavation 7-3 is located in the northeastern quadrant of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Beryllium	X			X	
Chrysene	X			X	
Copper	X				X
Dibenz(a,h)anthracene		X		X	
Indeno(1,2,3-cd)pyrene	X			X	
Lead	X				X
Zinc	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 7-3. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Riprap near the shoreline prevented completion of the delineation sampling on the north side of the excavation. Tables 7-3 and 7-3 SVOA at the end of this section present the results for the confirmation samples. The 12 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 7-3A – Aroclor-1260
- Figure 7-3B – Benzo(a)anthracene

- Figure 7-3C – Benzo(a)pyrene
- Figure 7-3D – Benzo(b)fluoranthene
- Figure 7-3E – Benzo(k)fluoranthene
- Figure 7-3F – Beryllium
- Figure 7-3G – Chrysene
- Figure 7-3H – Copper
- Figure 7-3I – Dibenz(a,h)anthracene
- Figure 7-3J – Indeno(1,2,3-cd)pyrene
- Figure 7-3K – Lead
- Figure 7-3L – Zinc

Summary of Sampling

The Navy collected 227 confirmation samples during the RAs in 1998 to 1999 and 2000 to 2001 to characterize Excavation 7-3. The Navy also collected 82 soil screening and waste profile samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
11,976	10	3,363	14,164	10	5,246

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 8,609 yd^3 of contaminated soil. Figure 7-3A illustrates the extent of excavation in this area. Excavation 7-3 merged with Excavations 7-4 and 7-5, and the as-built areas and volumes in the above table are best estimates of the portion represented by Excavation 7-3. Appendix C contains documentation for backfill operations.

4.2.4 Excavation 7-4

Excavation 7-4 is located in the northeastern quadrant of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Antimony		X			X
Aroclor-1254		X			X
Aroclor-1260		X			X
Arsenic		X			X
Benzo(a)anthracene		X			X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Bis(2-ethylhexyl)phthalate	X				X
Cadmium		X			X
Copper		X			X
Indeno(1,2,3-cd)pyrene	X				X
Lead	X				X
Manganese		X			X
Mercury		X			X
Total TPH		X			X
Zinc		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because concentrations of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom comfirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 7-4. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Tables 7-4, 7-4 Metals, and 7-4 SVOA at the end of this section present

the results for the confirmation samples. The 17 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 7-4A – Antimony
- Figure 7-4B – Aroclor-1254
- Figure 7-4C – Aroclor-1260
- Figure 7-4D – Arsenic
- Figure 7-4E – Benzo(a)anthracene
- Figure 7-4F – Benzo(a)pyrene
- Figure 7-4G – Benzo(b)fluoranthene
- Figure 7-4H – Benzo(k)fluoranthene
- Figure 7-4I – Bis(2-ethylhexyl)phthalate
- Figure 7-4J – Cadmium
- Figure 7-4K – Copper
- Figure 7-4L – Indeno(1,2,3-cd)pyrene
- Figure 7-4M – Lead
- Figure 7-4N – Manganese
- Figure 7-4O – Mercury
- Figure 7-4P – Total TPH
- Figure 7-4Q – Zinc

Summary of Sampling

The Navy collected 418 confirmation samples during the RAs in 1998 to 1999 RA and 2000 to 2001 to characterize Excavation 7-4. The Navy also collected 104 soil screening and waste profile samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
11,940	10	3,909	33,446	10	9,876

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 13,785 yd^3 of contaminated soil. Figure 7-4A illustrates the extent of excavation in this area. Excavation 7-4 merged with Excavations 7-3 and 7-5, and the as-built areas and volumes in the table above are best estimates of the portion represented by Excavation 7-4. Appendix C contains documentation for the backfill operations.

4.2.5 Excavation 7-5

Excavation 7-5 is located in the northeastern quadrant of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1254		X[3]			X
Aroclor-1260		X			X
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Beryllium	X				X
Chrysene	X				X
Copper	X				X
Indeno(1,2,3-cd)pyrene	X				X
Lead	X				X
Mercury		X			X
Total TPH		X			X
Zinc		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

2 Results for waste profile or screening samples identified the chemicals checked in this column as additional COPCs.

3 Aroclor-1254 was added as a COPC based on detections observed in samples intended to be analyzed for Aroclor-1260 but that were also analyzed for Aroclor-1254.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 7-5. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Riprap near the shoreline prevented completion of the delineation sampling on the north side of the excavation. Tables 7-5 and 7-5 SVOA at the end of this section

present the results for the confirmation samples. The 14 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 7-5A – Aroclor-1254
- Figure 7-5B – Aroclor-1260
- Figure 7-5C – Benzo(a)anthracene
- Figure 7-5D – Benzo(a)pyrene
- Figure 7-5E – Benzo(b)fluoranthene
- Figure 7-5F – Benzo(k)fluoranthene
- Figure 7-5G – Beryllium
- Figure 7-5H – Chrysene
- Figure 7-5I – Copper
- Figure 7-5J – Indeno(1,2,3-cd)pyrene
- Figure 7-5K – Lead
- Figure 7-5L – Mercury
- Figure 7-5M – Total TPH
- Figure 7-5N – Zinc

Summary of Sampling

The Navy collected 150 confirmation samples during the RAs in 1998 to 1999 and 2000 to 2001 to characterize Excavation 7-5. The Navy also collected 52 soil screening and waste profile samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
10,373	19	2,414	11,815	10	4,376

Notes:

bgs Below ground surface

ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 6,790 yd^3 of contaminated soil. Figure 7-5A illustrates the extent of excavation in this area. Excavation 7-5 merged with Excavations 7-3 and 7-4, and the as-built areas and volumes in the table above are best estimates of the portion represented by Excavation 7-5. The depth of excavation during the 1998 to 1999 RA was extended to below 10 feet to a maximum of 19 feet because elevated concentrations of polychlorinated biphenyls (PCB) were detected in sand blast grit at depths greater than 10 feet. The Navy continued to excavate the blast grit below 10 feet to provide additional protection for human health and the environment. Appendix C contains documentation for the backfill operations.

4.2.6 Excavation B0536

Excavation B0536 is located along the southern boundary of IR-07, adjacent to IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X		X	
Beryllium	X			X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of gasoline range organics exceeded the screening level (10 mg/kg) established at that time.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0536. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0536 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0536 – Aroclor-1260, Beryllium, Total TPH

Summary of Sampling

The Navy collected 15 confirmation samples during the 1998 to 1999 RA to characterize Excavation B0536. The Navy also collected 20 soil screening and waste profile samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
237	7	59	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 59 yd^3 of contaminated soil. Figure B0536 presents the as-built boundary and documents the RA at Excavation B0536. Appendix C contains documentation for the backfill operations.

4.2.7 Excavation B0628

Excavation B0628 is located in the north-central portion of IR-07, between Excavations 7-1 and 7-3 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X
Beryllium	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B0628. Results for composite and discrete samples were used to evaluate the lateral and vertical extent of contamination at the area of excavation. Table B0628 at the end of this section presents the results for the soil samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0628 – Aroclor-1260, Beryllium

Summary of Sampling

The Navy collected 20 confirmation and delineation samples during the 1998 to 1999 RA and 2000 to 2001 RA to characterize Excavation B0628. The Navy also collected 42 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
3,406	10	560	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 560 yd^3 of contaminated soil. The Navy and the BRAC Cleanup Team (BCT) agreed in a meeting on December 2, 1999, that additional excavation was not necessary to address the concentration of Aroclor-1260 at location 062855A that slightly exceeded the cleanup goal in the 2000 ESD. Data from location 062855A will be reevaluated during the TMSRA. Figure B0628 presents the as-built boundary and documents the RA at Excavation B0628. Appendix C contains documentation for the backfill operations.

4.2.8 Excavation B0632

Excavation B0632 is located in the central portion of IR-07, southeast of Excavation 7-1 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Beryllium	X			X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

COPC Chemical of potential concern
HHRA Human health risk assessment
Mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0632. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0632 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0632 – Arsenic, Beryllium, Total TPH

Summary of Sampling

The Navy collected 10 confirmation samples during the 1998 to 1999 RA to characterize Excavation B0632. The Navy also collected 22 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
639	4	59	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 59 yd^3 of contaminated soil. Figure B0632 presents the as-built boundary and documents the RA at Excavation B0632. Appendix C contains documentation for the backfill operations.

4.2.9 Excavation B0636

Excavation B0636 is located along the southern boundary of IR-07, adjacent to IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Lead		X		X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0636. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0636 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0636 – Arsenic, Lead

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B0636. The Navy also collected 11 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
54	7	14	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 14 yd^3 of contaminated soil. Figure B0636 presents the as-built boundary and documents the RA at Excavation B0636. Appendix C contains documentation for the backfill operations.

4.2.10 Excavation B0933

Excavation B0933 is located in the southeastern quadrant of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1254	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0933. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0933 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0933 – Aroclor-1254

Summary of Sampling

The Navy collected 13 confirmation samples during the 1998 to 1999 RA to characterize Excavation B0933. The Navy also collected 14 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
141	10	52	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 52 yd^3 of contaminated soil. Figure B0933 presents the as-built boundary and documents the RA at Excavation B0933. Appendix C contains documentation for the backfill operations.

4.2.11 Excavation B1036

Excavation B1036 is located in the southeastern corner of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
4,4'-DDD		X		X	
4,4'-DDE		X		X	
4,4'-DDT		X		X	
Aldrin	X			X	
Benzo(a)anthracene		X		X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene		X		X	
Benzo(k)fluoranthene		X		X	
Beryllium	X			X	
Chrysene		X		X	
Dibenz(a,h)anthracene		X		X	
Indeno(1,2,3-cd)pyrene		X		X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethene
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1036. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1036 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1036A – Aldrin, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene

- Figure B1036B – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Beryllium, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Total TPH

Summary of Sampling

The Navy collected 10 confirmation samples during the 1998 to 1999 RA to characterize Excavation B1036. The Navy also collected 18 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
180	8.25	56	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 56 yd^3 of contaminated soil. Figure B1036A presents the as-built boundary and documents the RA at Excavation B1036. Appendix C contains documentation for the backfill operations.

4.2.12 Excavation B1128

Excavation B1128 is located in the east-central portion of IR-07, completely within the boundary of Excavation 7-4 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene		X		X	
Benzo(a)pyrene		X		X	
Benzo(b)fluoranthene		X		X	
Benzo(k)fluoranthene		X		X	
Bis(2-ethylhexyl)phthalate		X		X	
Chrysene		X		X	
n-Nitroso-di-n-propylamine	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1128. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1128 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1128 – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, n-Nitroso-di-n-propylamine

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B1128. The Navy also collected 23 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
149	6	65	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 65 yd^3 of contaminated soil. Figure B1128 presents the as-built boundary and documents the RA at Excavation B1128. Appendix C contains documentation for the backfill operations.

4.2.13 Excavation B1132

Excavation B1132 is located in the southeastern quadrant of IR-07 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Copper	X			X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1132. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1132 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1132 – Copper, Total TPH

Summary of Sampling

The Navy collected 15 confirmation samples during the 1998 to 1999 RA to characterize Excavation B1132. The Navy also collected 28 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,492	8	233	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 233 yd^3 of contaminated soil. Figure B1132 presents the as-built boundary and documents the RA at Excavation B1132. Appendix C contains documentation for the backfill operations.

4.2.14 Excavation B1227

Excavation B1227 is located in the east-central portion of IR-07, completely within the boundary of Excavation 7-4 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene		X		X	
Beryllium	X			X	
Chrysene	X			X	
Dibenz(a,h)anthracene		X		X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1227. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1227 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1227A – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene
- Figure B1227B – Beryllium, Chrysene, Dibenz(a,h)anthracene, Total TPH

Summary of Sampling

The Navy collected 11 confirmation samples during the 1998 to 1999 RA to characterize Excavation B1227. The Navy also collected 32 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
2,779	10	582	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 582 yd^3 of contaminated soil. Figure B1227A presents the as-built boundary and documents the RA at Excavation B1227. Appendix C contains documentation for the backfill operations.

4.2.15 Excavation B1324

Excavation B1324 is located in the northeastern corner of IR-07, east of Excavation 7-4 and south of Excavation 7-5 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Antimony		X		X	
Benzo(a)anthracene	X			X	
Benzo(b)fluoranthene	X			X	
Chrysene	X			X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1324. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1324 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1324 – Antimony, Benzo(a)anthracene, Benzo(b)fluoranthene, Chrysene, Total TPH

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation B1324. The Navy also collected 15 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
121	8.25	37	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 37 yd^3 of contaminated soil. Figure B1324 presents the as-built boundary and documents the RA at Excavation B1324. Appendix C contains documentation for the backfill operations.

4.2.16 Excavation B1422

Excavation B1422 is located in the northeastern corner of IR-07, east of Excavation 7-5 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Beryllium	X			X	
Chrysene		X		X	
Indeno(1,2,3-cd)pyrene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1422. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1422 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1422 – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Beryllium, Chrysene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B1422. The Navy also collected 27 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
413	7	105	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 102 yd^3 of contaminated soil. Figure B1422 presents the as-built boundary and documents the RA at Excavation B1422. Appendix C contains documentation for the backfill operations.

4.3 IR-10

The following excavation areas at IR-10 are included in this section:

- 10-1
- 10-2
- 10-4
- 10-5
- B2725
- B2727
- B2925
- B2926
- B3125
- B3324
- B3422
- B3423
- B3425
- B3622
- B3623
- B3625

4.3.1 Excavation 10-1

Excavation 10-1 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Manganese	X				X
Total TPH	X				X
Trichloroethene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of gasoline range organics exceeded the screening level (10 mg/kg) established at that time.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected discrete soil samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 10-1. Results for samples were used to evaluate the lateral and vertical extent of contamination at the area of excavation. Table 10-1 at the end of this section presents the results for the soil samples. The three figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 10-1A – Manganese
- Figure 10-1B – Total TPH
- Figure 10-1C – Trichloroethene

Summary of Sampling

The Navy did not excavate at Area 10-1 because an SVE treatability study was being implemented in this area to treat trichloroethene (TCE). Therefore, the Navy did not collect any post-excavation confirmation samples at Area 10-1. However, the Navy collected 69 delineation samples at Area 10-1. Data from Area 10-1 were evaluated in the TMSRA. The TMSRA presents information supporting the reevaluation of the remedy, including risks from soil remaining at Parcel B and other remediation alternatives (such as covers and SVE) to address these risks.

Summary of Construction

There are no as-built parameters for the excavation because no soil has been excavated at Area 10-1.

4.3.2 Excavation 10-2

Excavation 10-2 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X				X
Beryllium	X				X
Manganese	X				X
Trichloroethene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete soil samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 10-2. Results for samples were used to evaluate the lateral and vertical extent of contamination at the area of excavation. Table 10-2 at the end of this section presents the results for the soil samples. The four figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 10-2A – Arsenic
- Figure 10-2B – Beryllium
- Figure 10-2C – Manganese
- Figure 10-2D – Trichloroethene

Summary of Sampling

The Navy did not excavate at Area 10-2 because an SVE treatability study is being implemented in this area to treat TCE. Therefore, the Navy did not collect any post-excavation confirmation samples at Area 10-2. However, the Navy collected 23 delineation samples at Area 10-2. Data from Area 10-2 were evaluated in the TMSRA. The TMSRA presents information supporting the reevaluation of the remedy, including risks from soil remaining at Parcel B and other remediation alternatives (such as covers and SVE) to address these risks.

Summary of Construction

There are no as-built parameters for the excavation because no soil has been excavated at Area 10-2.

4.3.3 Excavation 10-4

Excavation 10-4 is located about 10 feet south of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Nickel	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Nickel was identified as a COPC during the RI. However, the concentrations of this chemical did not exceed the 2000 ESD soil cleanup level. The site-specific soil cleanup level for nickel (5,675 mg/kg) was calculated using the nickel-cobalt regression (Tetra Tech 1999) based on a cobalt concentration of 123 mg/kg in a sample from boring IR10B008. The related magnesium concentration in the sample from boring IR10B008 was 105,000 mg/kg.

Delineation Activities

No delineation activities were conducted because nickel concentrations did not exceed the soil cleanup level.

Summary of Sampling

The Navy collected four samples to characterize the area during the RI. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. The figure at the end of this section illustrates the RI data (Figure 10-4).

Summary of Construction

No excavation was completed for Area 10-4 because nickel was the only COPC, and concentrations in samples collected during the RI at Area 10-4 did not exceed the 2000 ESD soil cleanup level.

4.3.4 Excavation 10-5

Excavation 10-5 is located about 10 feet south of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X				X
Copper	X				X
Lead	X				X
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete pre-excavation confirmation samples and composite post-excavation bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 10-5. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 10-5 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 10-5 A – Arsenic, Copper, Lead
- Figure 10-5 B – Manganese

Summary of Sampling

The Navy collected 21 confirmation samples during the 2000 to 2001 RA to characterize Excavation 10-5. During construction under the 2000 to 2001 RA, the Navy also collected one soil screening sample to guide the process. Appendix A contains the analytical results for the soil screening sample.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
NA	NA	NA	284	6	63

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 63 cubic yards (yd^3) of contaminated soil. Figure 10-5 A presents the as-built boundary and documents the RA at Excavation 10-5. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the east and west sidewalls of the excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 10-5 area was less than the soil cleanup level and, therefore, additional area along the east and west sidewalls was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.3.5 Excavation B2725

Excavation B2725 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Trichloroethene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete soil samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B2725. Results for composite and discrete samples were used to evaluate the lateral and vertical extent of contamination at the area of excavation. Table B2725 at the end of this section presents sampling results. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2725 – Trichloroethene

Summary of Sampling

The Navy collected 46 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2725. The Navy also collected 11 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
344	7	82	284	6	63

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 82 yd^3 of contaminated soil during the 1998 to 1999 RA. Figure B2725 presents the as-built boundary and documents the RA at Excavation B2725. Appendix C contains documentation for the backfill operations. Although contamination was delineated during the 2000 to 2001 RA, no additional soil was excavated because an SVE treatability study was being implemented to treat TCE. Data from Excavation B2725 were evaluated in the TMSRA. The TMSRA presents information supporting the reevaluation of the remedy, including risks from soil remaining at Parcel B and other remediation alternatives (such as covers and SVE) to address these risks.

4.3.6 Excavation B2727

Excavation B2727 is located about 30 feet south of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected pre-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B2727. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination in this area. Table B2727 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B2727 – Manganese

Summary of Sampling

The Navy collected nine confirmation samples during the 2000 to 2001 RA to characterize Excavation B2727. The Navy did not collect soil screening or waste profile samples at this excavation.

Summary of Construction

No excavation was completed at Area B2727. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on the sample from boring PA50TA01 that exceeded the soil cleanup level. However, the average manganese concentration for the B2727 area was less than the soil cleanup level and, therefore, the B2727 area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.3.7 Excavation B2925

Excavation B2925 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Diesel Range Organics	X			X	
Gasoline Range Organics	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2925. Results for confirmation samples from the 1998 to 1999 RA were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2925 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2925 – Arsenic, Diesel Range Organics, Gasoline Range Organics

Summary of Sampling

The Navy collected 18 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2925. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
572	8	88	284	6	63

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 88 yd^3 of contaminated soil. Figure B2925 presents the as-built boundary and documents the RA at Excavation B2925. Appendix C contains documentation for the backfill operations.

4.3.8 Excavation B2926

Excavation B2926 is located about 20 feet south of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzene	X				
1,1-Dichloroethene	X				
Benzo(a)pyrene	X				
Benzo(b)fluoranthene	X				
Bis(2-ethylhexylphthalate)	X				
Chrysene	X				
Gasoline Range Organics	X				

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Benzene, 1,1-dichloroethene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, and gasoline range organics were identified as COPCs during the RI. However, none of the concentrations of these chemicals exceed the 2000 ESD soil cleanup levels.

Delineation Activities

No delineation activities were conducted at B2926 because none of the COPCs exceeded soil cleanup levels.

Summary of Sampling

The Navy collected three samples to characterize the excavation during the RI. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. The figure at the end of this section illustrates the RI data (Figure B2926).

Summary of Construction

No excavation was completed for Area B2926 because benzene, 1,1-dichloroethene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, gasoline range organics, and bis(2-ethylhexyl)phthalate concentrations did not exceed the 2000 ESD soil cleanup levels.

4.3.9 Excavation B3125

Excavation B3125 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(b)fluoranthene	X			X	
Chrysene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B3125. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3125 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3125 – Benzo(a)anthracene, Benzo(b)fluoranthene, Chrysene

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B3125. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
82	3	9	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 9 yd^3 of contaminated soil. The figure at the end of this section presents the as-built boundary and documents the RA at Excavation B3125. Appendix C contains documentation for the backfill operations.

4.3.10 Excavation B3324

Excavation B3324 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Lead	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3324. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3324 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3324 – Lead

Summary of Sampling

The Navy collected 10 confirmation samples during the 2000 to 2001 RA to characterize Excavation B3324. During construction under the 2000 to 2001 RA, the Navy also collected one soil screening sample to guide the process.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
NA	NA	NA	133	6.5	15

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 15 yd^3 of contaminated soil. Figure B3324 presents the as-built boundary and documents the RA at Excavation B3324. Appendix C contains documentation for the backfill operation.

4.3.11 Excavation B3422

Excavation B3422 is located 20 feet north of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X			X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X			X	
Copper	X			X	
Dibenz(a,h)anthracene	X			X	
Diesel Range Organics	X			X	
Indeno(1,2,3-cd)pyrene	X			X	
Lead		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and post-excavation composite bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavtion B3422. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3422 at the end of this section presents the results for the confirmation samples. The four figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3422 A – Aroclor-1260
- Figure B3422 B – Benzo(a)pyrene, Benzo(b)fluoranthene

- Figure B3422 C – Benzo(k)fluoranthene, Copper, Dibenz(a,h)anthracene, Diesel Range Organics, Indeno(1,2,3-cd)pyrene

- Figure B3422 D – Lead

Summary of Sampling

The Navy collected 36 confirmation samples during the RAs to characterize Excavation B3422. During construction under the RAs, the Navy also collected 17 soil screening and waste profile samples to guide the process. Results for screening soil samples collected during the RAs were used to add Aroclor-1260 and lead as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
1,439	10	273	1,102	10	343

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 616 yd^3 of contaminated soil. Field crews encountered railroad tracks and a concrete electrical conduit tunnel during excavation. The Navy completed excavation and backfill operations around these obstructions, leaving them in place. Figure B3422 A presents the as-built boundary and documents the RA at Excavation B3422. Appendix C contains documentation for the backfill operation.

4.3.12 Excavation B3423

Excavation B3423 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
1,2-Dichloroethane	X				

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

The VOC 1,2-dichloroethane was identified as a COPC during the RI. However, concentrations of this chemical did not exceed the 2000 ESD soil cleanup level.

Delineation Activities

No excavation was completed at B3423 because the COPC did not exceed the soil cleanup level.

Summary of Sampling

The Navy collected two samples to characterize the excavation during the RI. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. The figure at the end of this section (Figure B3423) illustrates the RI data.

Summary of Construction

No excavation was completed for Area B3423 because 1,2-dichloroethane did not exceed the soil cleanup level.

4.3.13 Excavation B3425

Excavation B3425 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Beryllium	X			X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B3425. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3425 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure B3425 A – Beryllium
- Figure B3425 B – Manganese

Summary of Sampling

The Navy collected 17 confirmation samples during the 1998 to 1999 RA to characterize Excavation B3425. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
478	6	55	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 55 yd^3 of contaminated soil. Figure B3425 A presents the as-built boundary and documents the RA at Excavation B3425. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the south, west, and east sidewalls that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation B3425 area was less than the soil cleanup level; therefore, additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.3.14 Excavation B3622

Excavation B3622 is located between two sets of railroad tracks just north of Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X			X
Diesel Range Organics		X		X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3622. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3622 presents the results for the confirmation samples. The three figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3622 A – Diesel Range Organics
- Figure B3622 B – Aroclor-1260
- Figure B3622 C – Manganese

Summary of Sampling

The Navy collected 25 confirmation samples during the RAs to characterize Excavation Area B3622. During the construction process under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Results for screening soil samples collected during the 1998 to 1999 RA were used to add Aroclor-1260 and diesel range organics as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,344	10	356	405	7	105

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 461 yd^3 of contaminated soil. Field crews encountered railroad tracks during excavation. The Navy completed excavation and backfill operations around these obstructions, leaving them in place. Figure B3622 A presents the as-built boundary and documents the RA at Excavation B3622. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the south sidewall that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation B3622 area was less than the soil cleanup level; therefore, additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.3.15 Excavation B3623

Excavation B3623 is located inside Building 123, the Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Aroclor-1260 was identified as a COPC during the RI. However, the concentrations of this chemical did not exceed the 2000 ESD soil cleanup level.

Delineation Activities

No delineation activities were conducted because Aroclor-1260 concentrations did not exceed the soil cleanup level.

Summary of Sampling

The Navy collected one sample to characterize the area during the RI. No samples were collected during the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. The figure at the end of this section (Figure B3623) illustrates the RI data.

Summary of Construction

No excavation was completed at Area B3623 because Aroclor-1260 concentrations did not exceed the soil cleanup level.

4.3.16 Excavation B3625

Excavation B3625 is located inside Building 123, Battery and Electroplating Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Beryllium	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B3625. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3625 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B3625 – Beryllium

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation B3625. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
644	10	104	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 104 yd^3 of contaminated soil. Figure B3625 presents the as-built boundary and documents the RA at Excavation B3625. Appendix C contains documentation for the backfill operation.

4.4 IR-18

The following excavation areas at IR-18 are included in this section:

- 18-1
- 18-2
- 18-3
- 18-4
- B0136
- B0146
- B0241
- B0337
- B0638
- B1138

4.4.1 Excavation 18-1

Excavation 18-1 is located near the southwestern corner of Parcel B, along the western boundary of the HPS property, in an open, flat area that was formerly paved with asphalt and was used as a parking lot (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X			X	
Beryllium	X			X	
Chrysene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 18-1. The northern side of Excavation 18-1 merged with the southern side of Excavation 18-2 and the southwestern side of Excavation 18-4. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Tables 18-1 and 18-1 SVOA at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 18-1A – Benzo(k)fluoranthene, Beryllium, Chrysene
- Figure 18-1B – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene

Summary of Sampling

The Navy collected 53 confirmation samples during the RAs to characterize Excavation 18-1. During construction under the 1998 to 1999 RA, the Navy also collected 130 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
33,518	10	8,130	1,374	10	509

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 8,639 $yd^3$of contaminated soil. Figure 18-1 A presents the as-built boundary and documents the RA at Excavation 18-1. Appendix C contains documentation for the backfill operation.

4.4.2 Excavation 18-2

Excavation 18-2 is located along the western boundary and in the northwestern corner of IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1254	X				X
Aroclor-1260	X			X	
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Bis(2-ethylhexyl)phthalate	X			X	
Chrysene	X			X	
Dibenz(a,h)anthracene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	
Lead	X				X
Total TPH	X			X	
Zinc	X				X

Notes:

[1] The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) and motor oil range organics exceeded the screening level (1,000 mg/kg) established at that time.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 18-2. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Tables 18-2, 18-2 Metals, and 18-2 SVOA at the end of this section present the results for the confirmation samples. The 13 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 18-2A – Aroclor-1254
- Figure 18-2B – Aroclor-1260
- Figure 18-2C – Benzo(a)anthracene
- Figure 18-2D – Benzo(a)pyrene
- Figure 18-2E – Benzo(b)fluoranthene
- Figure 18-2F – Benzo(k)fluoranthene
- Figure 18-2G – Bis(2-ethylhexyl)phthalate
- Figure 18-2H – Chrysene
- Figure 18-2I – Dibenz(a,h)anthracene
- Figure 18-2J – Indeno(1,2,3-cd)pyrene
- Figure 18-2K – Lead
- Figure 18-2L – Total TPH
- Figure 18-2M – Zinc

Summary of Sampling

The Navy collected 124 confirmation samples during the RAs in 1998 to 1999 and 2000 to 2001 to characterize Excavation 18-2. The Navy also collected 82 soil screening samples during construction under the RAs in 1998 to 1999 and 2000 to 2001 to guide the process. Appendix A contains the analytical results for the screening samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
9,355	10	1,519	7,512	10	2,781

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 4,300 yd^3 of contaminated soil. Figure 18-2A presents the as-built boundary and documents the RA at Excavation 18-2. Excavation 18-2 merged with Excavation 18-1, and the as-built areas and volumes in the above table are best estimates of the portion represented by Excavation 18-2. Appendix C contains documentation for the backfill operations.

4.4.3 Excavation 18-3

Excavation 18-3 is located in the west-central portion of IR-18, just north of Excavation 18-1 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Chrysene	X			X	
Dibenz(a,h)anthracene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	
Lead	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation 18-3. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 18-3 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 18-3A – Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Lead
- Figure 18-3B – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation 18-3. The Navy also collected 11 soil screening and waste profile samples during

construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,267	10	469	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 469 yd^3 of contaminated soil. Figure 18-3A presents the as-built boundary and documents the RA at Excavation 18-3. Appendix C contains documentation for the backfill operations.

4.4.4 Excavation 18-4

Excavation 18-4 is located about 130 feet from the western boundary of the HPS property, at the northeast corner of Area 18-1, in an open flat area that was formerly paved with asphalt and was used as a parking lot (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1254	X			X	
Aroclor-1260		X			X
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Copper		X			X
Chrysene	X			X	
Dibenz(a,h)anthracene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	

Notes:
1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 18-4. The southern and western sides of Excavation 18-4 merged with the northern side of Excavation 18-1. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 18-4 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 18-4 A – Aroclor-1254, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
- Figure 18-4 B – Aroclor-1260, Copper

Summary of Sampling

The Navy collected 63 confirmation samples during the RAs to characterize Excavation 18-4. During construction under the 1998 to 1999 RA, the Navy also collected 22 soil screening and waste profile samples to guide the process. Results for soil screening samples collected during the RAs were used to add Aroclor-1260 and copper as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
3,945	10	809	669	10	248

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 1,057 yd^3 of contaminated soil. Figure 18-4 A presents the as-built boundary and documents the RA at Excavation 18-4. Appendix C contains documentation for the backfill operation.

4.4.5 Excavation B0136

Excavation B0136 is located along the northern boundary of IR-18, adjacent to IR-07 and north of Excavation 18-2 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
4,4'-DDD	X			X	
4,4'-DDD	X			X	
4,4'-DDT	X			X	
Benzo(a)anthracene	X			X	
Benzo(a)pyrene		X		X	
Benzo(b)fluoranthene		X		X	
Benzo(k)fluoranthene		X		X	
Chrysene	X			X	
Dibenz(a,h)anthracene		X		X	
Indeno(1,2,3-cd)pyrene		X		X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethene
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0136. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0136 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0136 – 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B0136. The Navy also collected 14 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
154	7	40	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 40 yd^3 of contaminated soil. Figure B0136 presents the as-built boundary and documents the RA at Excavation B0136. Appendix C contains documentation for the backfill operations.

4.4.6 Excavation B0146

Excavation B0146 is located in the southwestern corner of Parcel B on a steeply sloping hillside (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA	Waste Profile Sample	Field Observation [1]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Lead			X		X
Zinc			X		X

Notes:

1 The discovery and removal of a small group of empty paint cans on the hillside south of Excavation at 18-1 led to this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation confirmation sidewall and composite post-excavation sidewall and bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B0146. The northern side of Excavation B0146 merged with the southern side of Excavation 18-1. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0146 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0146 A – Lead
- Figure B0146 B – Zinc

Summary of Sampling

The Navy collected 56 confirmation samples during the RAs to characterize Excavation B0146. During construction under the 2000 to 2001 RA, the Navy also collected one waste profile sample to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
180	3.5	23	3,427	6	762

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 785 yd^3 of contaminated soil. The western side of Excavation B0146 was excavated to the HPS property boundary. Figure B0146 A presents the as-built boundary and documents the RA at Excavation B0146. Appendix C contains documentation for the backfill operation.

4.4.7 Excavation B0241

Excavation B0241 is located in the west-central portion of IR-18, just north of Excavation 18-1 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0241. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0241 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0241 – Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation B0241. The Navy also collected 13 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
63	10	23	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 23 yd^3 of contaminated soil. Figure B0241 presents the as-built boundary and documents the RA at Excavation B0241. Appendix C contains documentation for the backfill operations.

4.4.8 Excavation B0337

Excavation B0337 is located in the northwestern quadrant of IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	
Lead	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0337. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0337 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0337 – Aroclor-1260, Lead

Summary of Sampling

The Navy collected 10 confirmation samples during the 1998 to 1999 RA to characterize Excavation B0337. The Navy also collected 18 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,930	10	49	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 49 yd^3 of contaminated soil. Figure B0337 presents the as-built boundary and documents the RA at Excavation B0337. Appendix C contains documentation for the backfill operations.

4.4.9 Excavation B0638

Excavation B0638 is located in the north-central portion of IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
4,4'-DDD	X			X	
4,4'-DDT	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
DDD Dichlorodiphenyldichloroethane
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B0638. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B0638 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B0638 – 4,4'-DDD, 4,4'-DDT, Benzo(a)pyrene, Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation B0638. The Navy also collected 25 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
663	7	123	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 123 yd^3 of contaminated soil. Figure B0638 presents the as-built boundary and documents the RA at Excavation B0638. Appendix C contains documentation for the backfill operations.

4.4.10 Excavation B1138

Excavation B1138 is located in the northeastern corner of IR-18 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Beryllium	X			X	
Total TPH	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Total TPH was identified as a COPC during the remedial design because the concentration of diesel range organics exceeded the screening level (100 mg/kg) established at that time.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation
TPH Total petroleum hydrocarbons

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1138. Results for composite samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1138 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1138 – Beryllium, Total TPH

Summary of Sampling

The Navy collected 12 confirmation samples during the 1998 to 1999 RA to characterize Excavation B1138. The Navy also collected 22 soil screening and waste profile samples during construction under the 1998 to 1999 RA to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
149	9.25	46	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 46 yd^3 of contaminated soil. Figure B1138 presents the as-built boundary and documents the RA at Excavation B1138. Appendix C contains documentation for the backfill operations.

4.5 IR-20

The following excavation areas at IR-20 are included in this section:

- 20-1
- 20-2
- 20-3
- B4217
- B4219
- B4419
- B4420
- B4519

4.5.1 Excavation 20-1

Excavation 20-1 is located in the former waste storage yard adjacent to Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic		X		X	
Copper	X			X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation confirmation samples during the 2000 to 2001 RA. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 20-1 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 20-1A – Arsenic, Copper
- Figure 20-1B – Manganese

Summary of Sampling

The Navy collected 15 confirmation samples during the 1998 to 1999 RA to characterize Excavation 20-1. During construction under the 1998 to 1999 RA, the Navy also collected 13 soil screening and waste profile samples to guide the process. Results for soil screening samples collected during the 1998 to 1999 RA were used to add arsenic as a COPC. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
2,572	3	250	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 250 yd^3 of contaminated soil. Figure 20-1 A presents the as-built boundary and documents the RA at Excavation 20-1. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the west sidewall that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 20-1 area was less than the soil cleanup level and, therefore, additional area along the west sidewall was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.5.2 Excavation 20-2

Excavation 20-2 is located near the former waste storage yard next to Buildings 156, the Rubber Shop, and 163, the Rubber Shop Annex (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X
Mercury	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 20-2. The northern side of Excavation 20-2 merged with the southern side of Excavation B4420. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 20-2 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of the stepout and how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure 20-2 A – Aroclor-1260
- Figure 20-2 B – Mercury

Summary of Sampling

The Navy collected 38 confirmation samples during the RAs to characterize Excavation 20-2. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
5,087	10	1,154	2,218	10	754

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 1,908 yd^3 of contaminated soil. Figure 20-2 A presents the as-built boundary and documents the RA at Excavation 20-2. Appendix C contains documentation for the backfill operation.

4.5.3 Excavation 20-3

Excavation 20-3 is located in the southern portion of IR-20, about 140 feet from Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X		X	
Lead	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation 20-3. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 20-3 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure 20-3 – Aroclor-1260, Lead

Summary of Sampling

The Navy collected 11 confirmation samples during the 1998 to 1999 RA to characterize Excavation 20-3. During construction under the 1998 to 1999 RA, the Navy also collected 11 soil screening and waste profile samples to guide the process. Results for soil screening samples collected during the 1998 to 1999 RA were used to add Aroclor-1260 as a COPC. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
532	5	51	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 51 yd^3 of contaminated soil. Figure 20-3 presents the as-built boundary and documents the RA at Excavation 20-3. Appendix C contains documentation for the backfill operation.

4.5.4 Excavation B4217

Excavation B4217 is located about 100 feet north of Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aluminum	X			X	
Diesel Range Organics	X			X	
Gasoline Range Organics	X			X	
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel and gasoline range organics exceeded screening levels (100 and 10 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B4217. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4217 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4217 A – Aluminum, Diesel Range Organics, Gasoline Range Organics
- Figure B4217 B – Manganese

Summary of Sampling

The Navy collected 17 confirmation samples during the 1998 to 1999 RAs to characterize Excavation B4217. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
200	5.5	26	506	5.5	103

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 129 yd^3 of contaminated soil. Figure B4217 A presents the as-built boundary and documents the RA at Excavation B4217. Appendix C contains documentation for the backfill operations. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the east sidewall of the 1998 to 1999 excavation (that were removed) and along the south sidewall of the 2000 to 2001 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation B4217 area was less than the soil cleanup level and therefore additional area along the south sidewall was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.5.5 Excavation B4219

Excavation B4219 is located inside Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Nickel	X				

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Nickel was identified as a COPC during the RI. However, the concentrations of this chemical did not exceed the 2000 ESD soil cleanup level. The site-specific cleanup level for nickel in soil (953 mg/kg) was calculated using the nickel-cobalt regression (Tetra Tech 1999) based on a cobalt concentration of 35.4 mg/kg in a sample from boring IR20MW01A. The related magnesium concentration in the sample from boring IR20MW01A was 13,700 mg/kg.

Delineation Activities

No delineation activities were conducted because nickel concentrations did not exceed the soil cleanup level.

Summary of Sampling

The Navy collected two samples to characterize the area during the RI. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. Figure B4219 at the end of this section illustrates the RI data.

Summary of Construction

No excavation was completed for Area B4219 because nickel was the only COPC and concentrations in samples collected during the RI at Area B4219 did not exceed the 2000 ESD soil cleanup level.

4.5.6 Excavation B4419

Excavation B4419 is located approximately 20 feet east of Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	
Bis(2-ethylhexylphthalate)		X		X	
Copper		X		X	
Zinc		X		X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4419. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4419 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4419 – Aroclor-1260, Bis(2-ethylhexyl)phthalate, Copper, Zinc

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B4419. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Results for soil screening samples collected during the 1998 to 1999 RA were used to add, bis(2-ethylhexyl)phthalate, copper, and zinc as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
1,094	7	163	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 163 yd^3 of contaminated soil. Figure B4419 presents the as-built boundary and documents the RA at Excavation B4419. Appendix C contains documentation for the backfill operation.

4.5.7 Excavation B4420

Excavation B4420 is located near the former waste storage yard next to Buildings 156, the Rubber Shop, and 163, the Rubber Shop Annex (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to complete delineation at Excavation B4420. The southern side of Excavation B4420 merged with the northern side of Excavation 20-2. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4420 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing the progression of the stepouts and how the samples collected delineated the extent of contamination associated with the COPC:

- Figure B4420 – Aroclor-1260

Summary of Sampling

The Navy collected 38 confirmation samples during the RAs to characterize Excavation B4420. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil and waste profile screening samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,299	10	153	1,040	8	288

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 441 yd^3 of contaminated soil. Figure B4420 presents the as-built boundary and documents the RA at Excavation B4420. Appendix C contains documentation for the backfill operation.

4.5.8 Excavation B4519

Excavation B4519 is located approximately 75 feet southeast of Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aluminum	X			X	
Aroclor-1260	X				X
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and post-excavation composite bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B4519. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4519 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4519 A – Aluminum, Manganese
- Figure B4519 B – Aroclor-1260

Summary of Sampling

The Navy collected 13 confirmation samples during the RAs to characterize Excavation B4519. During construction under the 1998 to 1999 RA, the Navy also collected 15 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
806	7	94	275	7	71

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 165 yd^3 of contaminated soil. Figure B4519 A presents the as-built boundary and documents the RA at Excavation B4519. Appendix C contains documentation for the backfill operation.

4.6 IR-23

The following excavation areas at IR-23 are included in this section:

- 23-1
- 23-2
- 23-3
- B1525
- B2127
- EE-01
- EE-02
- EE-03

4.6.1 Excavation 23-1

Excavation 23-1 is located adjacent to Building 145, the former Saltwater Pumphouse (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Copper	X				X
Diesel Range Organics	X				X
Motor Oil Range Organics	X				X
Zinc	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel and motor oil range organics exceeded the screening level (100 and 1,000 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The northern side of Excavation 23-1 merged with the southern side of Excavation 23-3. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 23-1 presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 23-1 – Copper, Diesel Range Organics, Motor Oil Range Organics, Zinc

Summary of Sampling

The Navy collected nine confirmation samples during the RAs to characterize Excavation 23-1. During construction under the 1998 to 1999 RA, the Navy also collected one waste profile sample to guide the process. Appendix A contains the analytical results for the waste profile sample.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
256	6	57	306	10	113

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 170 yd^3 of contaminated soil. Field crews encountered three concrete slabs and a concrete utility corridor (utilidor) during excavation. The Navy completed excavation and backfill operations around these obstructions, leaving them in place. Figure 23-1 presents the as-built boundary and documents the RA at Excavation 23-1. Appendix C contains documentation for the backfill operation.

4.6.2 Excavation 23-2

Excavation 23-2 is located beneath railroad tracks about 75 feet northeast of Building 146, the former Photography Development Laboratory and Tactical Air Navigation (TACAN) Facility (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Beryllium	X			X	
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 23-2. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 23-2 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure 23-2 A – Beryllium
- Figure 23-2 B – Manganese

Summary of Sampling

The Navy collected 27 confirmation samples during the RAs to characterize Excavation 23-2. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
637	3	71	356	5	66

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 137 yd^3 of contaminated soil. Figure 23-2 A presents the as-built boundary and documents the RA at Excavation 23-2. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on a sample along the south sidewall (that was removed) and the north sidewall of the 1998 to 1999 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 23-2 area was less than the soil cleanup level and therefore additional area along the north sidewall was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.6.3 Excavation 23-3

Excavation 23-3 is located adjacent to Building 145, the former Saltwater Pumphouse (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation[2]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Copper	X			X	
Diesel Range Organics			X	X	
Gasoline Range Organics			X		
Indeno(1,2,3-cd)pyrene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 These chemicals were added as additional COPCs based on field observations

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 23-3. The southern side of Excavation 23-3 merged with the northern side of Excavation 23-1. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 23-3 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 23-3 A – Aroclor-1260, Copper, Diesel Range Organics, Gasoline Range Organics
- Figure 23-3 B – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected 26 confirmation samples during the RAs to characterize Excavation 23-3. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
327	7	29	459	10	170

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 199 yd^3 of contaminated soil. Field crews encountered a concrete block and concrete utilidor at the south wall, a concrete structure at the west wall, and a concrete block and a seawall at the north wall during excavation. The Navy completed excavation and backfill operations around these obstructions, leaving them in place. Figure 23-3 A presents the as-built boundary and documents the RA at Excavation 23-3. Appendix C contains documentation for the backfill operation.

4.6.4 Excavation B1525

Excavation B1525 is located about 10 feet west of Building 146, the former Photography Development Laboratory and TACAN Facility (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)pyrene	X			X	
Beryllium	X			X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B1525. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1525 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B1525 – Benzo(a)pyrene, Beryllium, Manganese

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B1525. During construction under the 1998 to 1999 RA, the Navy also collected eight soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
81	3	9	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 9 yd^3 of contaminated soil. Following excavation, the Navy completed backfill operations. Figure B1525 presents the as-built boundary and documents the RA at Excavation B1525. Appendix C contains documentation for the backfill operations.

4.6.5 Excavation B2127

Excavation B2127 is located about 30 feet north of Building 116, the Submarine Subsistence and Training building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2127. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2127 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2127 – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene

Summary of Sampling

The Navy collected 10 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2127. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Results for soil screening samples collected during the 1998 to 1999 RA were used to add benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
64	8	17	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 17 yd^3 of contaminated soil. Figure B2127 presents the as-built boundary and documents the RA at Excavation B2127. Appendix C contains documentation for the backfill operation.

4.6.6 Excavation EE-01

Excavation EE-01 is located in the central portion of IR-23, between Buildings 121 and 146 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA[2]	Delineated 2000 to 2001 RA
4,4'-DDT	X			X	
Aroclor-1260	X			X	
Arsenic	X			X	
Cadmium	X			X	
Copper	X			X	
Lead	X			X	
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 The sample results from the removal action at EE-01 completed in 1996 were used to delineate the extent of COPCs at this excavation.

COPC Chemical of potential concern
DDT Dichlorodiphenyltrichloroethane
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

Results for confirmation samples from the 1996 EE-01 removal were used to confirm the lateral and vertical extent of contamination at the area of excavation. Data from the exploratory excavation are not reproduced in this report, however. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure EE-01 – 4,4'-DDT, Aroclor-1260, Arsenic, Cadmium, Copper, Lead, Zinc

Summary of Sampling

The Navy collected five samples to characterize Excavation EE-01. No samples were collected for the 1998 to 1999 RA or the 2000 to 20001 RA.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1996 Removal Action			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
136	3	12	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 12 yd^3 of contaminated soil. Figure EE-01 presents the as-built boundary and documents the RA at Excavation EE-01. Appendix C contains documentation for the backfill operations.

4.6.7 Excavation EE-02

Excavation EE-02 is located about 30 feet north of Building 116, the Submarine Subsistence and Training building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Beryllium	X			X[2]	
Chrysene	X			X	
Indeno(1,2,3-cd)pyrene	X			X[2]	
Vanadium	X			X[2]	

Notes:

1 Results of post-removal action samples, which were collected after the exploratory excavation removal action of EE-02 in 1996, identified the chemicals checked in this column as additional COPCs.

2 The sample results from the removal action at EE-02 completed in 1996 were used to delineate the extent of these COPCs at this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to complete the delineation of Excavation EE-02. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table EE-02 at the end of this section presents the results for the confirmation samples. Data from the exploratory excavation are not reproduced in this report, however. The two figures at the end of this section illustrate the data, clearly showing the progression of the stepouts and how the results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure EE-02 A – Aroclor-1260
- Figure EE-02 B – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Beryllium, Chrysene, Indeno(1,2,3-cd)pyrene, Vanadium

Summary of Sampling

The Navy collected 34 confirmation samples during the RAs to characterize Excavation EE-02. During construction under the 1998 to 1999 RA, the Navy also collected 35 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
5,970	10	1,512	1,631	7	423

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 1,935 yd^3 of contaminated soil (1998 to 1999 RA volume includes 540 yd^3 removed in 1996). Figure EE-02 A presents the as-built boundary and documents the RA at Excavation EE-02. Appendix C contains documentation for the backfill operation.

4.6.8 Excavation EE-03

Excavation EE-03 is located in the central portion of IR-23 east of Building 146 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA[2]	Delineated 2000 to 2001 RA
Arsenic	X			X	
Copper	X			X	
Diesel Range Organics	X			X	
Lead	X			X	
Manganese	X			X	
Motor Oil Range Organics	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 The sample results from the removal action at EE-01 completed in 1996 were used to delineate the extent of COPCs at this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

Results for confirmation samples from the 1996 EE-03 removal were used to confirm the lateral and vertical extent of contamination at the area of excavation. Data from the exploratory excavation are not reproduced in this report, however. The four figures at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure EE-03 A – Arsenic
- Figure EE-03 B – Diesel Range Organics, Motor Oil Range Organics
- Figure EE-03 C – Copper, Lead
- Figure EE-03 D – Manganese

Summary of Sampling

The Navy collected 16 samples to characterize Excavation EE-03. No samples were collected for the 1998 to 1999 RA or the 2000 to 20001 RA.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1996 Removal Action			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
1,953	9.5	295	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 295 yd^3 of contaminated soil. Figure EE-03 A presents the as-built boundary and documents the RA at Excavation EE-03. Appendix C contains documentation for the backfill operations.

4.7 IR-24

The following excavation areas at IR-24 are included in this section:

- 24-1
- 24-2
- 24-3
- 24-4
- 24-5
- 24-6
- 24-8
- 24-9
- B2414
- B2614
- B2616
- B2715
- B2915
- B2918
- B3114
- B3415
- B3514
- B3614
- B3718
- B3914
- B3916
- B4017
- B4018
- B4113
- B4114

4.7.1 Excavation 24-1

Excavation 24-1 is located approximately 10 feet south of Building 128, the Shop Service and Work Control Center (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Diesel Range Organics	X			X	
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation confirmation samples during the 2000 to 2001 RA. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-1 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 24-1 A – Arsenic, Diesel Range Organics
- Figure 24-1 B – Manganese

Summary of Sampling

The Navy collected 52 confirmation samples during the RAs to characterize Excavation 24-1. During construction under the 1998 to 1999 RA, the Navy also collected 16 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,150	8	304	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 304 yd^3 of contaminated soil. Figure 24-1 A presents the as-built boundary and documents the RA at Excavation 24-1. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the west, north, and east sidewalls of the 1998 to 1999 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 24-1 area was less than the soil cleanup level and, therefore, additional area along the west, north, and east sidewalls was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.7.2 Excavation 24-2

Excavation 24-2 is located approximately 40 feet northeast of Building 128, the Shop Service and Work Control Center (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation bottom and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 24-2. The western side of Excavation 24-2 merged with the eastern side of Excavation B3114. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at Excavation 24-2. Table 24-2 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure 24-2 – Aroclor-1260

Summary of Sampling

The Navy collected 11 confirmation samples during the RA to characterize Excavation 24-2. During construction under the 1998 to 1999 RA, the Navy also collected 11 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
904	3	58	874	4	130

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 188 yd^3 of contaminated soil. The field crew encountered a storm drain inlet during excavation. The Navy completed excavation and backfill operations around this obstruction, leaving it in place. Figure 24-2 presents the as-built boundary and documents the RA at Excavation 24-2. Appendix C contains documentation for the backfill operation.

4.7.3 Excavation 24-3

Excavation 24-3 is located approximately 50 feet northeast of Building 128, the Shop Service and Work Control Center, near railroad tracks that lead to Berth 58 (Figure 1-2). The following table summarizes the history of COPCs, investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 24-3. The southern side of Excavation 24-3 merged with the excavation for Fuel Line A. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-3 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure 24-3 – Aroclor-1260

Summary of Sampling

The Navy collected 14 confirmation samples during the RA to characterize Excavation 24-3. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
370	3	41	167	5	31

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 72 yd^3 of contaminated soil. Field crews encountered a concrete electrical conduit during excavation. The Navy completed excavation and backfill operations around this obstruction, leaving it in place. Excavation at the north wall was discontinued when a sea wall was encountered. Figure 24-3 presents the as-built boundary and documents the RA at Excavation 24-3. Appendix C contains documentation for the backfill operation.

4.7.4 Excavation 24-4

Excavation 24-4 is located inside Building 128, the Shop and Service Work Center (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation[3]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1242		X			X
Aroclor-1260	X				X
Benzo(a)anthracene			X		X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene		X			X
Benzo(k)fluoranthene			X		X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.
3 Full-suite analysis of screening samples for PAHs identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
PAH Polynuclear aromatic hydrocarbons
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected sidewall and bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 24-4. Samples could not be collected north of the western half of Excavation 24-4 because a subsurface concrete vault obstructed access. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-4 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 24-4 – Aroclor-1242, Aroclor-1260, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene

Summary of Sampling

The Navy collected 29 confirmation samples during the 2000 to 2001 RA to characterize Excavation 24-4. During construction under the 2000 to 2001 RA, the Navy also collected one waste profile sample to guide the process. Results for screening soil samples collected during

the RAs were used to add Aroclor-1242 and benzo(b)fluoranthene as COPCs. Appendix A contains the analytical results for the waste profile sample.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
NA	NA	NA	357	3	40

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 40 yd^3 of contaminated soil. Field crews encountered a concrete vault wall that limited the northern extent of the excavation. The vault wall was scraped clean during excavation activities. Figure 24-4 presents the as-built boundary and documents the RA at Excavation 24-4. Appendix C contains documentation for the backfill operations.

4.7.5 Excavation 24-5

Excavation 24-5 is located approximately 50 feet north of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation 24-5. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-5 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure 24-5 – Manganese

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation 24-5. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
357	4	37	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 37 yd^3 of contaminated soil. Figure 24-5 presents the as-built boundary and documents the RA at Excavation 24-5. Appendix C contains documentation for the backfill operation.

4.7.6 Excavation 24-6

Excavation 24-6 is located approximately 50 feet south of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Barium	X			X	
Beryllium	X			X	
Copper	X				X
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected pre-excavation and post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 24-6. The western side of Excavation 24-6 merged with the excavation for Fuel Line C. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-6 at the end of this section presents the results for the confirmation samples. The three figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 24-6 A – Arsenic, Barium, Beryllium
- Figure 24-6 B – Copper
- Figure 24-6 C – Manganese

Summary of Sampling

The Navy collected 25 confirmation samples during the RAs to characterize Excavation 24-6. During construction under the 1998 to 1999 RA, the Navy also collected 11 soil screening and

waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
770	3	82	988	6	220

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 302 yd^3 of contaminated soil. Figure 24-6 A presents the as-built boundary and documents the RA at Excavation 24-6. Appendix C contains documentation for the backfill operation.

4.7.7 Excavation 24-8

Excavation 24-8 is located approximately 10 feet east of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation[3]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Benzo(a)anthracene		X			X
Benzo(a)pyrene		X			X
Beryllium	X			X	
Copper	X			X	
Diesel Range Organics			X		X
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile samples were used to identify the chemicals checked in this column as additional COPCs.
3 Staining was noted in several field samples collected during 2000 to 2001.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 24-8. The western side of Excavation 24-8 merged with the excavation for Fuel Line C. Furthermore, the Parcel B TPH program conducted additional investigations in this general area on the extent of fuel-related contamination near the northeast corner of Building 130 (TPA-CKY 2005). Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Tables 24-8 and 24-8 SVOA and VOA at the end of this section presents the results for the confirmation samples. Results for TPH investigation samples collected during 2000 to 2001 were used to add benzo(a)anthracene and benzo(a)pyrene as COPCs. Observations of staining during field activities caused diesel range organics to be added as a COPC. The five figures at the end of this section illustrate the data, clearly showing how the results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 24-8 A – Copper

- Figure 24-8 B – Arsenic, Beryllium
- Figure 24-8 C – Benzo(a)anthracene, Benzo(a)pyrene
- Figure 24-8 D – Diesel Range Organics
- Figure 24-8 E – Manganese

Summary of Sampling

The Navy collected 38 confirmation samples during the RAs to characterize Excavation 24-8. During construction under the 1998 to 1999 RA, the Navy also collected 14 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
831	3	92	2,431	10	900

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 992 yd^3 of contaminated soil. Figure 24-8 A presents the as-built boundary and documents the RA at Excavation 24-8. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the south, west, and north sidewalls (all removed) of the 1998 to 1999 excavation and discrete samples collected south of the excavation in 2000 to 2001 that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 24-8 area was less than the soil cleanup level and, therefore, additional area along the south sidewall was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.7.8 Excavation 24-9

Excavation 24-9 is located inside Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Diesel Range Organics	X			X	
Gasoline Range Organics	X			X	
Manganese	X			X	
Trichloroethene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel and gasoline range organics exceeded screening levels (100 and 10 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples to complete the delineation at Excavation 24-9. The Navy also collected discrete pre-excavation confirmation samples during the 2000 to 2001 RA. The northern side of Excavation 24-9 merged with the southern side of Excavation B3916. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 24-9 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 24-9 A – Diesel Range Organics, Gasoline Range Organics, Trichloroethene
- Figure 24-9 B – Manganese

Summary of Sampling

The Navy collected 27 confirmation samples during the RAs to characterize Excavation 24-9. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,088	10	194	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 194 yd^3 of contaminated soil. Figure 24-9 A presents the as-built boundary and documents the RA at Excavation 24-9. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the west and south sidewalls of the 1998 to 1999 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation 24-9 area was less than the soil cleanup level, therefore additional area along the west and south sidewalls was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.7.9 Excavation B2414

Excavation B2414 is located about 60 feet north of Building 159, a latrine, and about 50 feet from Berth 61 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X				X
Diesel Range Organics	X				X
Mercury		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and post-excavation bottom composite samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B2414. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2414 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure B2414 A – Aroclor-1260, Diesel Range Organics
- Figure B2414 B – Mercury

Summary of Sampling

The Navy collected 19 confirmation samples during the RAs to characterize Excavation B2414. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Results for waste profile samples collected during the 2000 to 2001 RA were used to add mercury as a COPC. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
1,264	10	241	582	10	216

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 457 yd^3 of contaminated soil. Figure B2414 A presents the as-built boundary and documents the RA at Excavation B2414. Appendix C contains documentation for the backfill operation.

4.7.10 Excavation B2614

Excavation B2614 is located about 50 feet north of Building 159, a latrine (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Chrysene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2614. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2614 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2614 – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene

Summary of Sampling

The Navy collected five confirmation samples during the RAs to characterize Excavation B2614. During construction under the 1998 to 1999 RA, the Navy also collected eight soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
460	7	17	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 17 yd^3 of contaminated soil. Figure B2614 presents the as-built boundary and documents the RA at Excavation B2614. Appendix C contains documentation for the backfill operation.

4.7.11 Excavation B2616

Excavation B2616 is located between Buildings 125, the Submarine Cafeteria, and 159, a latrine adjacent to a concrete transformer pad and subsurface vault (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1242	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation and post-excavation discrete sidewall and composite bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B2616. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2616 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B2616 – Aroclor-1242

Summary of Sampling

The Navy collected 25 confirmation samples during the RAs to characterize Excavation B2616. During construction under the 1998 to 1999 RA, the Navy also collected four soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
54	2	4	133	10	49

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 53 yd^3 of contaminated soil. Field crews encountered an underground vault that limited the eastern extent of the excavation. The vault wall was scraped clean during excavation activities. Figure B2616 presents the as-built boundary and documents the RA at Excavation B2616. Appendix C contains documentation for the backfill operation.

4.7.12 Excavation B2715

Excavation B2715 is located just northeast of Building 159, a latrine (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Copper		X			X
Zinc		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected pre-excavation and post-excavation discrete sidewall and post-excavation composite bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B2715. The eastern side of Excavation B2715 merged with the excavation for Fuel Line A. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2715 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2715 A – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(a)fluoranthene, Benzo(k)fluoranthene
- Figure B2715 B – Copper, Zinc

Summary of Sampling

The Navy collected 63 confirmation samples during the 2000 to 2001 RA to characterize Excavation B2715. During construction, the Navy also collected three waste profile samples.

Results for screening soil samples collected during the 2000 to 2001 RA were used to add copper and zinc as COPCs. Appendix A contains the analytical results for the waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
NA	NA	NA	1,584	7	411

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 411 yd^3 of contaminated soil. Figure B2715 A presents the as-built boundary and documents the RA at Excavation B2715. Appendix C contains documentation for the backfill operation.

4.7.13 Excavation B2915

Excavation B2915 is located about 10 feet north of Building 128, the Shop Service and Work Control Center (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	
Diesel Range Organics	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2915. Excavation B2915 merged with the excavation for Fuel Line A. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2915 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2915 – Aroclor-1260, Diesel Range Organics

Summary of Sampling

The Navy collected 16 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2915. During construction under the 1998 to 1999 RA, the Navy also collected eight soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
612	10	116	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 116 yd^3 of contaminated soil. During excavation, the field crews encountered a concrete wall along the north sidewall. The Navy completed excavation and backfill operations around this obstruction, leaving it in place. Figure B2915 presents the as-built boundary and documents the RA at Excavation B2915. Appendix C contains documentation for the backfill operation.

4.7.14 Excavation B2918

Excavation B2918 is located approximately 25 feet west of Building 128, the Shop Service and Work Control Center (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2918. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2918 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2918 – Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B2918. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
114	2	8	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 8 yd^3 of contaminated soil. Figure B2918 presents the as-built boundary and documents the RA at Excavation B2918. Appendix C contains documentation for the backfill operation.

4.7.15 Excavation B3114

Excavation B3114 is located about 40 feet north of Building 128, the Shop Service and Work Control Center (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3114. The eastern side of Excavation B3114 merged with the western side of Excavation 24-2. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3114 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3114 A – Benzo(a)pyrene
- Figure B3114 B – Benzo(b)fluoranthene, Benzo(k)fluoranthene

Summary of Sampling

The Navy collected 20 confirmation samples during the RAs to characterize Excavation B3114. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
1,086	2	69	2,040	3	227

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 296 yd3 of contaminated soil. Figure B3114 A presents the as-built boundary and documents the RA at Excavation B3114. Appendix C contains documentation for the backfill operation.

4.7.16 Excavation B3415

Excavation B3415 is located about 25 feet northwest of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy did not collect any composite sidewall or bottom samples to delineate the extent of contamination in Area B3415 because the area was excavated as part of Fuel Line A. Confirmation samples collected for Fuel Line A were used to delineate the extent of contamination at Excavation B3415. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs.

- Figure B3415 – Aroclor-1260

Summary of Sampling

The Navy did not collect confirmation, waste profile or soil screening samples specifically to characterize Excavation B3415, but instead used data from the surrounding Fuel Line A excavation. Data from the RI are not reproduced in this report. Figure B3415 at the end of this section illustrates the data in the area of Excavation B3415.

Summary of Construction

The B3415 area was excavated as part of Fuel Line A excavation during the 1998 to 1999 RA and as-built construction parameters are included within the summary for Fuel Line A.

4.7.17 Excavation B3514

Excavation B3514 is located about 25 feet north of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Cyanide	X			X	
Diesel Range Organics	X			X	
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B3514. Excavation B3514 merged with Fuel Line A. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3514 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3514 – Cyanide, Diesel Range Organics, Zinc

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B3514. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil and waste profile screening samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
75	3	6	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 6 yd^3 of contaminated soil specifically for Excavation B3514. The area, including Excavation B3514, was deepened as part of activities for Fuel Line A. Figure B3514 presents the as-built boundary and documents the RA at Excavation B3514. Appendix C contains documentation for the backfill operation.

4.7.18 Excavation B3614

Excavation B3614 is located approximately 20 feet north of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Chrysene	X				X
Dibenz(a,h)anthracene	X				X
Indeno(1,2,3-cd)pyrene	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete sidewall pre-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3614. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3614 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3614 – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene

Summary of Sampling

The Navy collected seven confirmation samples during the RA to characterize Excavation B3614. During construction under the 1998 to 1999 RA, the Navy also collected eight soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
63	2	3	335	2	25

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 28 yd^3 of contaminated soil. Figure B3614 presents the as-built boundary and documents the RA at Excavation B3614. Appendix C contains documentation for the backfill operation.

4.7.19 Excavation B3718

Excavation B3718 is located about 25 feet south of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation[2]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aluminum	X			X	
Cadmium			X		X
Chrysene	X			X	
Diesel Range Organics	X			X	
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

2 Full-suite analysis for metals identified the chemical checked in this column as an additional COPC.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete sidewall pre-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3718. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3718 at the end of this section presents the results for the confirmation samples. The three figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3718 A – Aluminum, Chrysene, Diesel Range Organics
- Figure B3718 B – Cadmium
- Figure B3718 C – Manganese

Summary of Sampling

The Navy collected 21 confirmation samples during the RA to characterize Excavation B3718. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and

waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
412	5	38	583	5	108

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 146 yd^3 of contaminated soil. Figure B3718 A presents the as-built boundary and documents the RA at Excavation B3718. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the east sidewall (that was removed) of the 1998 to 1999 excavation and along the north, east, and south sidewalls of the 2000 to 2001 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation B3718 area was less than the soil cleanup level and, therefore, additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.7.20 Excavation B3914

Excavation B3914 is located about 20 feet north of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Chrysene	X				X
Copper	X				X
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation and composite post-excavation confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B3914. Excavation B3914 merged with Fuel Line B. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3914 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B3914 A – Chrysene, Copper
- Figure B3914 B – Manganese

Summary of Sampling

The Navy collected 15 confirmation samples during the RAs to characterize Excavation B3914. During construction under the 1998 to 1999 RA, the Navy also collected 10 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
395	5	43	492	6	109

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 152 yd^3 of contaminated soil. Figure B3914 A presents the as-built boundary and documents the RA at Excavation B3914. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the south and west sidewall (that were removed) of the 1998 to 1999 excavation and along the south sidewall (also removed) of the 2000 to 2001 excavation that exceeded the soil cleanup level. The average manganese concentration for the Excavation B3914 area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.7.21 Excavation B3916

Excavation B3916 is located inside Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B3916. The southern side of Excavation B3916 merged with the northern side of Excavation 24-9. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B3916 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B3916 – Zinc

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B3916. During construction under the 1998 to 1999 RA, the Navy also collected one screening soil sample to guide the process. Appendix A contains the analytical results for the screening soil sample.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
467	7	62	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 62 yd^3 of contaminated soil. Figure B3916 presents the as-built boundary and documents the RA at Excavation B3916. Appendix C contains documentation for the backfill operation.

4.7.22 Excavation B4017

Excavation B4017 is located about 40 feet east of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Bis(2-ethylhexylphthalate)	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4017. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4017 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B4017 – Bis(2-ethylhexyl)phthalate

Summary of Sampling

The Navy collected 12 confirmation samples during the 1998 to 1999 RA to characterize Excavation B4017. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,040	10	162	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 162 yd^3 of contaminated soil. Figure B4017 presents the as-built boundary and documents the RA at Excavation B4017. Appendix C contains documentation for the backfill operation.

4.7.23 Excavation B4018

Excavation B4018 is located 20 feet southeast of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X			X
Benzo(a)pyrene	X			X	
Lead		X			X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected pre-excavation sidewall and post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B4018. Excavation B4018 merged with Fuel Line C. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4018 at the end of this section presents the results for the confirmation samples. The three figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4018 A – Aroclor-1260
- Figure B4018 B – Benzo(a)pyrene
- Figure B4018 C – Lead

Summary of Sampling

The Navy collected 21 confirmation samples during the RAs to characterize Excavation B4018. During construction under the 1998 to 1999 RA, the Navy also collected one waste profile sample to guide the process. Results for the waste profile sample collected during the 1998 to

1999 RA were used to add Aroclor-1260 and lead as COPCs. Appendix A contains the analytical results for the waste profile sample.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
81	2	5	280	7	73

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 78 yd^3 of contaminated soil. Figure B4018 A presents the as-built boundary and documents the RA at Excavation B4018. Appendix C contains documentation for the backfill operation.

4.7.24 Excavation B4113

Excavation B4113 is located approximately 50 feet northeast of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Chrysene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples, as well as discrete pre-excavation confirmation samples, to delineate the extent of contamination at Excavation B4113. Excavation B4113 merged with Fuel Line B. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4113 at the end of this section presents the results for the confirmation samples. The four figures at the end of this section illustrate the data, clearly showing the progression of step outs and how the samples collected delineated the extent of contamination associated with the various COPCs:

- Figure B4113 A – Benzo(a)anthracene
- Figure B4113 B – Benzo(a)pyrene
- Figure B4113 C – Benzo(b)fluoranthene
- Figure B4113 D – Chrysene

Summary of Sampling

The Navy collected eight confirmation samples during the RAs to characterize Excavation B4113. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
280	4	21	123	4	18

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 39 yd^3 of contaminated soil. Figure B4113 A presents the as-built boundary and documents the RA at Excavation B4113. Appendix C contains documentation for the backfill operation.

4.7.25 Excavation B4114

Excavation B4114 is located about 100 feet east of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Beryllium	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4114. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4114 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B4114 – Beryllium

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B4114. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
438	7	53	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 53 yd^3 of contaminated soil. Figure B4114 presents the as-built boundary and documents the RA at Excavation B4114. Appendix C contains documentation for the backfill operation.

4.8 IR-26

The following excavation areas at IR-26 are included in this section:

- 26-1 (EE-04A)
- 26-2 (EE-04B)
- B4315
- B4417
- B4715
- B4815
- B4818
- EE-04C
- EE-05

4.8.1 Excavation 26-1 (EE-04A)

Excavation 26-1 is located inside Building 157, the Nondestructive Testing Laboratory (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA[2]	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 The sample results from the removal action at EE-04 completed in 1996 were used to delineate the extent of the COPCs at this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete sidewall and bottom samples during the 1996 removal action. Results for confirmation samples from the 1996 EE-04A removal action were used to confirm the lateral and vertical extent of contamination at the area of excavation. Data from the exploratory excavation activities are not reproduced in this report. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure 26-1 (EE-04A) – Aroclor-1260, Zinc

Summary of Sampling

The Navy collected seven samples to characterize Excavation 26-1 (EE-04A). No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
287	2	22	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 22 yd^3 of contaminated soil at Excavation Area 26-1 (EE-04A) during the 1996 removal action. Figure 26-1 (EE-04A) presents the as-built boundary and documents the RA at Excavation 26-1 (EE-04A). Appendix C contains documentation for the backfill operation.

4.8.2 Excavation 26-2 (EE-04B)

Excavation 26-2 is located inside Building 157, the Nondestructive Testing Laboratory (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA[2]	Delineated 2000 to 2001 RA
Tetrachloroethene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 The sample results from the removal action at EE-04 completed in 1996 were used to delineate the extent of the COPCs at this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete sidewall and bottom samples during the 1996 removal action. Results for confirmation samples from the 1996 EE-04B removal action were used to confirm the lateral and vertical extent of contamination at the area of excavation. Data from the exploratory excavation activities are not reproduced in this report. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure 26-2 (EE-04B) – Tetrachloroethene

Summary of Sampling

The Navy collected seven samples to characterize Excavation 26-2 (EE-04B). No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
964	3	44	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 44 yd^3 of contaminated soil at Excavation 26-2 (EE-04B) during the 1996 removal action. Figure 26-2 (EE-04B) presents the as-built boundary and documents the RA at Excavation 26-2 (EE-04B). Appendix C contains documentation for the backfill operation.

4.8.3 Excavation B4315

Excavation B4315 is located about 150 feet east of Building 130, the Machine Shop and Service Building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Bis(2-ethylhexylphthalate)	X			X	
Chrysene	X			X	
Motor Oil Range Organics	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Motor oil range organics exceeded the screening level (1,000 mg/kg).

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4315. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4315 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4315 – Benzo(a)anthracene, Bis(2-ethylhexyl)phthalate, Chrysene, Motor Oil Range Organics

Summary of Sampling

The Navy collected 19 confirmation samples during the 1998 to 1999 RA to characterize Excavation B4315. During construction under the 1998 to 1999 RA, the Navy also collected 11 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
729	10	148	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 148 yd^3 of contaminated soil. Field crews encountered a storm drain on the north wall and a sanitary sewer on the east wall during excavation. The Navy completed excavation and backfill operations around these obstructions, leaving them in place. Figure B4315 presents the as-built boundary and documents the RA at Excavation B4315. Appendix C contains documentation for the backfill operation.

4.8.4 Excavation B4417

Excavation B4417 is located 75 feet northeast of Building 156, the Rubber Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Copper	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4417. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4417 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B4417 – Copper

Summary of Sampling

The Navy collected six confirmation samples during the 1998 to 1999 RA to characterize Excavation B4417. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
904	7	138	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 138 yd^3 of contaminated soil. Figure B4417 presents the as-built boundary and documents the RA at Excavation B4417. Appendix C contains documentation for the backfill operations.

4.8.5 Excavation B4715

Excavation B4715 is located about 20 feet north of Building 157, the Nondestructive Testing Laboratory (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4715. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4715 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure B4715 – Arsenic, Manganese

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B4715. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
429	7	48	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 48 yd^3 of contaminated soil. Figure B4715 presents the as-built boundary and documents the RA at Excavation B4715. Appendix C contains documentation for the backfill operation.

4.8.6 Excavation B4815

Excavation B4815 is located immediately north of Building 157, the Nondestructive Testing Laboratory (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(k)fluoranthene	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B4815. Results for confirmation samples from were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B4815 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure B4815 – Benzo(a)anthracene, Benzo(k)fluoranthene

Summary of Sampling

The Navy collected five confirmation samples during the 1998 to 1999 RA to characterize Excavation B4815. During construction under the 1998 to 1999 RA, the Navy also collected nine soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
593	7	123	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 123 yd^3 of contaminated soil. Figure B4815 presents the as-built boundary and documents the RA at Excavation B4815. Appendix C contains documentation for the backfill operation.

4.8.7 Excavation B4818

Excavation B4818 is located adjacent to the shoreline in the northwestern corner of IR-26 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Chrysene	X				X
Copper		X			X
Dibenz(a,h)anthracene	X				X
Indeno(1,2,3-cd)pyrene	X				X
Lead		X			X
Mercury		X			X
Zinc	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation B4818. Results for these samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Riprap near the shoreline prevented delineation sampling on the north side of the excavation. Tables B4818 and B4818 SVOA at the end of this section present the results for the confirmation samples. The 11 figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B4818A – Benzo(a)anthracene
- Figure B4818B – Benzo(a)pyrene
- Figure B4818C – Benzo(b)fluoranthene
- Figure B4818D – Benzo(k)fluoranthene

- Figure B4818E – Chrysene
- Figure B4818F – Copper
- Figure B4818G – Dibenz(a,h)anthracene
- Figure B4818H – Indeno(1,2,3,-cd)pyrene
- Figure B4818I – Lead
- Figure B4818J – Mercury
- Figure B4818K – Zinc

Summary of Sampling

The Navy collected 114 confirmation samples during the 2000 to 2001 RA to characterize Excavation B4818. The Navy also collected waste profile samples during construction under the 2000 to 2001 RA to guide the process. Appendix A contains the analytical results for the waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
NA	NA	NA	3,008	10	1,114

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 1,114 yd^3 of contaminated soil. Figure B4818A presents the as-built boundary and documents the RA at Excavation B4818. Appendix C contains documentation for the backfill operations.

4.8.8 Excavation EE-04C

Excavation EE-04C is located immediately northeast of Building 157, the Nondestructive Testing Laboratory (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA[2]	Delineated 2000 to 2001 RA
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X			X	
Benzo(k)fluoranthene	X			X	
Motor Oil Range Organics	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Motor oil range organics exceeded the screening level (1,000 mg/kg).

2 The sample results from the removal action at EE-04 completed in 1996 were used to delineate the extent of the COPCs at this excavation.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete sidewall and bottom samples during the 1996 removal action. Results for confirmation samples from the 1996 EE-04C removal action were used to confirm the lateral and vertical extent of contamination at the area of excavation. Data from the exploratory excavation activities are not reproduced in this report. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure EE-04C – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Motor Oil Range Organics

Summary of Sampling

The Navy collected seven samples to characterize Excavation EE-04C. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
951	7	249	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 249 yd^3 of contaminated soil at Excavation EE-04C during the 1996 removal action. Figure EE-04C presents the as-built boundary and documents the RA at Excavation EE-04C. Appendix C contains documentation for the backfill operation.

4.8.9 Excavation EE-05

Excavation EE-05 is located about 100 feet east of Building 140, the pump house for Dry Dock 3 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Alpha-Chlordane		X			X
Arsenic	X				X
Benzo(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Chrysene	X				X
Copper	X				X
Dibenz(a,h)anthracene	X				X
Gamma-Chlordane		X			X
Indeno(1,2,3-cd)pyrene	X				X
Lead	X				X
Manganese	X				X
Mercury	X				X
Zinc	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation EE-05. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Tables EE-05, EE-05 PAH, and EE-05 SVOA at the end of this section present the results for the confirmation samples. The eight figures at the end of this section illustrate the data, clearly showing the progression of stepouts and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs.

- Figure EE-05 A – Lead
- Figure EE-05 B – Manganese
- Figure EE-05 C – Arsenic, Mercury
- Figure EE-05 D – Chrysene, Dibenz(a,h)anthracene
- Figure EE-05 E – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene
- Figure EE-05 F – Copper
- Figure EE-05 G – Zinc
- Figure EE-05 H – Alpha-Chlordane, Gamma-Chlordane

Summary of Sampling

The Navy collected 326 confirmation samples during the RA to characterize Excavation EE-05. The Navy also collected soil screening and waste profile samples to guide the process. Results for waste profile samples collected during the 2000 to 2001 RA were used to add alpha-chlordane and gamma-chlordane as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
2,155	7	501	14,165	10	5,077

Notes:
bgs Below ground surface
ft^2 Square feet
RA Remedial action
yd^3 Cubic yards

The Navy excavated 5,578 yd^3 of contaminated soil. Field crews encountered a concrete electrical conduit along the southern sidewall during the 2000 to 2001 excavation. The Navy completed excavation and backfill operations around this obstruction, leaving it in place. Building 141, the Dock Shipwright's Shop, was removed during the 2000 to 2001 activities. Figure EE-05 A presents the as-built boundary and documents the RA at Excavation EE-05. Appendix C contains documentation for the backfill operation.

4.9 IR-42

The following excavation areas at IR-42 are included in this section:

- 42-1
- B3229
- B3229A

4.9.1 Excavation 42-1

Excavation 42-1 is located about 10 feet northeast of Building 113, the Tug Maintenance and Salvage Divers' Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aluminum	X			X	
Arsenic		X		X	
Manganese	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation 42-1. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 42-1 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 42-1 – Aluminum, Arsenic, Manganese

Summary of Sampling

The Navy collected nine confirmation samples during the 1998 to 1999 RA to characterize Excavation 42-1. During construction under the 1998 to 1999 RA, the Navy also collected 14 soil screening and waste profile samples to guide the process. Results for screening soil samples collected during the 1998 to 1999 RA were used to add arsenic as a COPC. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,697	10	260	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 260 yd^3 of contaminated soil. Figure 42-1 presents the as-built boundary and documents the RA at Excavation 42-1. Appendix C contains documentation for the backfill operation.

4.9.2 Excavation B3229

Excavation B3229 is located inside Building 113, the Tug Maintenance and Salvage Divers' Shop (Figure 1-2). The following table summarizes the history of the COPC investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected discrete sidewall and bottom samples during the 2000 to 2001 RA to delineate the extent of contamination. No excavation was completed because the average concentration of manganese is only slightly higher than the ESD 2000 goal and this area is located within a building. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at this area. Table B3229 presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B3229 – Manganese

Summary of Sampling

The Navy collected 17 confirmation samples during the 2000 to 2001 RA to characterize Excavation B3229. The Navy did not collect screening soil or waste profile samples.

Summary of Construction

No excavation was conducted at Area B3229. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples collected north and east of boring PA42SS06 during the 2000 to 2001 excavation that exceeded the soil cleanup level. However, the average manganese concentration for the Excavation B3229 area (1,470 mg/kg) was only slightly greater than the soil cleanup level. Furthermore, excavation in Area B3329 would compromise the structural integrity of Building 113 because major roof support columns and interior walls are immediately adjacent to the area that would be excavated. More information

on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.9.3 Excavation B3229A

Excavation B3229A is located inside Building 113, the Tug Maintenance Shop and Salvage Divers' Shop (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aluminum	X				X
Aroclor-1254	X				X
Aroclor-1260	X				X
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Aluminum, Aroclor-1254, Aroclor-1260, benzo(b)fluoranthene, and manganese were identified as COPCs during the RI. However, the concentrations of these chemicals did not exceed the 2000 ESD soil cleanup levels.

COPC Chemical of potential concern
ESD Explanation of significant differences
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

No delineation activities were completed at Area B3229A because no chemical concentrations exceeded the soil cleanup levels.

Summary of Sampling

The Navy collected two samples to characterize the area during the RI. No samples were collected for the 1998 to 1999 RA or the 2000 to 2001 RA. Data from the RI are not reproduced in this report. Figure B3229A at the end of this section illustrates the RI data.

Summary of Construction

No excavation was completed for Area B3229A because aluminum, Aroclor-1254, Aroclor-1260, benzo(b)fluoranthene, and manganese concentrations did not exceed soil cleanup levels.

4.10 FUEL LINES

The following excavation areas associated with the fuel lines (part of IR-46) are included in this section:

- Fuel Line A
- Fuel Line B
- Fuel Line C
- Fuel Line F

Fuel lines connected the ship berthing areas on the piers north of Parcel B to the fuel farm at IR-06 in Parcel C (Figure 1-2). These fuel lines are subdivided in this report into manageable sections to promote clarity in the presentation of the field activities conducted there. Fuel Lines A, B, and C are sections along the fuel line leading from the IR-06 area to Berths 55 through 58. Fuel Line D is also part of this line, but is included in Parcel C. Fuel Line F is a separate line in Parcel B that connected tanks near Building 146 to the piers at Berth 64 and Dry Dock 7. Each fuel line section is further subdivided into segments to address the variations in excavation depths along each fuel line section.

4.10.1 Fuel Line A

Fuel Line A includes the fuel line section in the area roughly north of Building 128 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation. COPCs are the same for all the fuel lines and are based on the RD amendment (Tetra Tech 2001b).

COPC	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X
Arsenic		X
Benzo(a)anthracene		X
Benzo(a)pyrene		X
Benzo(b)fluoranthene		X
Benzo(k)fluoranthene		X
Beryllium	X	
Chrysene		X
Copper		X
Dibenz(a,h)anthracene		X
Diesel Range Organics	X	
Gasoline Range Organics	X	
Indeno(1,2,3-cd)pyrene		X
Manganese		X
Motor Oil Range Organics	X	
Zinc		X

Notes:

COPC Chemical of potential concern
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Fuel Line A. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at Fuel Line A. Tables Fuel Line A and Fuel Line A SVOA at the end of this section present the results for the confirmation samples. The seven figures at the end of this section illustrate the data, clearly showing the progression of step outs and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Fuel Line A, Figure A – Overview
- Fuel Line A, Figure B – Copper, Gasoline Range Organics, Zinc

- Fuel Line A, Figure C – Aroclor-1260, Arsenic, Beryllium, Diesel Range Organics
- Fuel Line A, Figure D – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene
- Fuel Line A, Figure E – Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
- Fuel Line A, Figure F – Mercury, Motor Oil Range Organics
- Fuel Line A, Figure G – Manganese

Fuel Line A is divided into segments on the figures according to variations in the excavation depth.

Summary of Sampling

The Navy collected 296 confirmation samples during the RAs to characterize Fuel Line A. During construction under the 1998 to 1999 RA, the Navy also collected 153 soil screening samples (from all the fuel line sections) to guide the process. Appendix A contains the analytical results for the screening samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
3,960	8	644	9,407	10	2,838

Notes: Area, maximum depth, and in place volume for the 1998 to 1999 RA are estimated. Fuel line excavations were not surveyed during the 1998 to 1999 RA, thus precise as-built dimensions are not available.

bgs Below ground surface
ft^2 Square feet
RA Remedial action
yd^3 Cubic yards

The Navy excavated 3,482 yd^3 of contaminated soil. Figure A for Fuel Line A presents the as-built boundary and documents the RA at Fuel Line A. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on a sample along the east sidewall of the 1998 to 1999 excavation (segment A7) that exceeded the soil cleanup level. The average manganese concentration for the segment A7 area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.10.2 Fuel Line B

Fuel Line B includes the fuel line section in the area roughly north of Building 130 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation. COPCs are the same for all the fuel lines and are based on the RD amendment (Tetra Tech 2001b).

COPC	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260		X
Arsenic	X	
Benzo(a)anthracene		X
Benzo(a)pyrene		X
Benzo(b)fluoranthene		X
Benzo(k)fluoranthene		X
Beryllium	X	
Chrysene		X
Copper		X
Dibenz(a,h)anthracene		X
Diesel Range Organics		X
Gasoline Range Organics	X	
Indeno(1,2,3-cd)pyrene		X
Manganese		X
Motor Oil Range Organics	X	
Zinc		X

Notes:

COPC Chemical of potential concern
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Fuel Line B. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at Fuel Line B. Tables Fuel Line B and Fuel Line B SVOA at the end of this section present the results for the confirmation samples. The nine figures at the end of this section illustrate the data, clearly showing the progression of step outs and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Fuel Line B, Figure A – Overview
- Fuel Line B, Figure B – Copper

- Fuel Line B, Figure C – Indeno(1,2,3-cd)pyrene
- Fuel Line B, Figure D – Zinc
- Fuel Line B, Figure E – Chrysene, Dibenz(a,h)anthracene
- Fuel Line B, Figure F – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene
- Fuel Line B, Figure G – Aroclor-1260, Arsenic, Beryllium
- Fuel Line B, Figure H – Diesel Range Organics, Gasoline Range Organics, Motor Oil Range Organics
- Fuel Line B, Figure I – Manganese

Fuel Line B is divided into segments on the figures according to variations in the excavation depth.

Summary of Sampling

The Navy collected 137 confirmation samples during the RAs to characterize Fuel Line B. During construction under the 1998 to 1999 RA, the Navy also collected 153 soil screening samples (from all the fuel line sections) to guide the process. Appendix A contains the analytical results for the screening samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
3,000	5	494	6,616	10	1,996

Notes: Area, maximum depth, and in place volume for the 1998 to 1999 RA are estimated. Fuel line excavations were not surveyed during the 1998 to 1999 RA, thus precise as-built dimensions are not available.

bgs Below ground surface
ft^2 Square feet
RA Remedial action
yd^3 Cubic yards

The Navy excavated 2,490 yd^3 of contaminated soil. Figure A for Fuel Line B presents the as-built boundary and documents the RA at Fuel Line B. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based samples along the north and south sidewalls and bottom of the 1998 to 1999 excavation (segments B2 and B3) that exceeded the soil cleanup level. The average manganese concentration for the segment B2 and B3 area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.10.3 Fuel Line C

Fuel Line C includes the fuel line section in the area roughly east and south of Building 130 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation. COPCs are the same for all the fuel lines and are based on the RD amendment (Tetra Tech 2001b).

COPC	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X	
Arsenic	X	
Benzo(a)anthracene		X
Benzo(a)pyrene		X
Benzo(b)fluoranthene		X
Benzo(k)fluoranthene		X
Beryllium	X	
Chrysene		X
Copper		X
Dibenz(a,h)anthracene		X
Diesel Range Organics		X
Gasoline Range Organics	X	
Indeno(1,2,3-cd)pyrene		X
Manganese		X
Motor Oil Range Organics	X	
Zinc	X	

Notes:

COPC Chemical of potential concern
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Fuel Line C. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at fuel line C. Table Fuel Line C at the end of this section presents the results for the confirmation samples. The four figures at the end of this section illustrate the data, clearly showing the progression of step outs and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Fuel Line C, Figure A – Copper
- Fuel Line C, Figure B – Aroclor-1260, Arsenic, Beryllium, Diesel Range Organics, Gasoline Range Organics, Motor Oil Range Organics, Zinc
- Fuel Line C, Figure C – Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
- Fuel Line C, Figure D – Manganese

Fuel Line C is divided into segments on the figures according to variations in the excavation depth.

Summary of Sampling

The Navy collected 130 confirmation samples during the RAs to characterize Fuel Line C. During construction under the 1998 to 1999 RA, the Navy also collected 153 soil screening samples (from all the fuel line sections) to guide the process. Appendix A contains the analytical results for the screening samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
2,880	10	844	4,984	10	1,318

Notes: Area, maximum depth, and in place volume for the 1998 to 1999 RA are estimated. Fuel line excavations were not surveyed during the 1998 to 1999 RA, thus precise as-built dimensions are not available.

bgs Below ground surface
ft^2 Square feet
RA Remedial action
yd^3 Cubic yards

The Navy excavated 2,162 yd^3 contaminated soil. Figure A for Fuel Line C presents the as-built boundary and documents the RA at Fuel Line C. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based samples along the east sidewall and bottom of the 1998 to 1999 excavation (all segments) that exceeded the soil cleanup level. The average manganese concentration for the Fuel Line C area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.10.4 Fuel Line F

Fuel Line F extends northeast of Building 146, the former Photography Development Laboratory and TACAN Facility, toward Dry Dock 7 and Berth 64 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation. COPCs are the same for all the fuel lines and are based on the RD amendment (Tetra Tech 2001b).

COPC	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X	X
Arsenic		X
Benzo(a)anthracene		X
Benzo(a)pyrene		X
Benzo(b)fluoranthene		X
Benzo(k)fluoranthene		X
Beryllium	X	
Chrysene		X
Copper		X
Dibenz(a,h)anthracene		X
Diesel Range Organics	X	
Gasoline Range Organics	X	
Indeno(1,2,3-cd)pyrene		X
Manganese		X
Motor Oil Range Organics	X	
Zinc		X

Notes:

COPC Chemical of potential concern
RA Remedial action

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA and discrete pre-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at Fuel Line F. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at Fuel Line F. Table Fuel Line F at the end of this section presents the results for the confirmation samples. The eight figures at the end of this section illustrate the data, clearly showing the progression of step outs and how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Fuel Line F, Figure A – Aroclor-1260, Beryllium, Chrysene, Dibenz(a,h)anthracene, Diesel Range Organics, Gasoline Range Organics, Motor Oil Range Organics, Zinc
- Fuel Line F, Figure B – Copper
- Fuel Line F, Figure C – Arsenic
- Fuel Line F, Figure D – Benzo(a)anthracene, Benzo(a)pyrene
- Fuel Line F, Figure E – Benzo(b)fluoranthene
- Fuel Line F, Figure F – Benzo(k)fluoranthene
- Fuel Line F, Figure G – Indeno(1,2,3-cd)pyrene
- Fuel Line F, Figure H – Manganese

Fuel line F is divided into segments on the figures according to variations in the excavation depth.

Summary of Sampling

The Navy collected 117 confirmation samples during the RAs to characterize Fuel Line F. During construction under the 1998 to 1999 RA, the Navy also collected 153 soil screening samples (from all the fuel line sections) to guide the process. Appendix A contains the analytical results for the screening samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
1,620	7	241	3,658	10	882

Notes: Area, maximum depth, and in place volume for the 1998 to 1999 RA are estimated. Fuel line excavations were not surveyed during the 1998 to 1999 RA, thus precise as-built dimensions are not available.

bgs Below ground surface
ft^2 Square feet
RA Remedial action
yd^3 Cubic yards

The Navy excavated 1,123 yd^3 of contaminated soil. Figure A for Fuel Line F presents the as-built boundary and documents the RA at Fuel Line F. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on samples along the west and east sidewalls (all removed) of the 1998 to 1999 excavation (segment F2) that exceeded the soil cleanup level. The average manganese concentration for the segment F2 area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.11 IR-60

The following excavation areas at IR-60 are included in this section:

- 60-1
- 60-2
- B1816

4.11.1 Excavation 60-1

Excavation 60-1 is located along the seawall southwest of Dry Dock 7 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Benzo(a)anthracene	X			X	
Benzo(a)pyrene	X			X	
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X			X	
Chrysene		X		X	
Dibenz(a,h)anthracene	X			X	
Indeno(1,2,3-cd)pyrene	X			X	
Manganese	X				X

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Results for waste profile or screening soil samples identified the chemicals checked in this column as additional COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy also collected discrete pre-excavation sidewall and bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 60-1. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 60-1 at the end of this section presents the results for the confirmation samples. The three figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 60-1 A – Arsenic, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene
- Figure 60-1 B – Benzo(b)fluoranthene
- Figure 60-1 C – Manganese

Summary of Sampling

The Navy collected 13 confirmation samples during the RAs to characterize Excavation 60-1. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Results for screening soil samples collected during the 1998 to 1999 RA were used to add chrysene as a COPC. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
427	3	22	160	3	18

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 40 yd^3 of contaminated soil. Figure 60-1 A presents the as-built boundary and documents the RA at Excavation 60-1. Appendix C contains documentation for the backfill operation. Manganese was identified as a risk driver relative to the 2000 ESD soil cleanup level based on a discrete bottom sample beneath the north sidewall (that was removed) of the 2000 to 2001 excavation and a discrete sidewall sample on the east sidewall (not removed) that exceeded the soil cleanup level. The average manganese concentration for the Excavation 60-1 area was less than the soil cleanup level and additional area was not excavated. Further information on manganese is available in the "Final Manganese Site Proposal" dated September 11, 2001 (Tetra Tech 2001c) and the "Final Evaluation of Ambient Manganese Conditions" dated December 21, 2001 (Tetra Tech 2001e).

4.11.2 Excavation 60-2

Excavation 60-2 is located along the seawall southwest of Dry Dock 6 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample[2]	Field Observation[3]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Cadmium		X		X	
Copper		X			X
Diesel Range Organics			X	X	
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

2 Results for waste profile or screening soil samples were used to identify the chemicals checked in this column as additional COPCs.

3 Diesel range organics was added as a COPC based on visual and olfactory field observations.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA. The Navy collected discrete pre-excavation sidewall and composite post-excavation bottom samples during the 2000 to 2001 RA to delineate the extent of contamination at Excavation 60-2. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table 60-2 at the end of this section presents the results for the confirmation samples. The two figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure 60-2 A – Arsenic, Cadmium, Diesel Range Organics, Zinc
- Figure 60-2 B – Copper

Summary of Sampling

The Navy collected 25 confirmation samples during the RAs to characterize Excavation 60-2. During construction under the 1998 to 1999 RA, the Navy also collected 18 soil screening and waste profile samples to guide the process. Results for waste profile samples collected during

the 1998 to 1999 RA were used to add cadmium and copper as COPCs. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
2,187	7	365	620	7	161

Notes:

bgs	Below ground surface
ft^2	Square feet
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 526 yd^3 of contaminated soil. Figure 60-2 A presents the as-built boundary and documents the RA at Excavation 60-2. Appendix C contains documentation for the backfill operation.

4.11.3 Excavation B1816

Excavation B1816 is located along the seawall southwest of Dry Docks 6 and 7 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation[2]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Diesel Range Organics			X	X	
Zinc	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Diesel range organics was added as a COPC based on visual and olfactory field observations.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples to delineate the extent of contamination at Excavation B1816. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B1816 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the COPCs:

- Figure B1816 – Diesel Range Organics, Zinc

Summary of Sampling

The Navy collected 19 confirmation samples during the 1998 to 1999 RA to characterize Excavation B1816. During construction under the 1998 to 1999 RA, the Navy also collected eight soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
81	10	13	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 13 yd^3 of contaminated soil. Figure B1816 presents the as-built boundary and documents the RA at Excavation B1816. Appendix C contains documentation for the backfill operation.

4.12 IR-61

The following excavation areas at IR-61 are included in this section:

- B2225
- B2425

4.12.1 Excavation B2225

Excavation B2225 is located immediately west of Building 122, a compressor plant (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Aroclor-1260	X			X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2225. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2225 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing the progression of step outs and how results for the samples collected were used to delineate the extent of contamination associated with the COPC:

- Figure B2225 – Aroclor-1260

Summary of Sampling

The Navy collected 10 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2225. During construction under the 1998 to 1999 RA, the Navy also collected 11 soil and waste profile screening samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
210	10	78	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 78 yd^3 of contaminated soil. Figure B2225 presents the as-built boundary and documents the RA at Excavation B2225. Appendix C contains documentation for the backfill operation.

4.12.2 Excavation B2425

Excavation B2425 is located on the eastern side of Building 122, an Electrical Substation and Compressor Plant (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation[2]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Arsenic	X			X	
Diesel Range Organics	X		X	X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs.
2 Diesel range organics was added as a COPC based on visual and olfactory field observations.

COPC Chemical of potential concern
HHRA Human health risk assessment
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2425. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2425 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with COPCs:

- Figure B2425 – Arsenic, Diesel Range Organics

Summary of Sampling

The Navy collected 12 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2425. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
71	2	4	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 4 yd^3 of contaminated soil. Figure B2425 presents the as-built boundary and documents the RA at Excavation B2425. Appendix C contains documentation for the backfill operation.

4.13 IR-62

The following excavation area at IR-62 is included in this section:

- B2030

4.13.1 Excavation B2030

Excavation B2030 is located immediately west of Building 116, the Submarine Subsistence and Training building (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation[2]	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Diesel Range Organics	X			X	
Gasoline Range Organics			X	X	

Notes:

1 The HHRA completed during the RI identified the chemicals checked in this column as COPCs. Diesel range organics exceeded the screening level (100 mg/kg).

2 Gasoline range organics were added as a COPC based on visual and olfactory field observations.

COPC Chemical of potential concern
HHRA Human health risk assessment
mg/kg Milligram per kilogram
RA Remedial action
RI Remedial investigation

Delineation Activities

The Navy collected composite sidewall and bottom samples during the 1998 to 1999 RA to delineate the extent of contamination at Excavation B2030. Results for confirmation samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table B2030 at the end of this section presents the results for the confirmation samples. The figure at the end of this section illustrates the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure B2030 – Diesel Range Organics, Gasoline Range Organics

Summary of Sampling

The Navy collected 48 confirmation samples during the 1998 to 1999 RA to characterize Excavation B2030. During construction under the 1998 to 1999 RA, the Navy also collected 12 soil screening and waste profile samples to guide the process. Appendix A contains the analytical results for the screening and waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)	Area (ft^2)	Maximum Depth (feet bgs)	In Place Volume (yd^3)
8,240	10	1,553	NA	NA	NA

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 1,553 yd^3 of contaminated soil. Field crews encountered a utility pole during excavation. The Navy completed excavation and backfill operations around this obstruction leaving it in place. Figure B2030 presents the as-built boundary and documents the RA at Excavation B2030. Appendix C contains documentation for the backfill operation.

4.14 INDUSTRIAL DRAIN LINE

The excavation for the Industrial Drain Line extends from the area between Buildings 123 and 134, along Lockwood Street, to an end point west of Building 146 in Excavation 7-4 (Figure 1-2). The following table summarizes the history of COPCs investigated at this excavation.

COPC	HHRA[1]	Waste Profile Sample	Field Observation	Delineated 1998 to 1999 RA	Delineated 2000 to 2001 RA
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Cadmium	X				X
Copper	X				X
Lead	X				X

Notes:

1 The chemicals checked in this column were identified as COPCs based on concentrations that exceeded the ESD 2000 cleanup goals.

COPC Chemical of potential concern
ESD Explanation of significant differences
HHRA Human health risk assessment
RA Remedial action

Delineation Activities

The Navy collected discrete post-excavation sidewall and composite post-excavation bottom confirmation samples during the 2000 to 2001 RA to delineate the extent of contamination at the excavation for the Industrial Drain Line. Samples were analyzed for the full suites of metals, VOCs, SVOCs, and PCBs. Results for these samples were used to confirm the lateral and vertical extent of contamination at the area of excavation. Table IDL at the end of this section presents the results for the confirmation samples. The six figures at the end of this section illustrate the data, clearly showing how results for the samples collected were used to delineate the extent of contamination associated with the various COPCs:

- Figure IDL-A – Benzo(a)pyrene
- Figure IDL-B – Benzo(b)fluoranthene
- Figure IDL-C – Benzo(k)fluoranthene
- Figure IDL-D – Cadmium
- Figure IDL-E – Copper
- Figure IDL-F – Lead

Summary of Sampling

The Navy collected 51 confirmation samples during the 2000 to 2001 RA to characterize the excavation for the Industrial Drain Line. The Navy did not collect any soil screening or waste profile samples.

Summary of Construction

The following table presents the as-built parameters for the excavation.

1998 to 1999 RA			2000 to 2001 RA		
Area (ft^2)	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**	**Area (ft^2)**	**Maximum Depth (feet bgs)**	**In Place Volume (yd^3)**
NA	NA`	NA	7,800	12	2,050

Notes:

bgs	Below ground surface
ft^2	Square feet
NA	Not applicable
RA	Remedial action
yd^3	Cubic yards

The Navy excavated 2,050 yd^3 of contaminated soil. Figure IDL-A presents the as-built boundary and documents the RA at the excavation for the Industrial Drain Line. Appendix C contains documentation for the backfill operations.

4.15 PAH-ONLY SAMPLES

The Navy collected additional samples from selected areas during the 2000 to 2001 RA to address data gaps for PAHs in soils in accordance with the data quality objectives specified in the RD and RD amendment (Tetra Tech and MK 1999; Tetra Tech 2001b). These selected areas contained samples collected during previous investigations that had elevated reporting limits for PAHs due to matrix interference from high TPH concentrations. In general, samples were targeted toward areas where previous samples had detection limits greater than 3 mg/kg for samples collected at depths less than 10 feet bgs. Appendix 6 of the RD amendment contains a detailed discussion of the sampling rationale.

The Navy collected 58 confirmation samples from 42 locations (see PAH Sample Location figure at the end of this section). Many locations were distributed across Parcel B; some samples were collected at IR-06 which was transferred to Parcel C. Table PAH Only at the end of this section presents the data from the PAH samples.

Only one sample contained a PAH detection that exceeded the 2000 ESD soil cleanup level. This sample (PAH002) became the initiating point for Excavation B4818.

5.0 CONCLUSION

The Navy completed excavation activities at Parcel B during 1996, 1998 to 1999, and 2000 to 2001 to meet the soil cleanup requirements contained in the October 1997 ROD and subsequent August 1998 and May 2000 ESDs. The excavation activities were completed, in general, according to the requirements presented in the RD and RD amendment documents (Tetra Tech and MK 1999; Tetra Tech 2001b). The Navy removed about 101,600 yd^3 of contaminated soil from 106 excavation areas at Parcel B and backfilled these areas with clean material. The Navy met the cleanup requirements contained in the ROD and ESDs at 93 of these excavation sites. The ubiquitous distribution of metals in soil, especially arsenic and manganese, led to the reevaluation of the remedy for soil at Parcel B. The TMSRA (ChaduxTt 2007) presents information to support the reevaluation of the remedy, including risks from soil remaining at Parcel B and other remediation alternatives (such as covers) to address these risks.

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APPENDIX A
SCREENING SOIL AND WASTE PROFILE SAMPLE ANALYTICAL RESULTS

(Please note appendices are provided on DVD only.)

APPENDIX B
DECOMMISSIONED MONITORING WELL LOGS

(Please note appendices are provided on DVD only.)

APPENDIX C
BACKFILL OPERATION INFORMATION (CERTIFICATION OF QUALITY, ANALYTICAL RESULTS, COMPACTION DATA SUMMARY, AND COMPACTION CURVE REPORTS)

(Please note appendices are provided on DVD only.)

APPENDIX D
MATERIAL MANAGEMENT REPORTS – DISPOSAL RECORDS

(Please note appendices are provided on DVD only.)

APPENDIX E
SAMPLE LOG-IN AND CHAIN-OF-CUSTODY FORMS

(Please note appendices are provided on DVD only.)

APPENDIX F
QUALITY CONTROL SUMMARY REPORT

(Please note appendices are provided on DVD only.)

APPENDIX G
RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT CONSTRUCTION SUMMARY REPORT

(Please note appendices are provided on DVD only.)

APPENDIX H
RESPONSES TO REGULATORY AGENCY COMMENTS ON THE DRAFT CONSTRUCTION SUMMARY REPORT ADDENDUM

(Please note appendices are provided on DVD only.)