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FINAL AMENDED RECORD OF DECISION FOR OPERABLE UNIT 2 (OU 2) SITE 5 NAS CECIL FIELD FL

1/1/2000

TETRA TECH NUS INC

Amended Record Of Decision
Operable Unit 2, Site 5

for

Naval Air Station
Cecil Field

Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0066

January 2000

AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
FOR

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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Naval Facilities Engineering Command
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ACRONYM LIST

ABB-ES	ABB Environmental Services, Inc.
ARAR	Applicable or relevant and appropriate requirements
AS/VE	Air sparging/vapor extraction
bls	Below land surface
BCT	BRAC Cleanup Team
BRA	Baseline risk assessment
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of concern
COPC	Chemical of potential concern
DON	Department of the Navy
EE	Envirodyne Engineers
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facility Agreement
FS	Feasibility study
ft	Feet
G&M	Geraghty & Miller
HHRA	Human Health Risk Assessment
HI	Hazard Index
HLA	Harding Lawson Associates
HQ	Hazard quotient
IAS	Initial assessment study
ILCR	Incremental Lifetime Cancer Risk
IRA	Interim remedial action
IROD	Interim Record of Decision
LUC	Land Use Controls
LUCIP	Land Use Control Implementation Plan
mg/kg	Milligram per kilogram
mg/l	Milligram per liter
MOA	Memorandum of Agreement
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and maintenance

OU	Operable unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RAB	Restoration Advisory Board
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RI	Remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semivolatile organic compound
TBC	To be considered (criteria)
TRPH	Total recoverable petroleum hydrocarbon
TtNUS	Tetra Tech NUS, Inc.
µg/kg	Microgram per kilogram
µg/L	Microgram per liter
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground storage tank
UV	Ultraviolet light
VOC	Volatile organic compound

1.0 DECLARATION OF THE AMENDED RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Operable Unit (OU) 2 is located in an undeveloped area in the western part of the main base of Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. OU 2 consists of Site 5, Oil Disposal Area Northwest, and Site 17, Sludge Disposal Pit Southwest. This amended Record of Decision (ROD) contains modifications to the remedy for the Site 5 portion of OU 2 that is contained within the Interim ROD (IROD) and ROD for OU 2 [ABB Environmental Services (ABB-ES), 1994b and 1995d]. No modifications to the remedy for Site 17 have been proposed to date.

1.2 STATEMENT OF BASIS AND PURPOSE

This document is an amendment to the IROD and the ROD originally published in September 1994 and September 1995, respectively (ABB-ES, 1994b and 1995d). The IROD was submitted by the Department of the Navy (DON) on September 1, 1994 and was accepted by the state of Florida Department of Environmental Protection (FDEP) and the United States Environmental Protection Agency (U.S. EPA) Region 4 as the interim remedy for soil at OU 2, Site 5. The ROD addressed the remedy for sediment and groundwater and was submitted by the DON on September 27, 1995 and was accepted by FDEP and the U.S. EPA Region 4 as the selected remedy for sediment and groundwater at OU 2, Site 5.

The remedy presented in the IROD for the source area soils consisted of excavation and on-site biological treatment of contaminated soil. The remedy presented in the ROD consisted of excavation and biological treatment of sediment. The ROD also selected two groundwater technologies: air sparging and in-situ stripping/biological treatment. The two technologies were to be evaluated and the most promising technology was to be implemented for treatment of groundwater. However, since the publication of the IROD and the ROD, certain site conditions have changed and information has become available. These changes are summarized as follows.

- The concentrations of site chemicals of concern (COCs) in Site 5 groundwater have diminished since 1993.

- Analytical data indicate that naturally occurring biological processes are degrading volatile organic compounds (VOCs) in the groundwater.

- Groundwater COCs are not migrating outside the boundaries of Site 5 at unacceptable concentrations.

- The naturally occurring biodegradation processes, which have already been observed in the groundwater at the site, are well suited for the removal of low concentrations of VOCs.

- In the original remedy, soil and sediment were to be treated using an on-site biological treatment facility. However, during operation of the treatment facility, it was determined that there was a potential for contaminants to migrate to clean areas, possibly exposing nearby populations and wetlands. Consequently, other alternatives for soil and sediment were evaluated and implemented in 1998 as documented in the Action Memorandum for Soil and Sediment Removal for OU 2, Site 5 (ABB-ES, 1998). Soil and sediment that would pose a threat to human health or the environment have been either biologically treated or, during a removal action, disposed off site.

- The removal of contaminated soils has greatly reduced the migration of contaminants from soil to groundwater.

An amendment to the IROD and ROD is required to document these important changes. This amended ROD presents a revised remedy for OU 2, Site 5 at NAS Cecil Field. The revised remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (CERCLA § 117), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations §300.435(c)(2)(ii)].

The U.S. EPA and the state of Florida concur with the revised selected remedy.

1.3 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response actions selected in this amended ROD, may present an endangerment to public health, welfare, or the environment. Unacceptable human health risks would exist if groundwater from the surficial aquifer at OU 2, Site 5 were used as a potable water source. Removal actions conducted to date have adequately addressed human and ecological risks associated with exposure to soil and sediment at OU 2, Site 5.

1.4 DESCRIPTION OF THE SELECTED REMEDY

This amended ROD presents the final remedy for OU 2, Site 5. Final RODs have been approved for OU 1; OU 2, Site 17; OU 3; OU 4; OU 5, Site 14; OU 6; OU 7 and OU 8. A remedial investigation (RI), baseline risk assessment (BRA), and feasibility study (FS) were completed for OU 5, Site 15. Based on

an additional data-gap investigation, a revised FS, Proposed Plan, and subsequent ROD are pending for OU 5, Site 15. An RI has been completed and an FS is currently being written for OU 9, Sites 36 and 37.

The remedies that were selected for OU 2, Site 5 in the IROD and ROD included excavation and biological treatment of soil and sediment, treatment of groundwater by either air sparging or in-situ stripping/biological treatment, and implementation of site controls. The major components of the originally selected remedy were as follows.

Soil and sediment

- Excavate and biologically treat contaminated soil and sediment.

Groundwater

- Evaluate two technologies.
  - Air sparging: Air would be injected into groundwater wells, discharging the air into the aquifer, whereby stripping organic compounds from the groundwater.
  - In-situ stripping and biological treatment: Groundwater would be circulated through a well and air would be introduced to strip VOCs. Natural biological processes would reduce levels of other organic compounds.
- Implement the most promising technology.
- If required, discharge treated water into an infiltration basin.
- Restrict use of groundwater from the surficial aquifer.
- Monitor treatment to measure effectiveness and perform 5-year progress reviews.

For the revised selected remedy, the following groundwater components are recommended. The soil and sediment components were completed through an interim removal action (IRA) conducted from 1995 to 1996 and through a soil removal action conducted in 1998.

Soil and sediment

- Excavate and biologically treat 5,000 cubic yards of contaminated soil (conducted from 1995 to 1996).
- Excavate 2,600 cubic yards of contaminated soil and sediment and dispose off site (conducted in 1998).

Groundwater

- Utilize monitored natural attenuation of the groundwater to remove contaminants through biological and other natural treatment processes.
- Restrict use of groundwater from the surficial aquifer.
- Monitor treatment to measure effectiveness. Perform 5-year progress reviews. If natural attenuation fails to achieve clean-up goals, implement either air sparging or enhanced bioremediation of the groundwater.

By separate Memorandum of Agreement (MOA) dated September 7, 1999 with U.S. EPA and FDEP, NAS Cecil Field, on behalf of the Department of the Navy, agreed to implement base-wide, certain periodic site inspection, condition certification and agency notification procedures designed to ensure the maintenance by Navy personnel of any site-specific Land Use Controls (LUCs) deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Navy' s substantial good-faith compliance with the procedures called for therein, reasonable assurances would be provided to U.S. EPA and FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by the Navy, U.S. EPA and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Navy's substantial good-faith compliance with the specific LUC maintenance commitments reflected therein. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

1.5 STATUTORY DETERMINATIONS

The selected amended remedy is protective of human health and the environment, is cost effective, and complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedy. The nature of the selected remedy for OU 2, Site 5 is such that applicable or relevant and appropriate requirements (ARARs) will be met in the long-term when residual concentrations of contaminants in the groundwater are reduced through monitored natural attenuation. The remedy utilizes permanent solutions and satisfies the statutory preferences for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element. Because this remedy would result in hazardous substances remaining on site above health-based concentrations, a policy 5-year review will be conducted within 5 years of the commencement of the remedy to ensure that the remedy continues to provide adequate protection of human health.

1.6 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

Scott A. Glass, P.E.
Base Realignment and Closure
Environmental Coordinator

1/11/00
Date

2.0 AMENDED DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

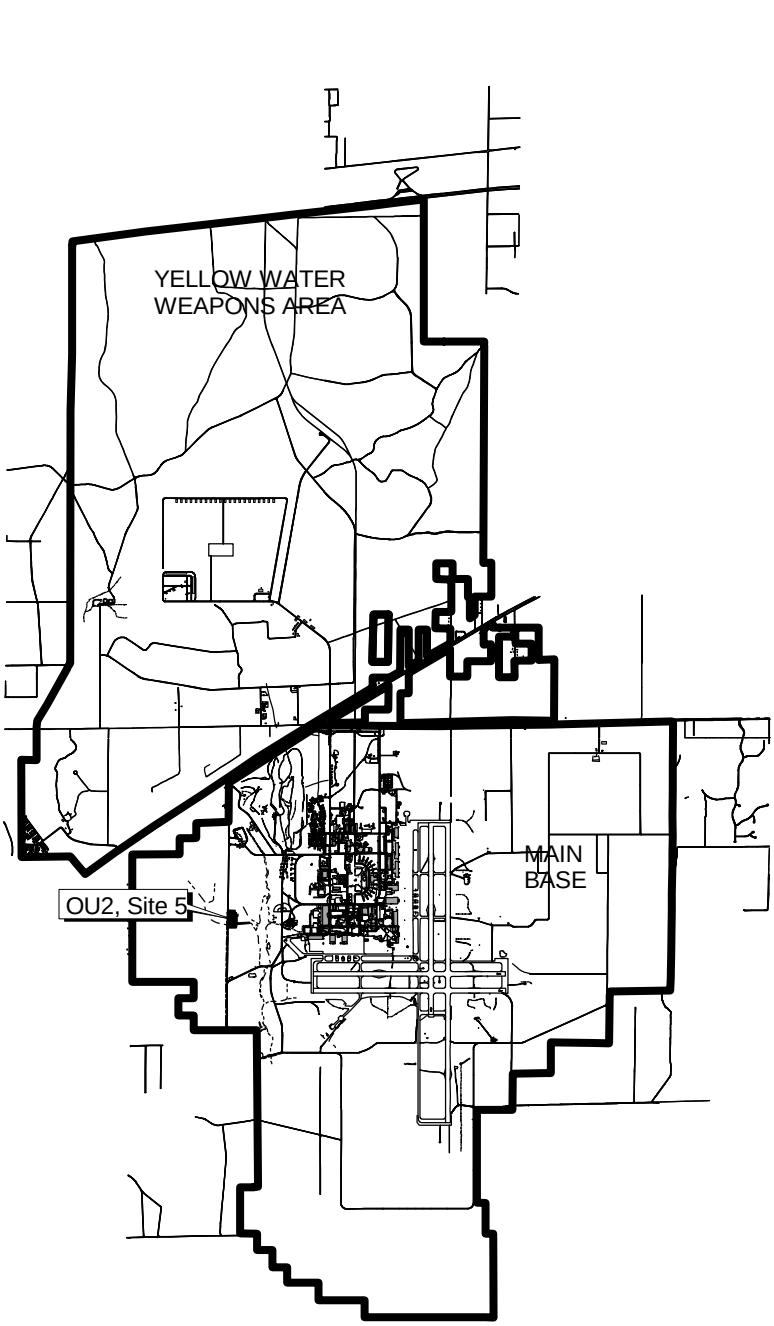
NAS Cecil Field is located 14 miles southwest of Jacksonville, Florida (Figure 2-1). The majority of Cecil Field is located within Duval County. The southernmost part of the facility is located in Clay County. NAS Cecil Field was established in 1941 and provided facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operation forces as designated by the Chief of Naval Operations. NAS Cecil Field was closed in September 1999. Much of the facility will be transferred to the Jacksonville Port Authority and the city of Jacksonville. Per the reuse plan, the facility will have multiple uses but will be used primarily for aviation-related activities.

OU 2 consists of Site 5 (Figure 2-1), Oil Disposal Area Northwest, and Site 17, Sludge Disposal Pit Southwest, and is located in the western portion of NAS Cecil Field. This amended ROD contains modifications to the remedy for the Site 5 portion of OU 2 that is contained within the IROD and ROD for OU 2 (ABB-ES, 1994b and 1995d). No modifications to the remedy for Site 17 have been proposed to date; therefore, Site 17 will not be referred to for the remainder of this amended ROD.

Site 5 is located approximately 2,500 feet north of the intersection of Perimeter Road and the Lake Fretwell access road. Perimeter Road forms the western boundary of the site. It is an undeveloped site with no electrical, water, stormwater, or sewer facilities or access in the immediate area. The northern and eastern boundaries of the site are forested and are not defined by physical features. A small drainage ditch forms the southern boundary of the site.

The former disposal pit was approximately 0.5 acre, which included an unlined pit and the adjacent access areas. The disposal pit was reported to be approximately 100 feet by 200 feet or approximately 0.2 acre in size. The former location of the pit is shown on Figure 2-2. The area of investigation is approximately 7 acres and includes areas north and south of the drainage ditch and west of Perimeter Road.

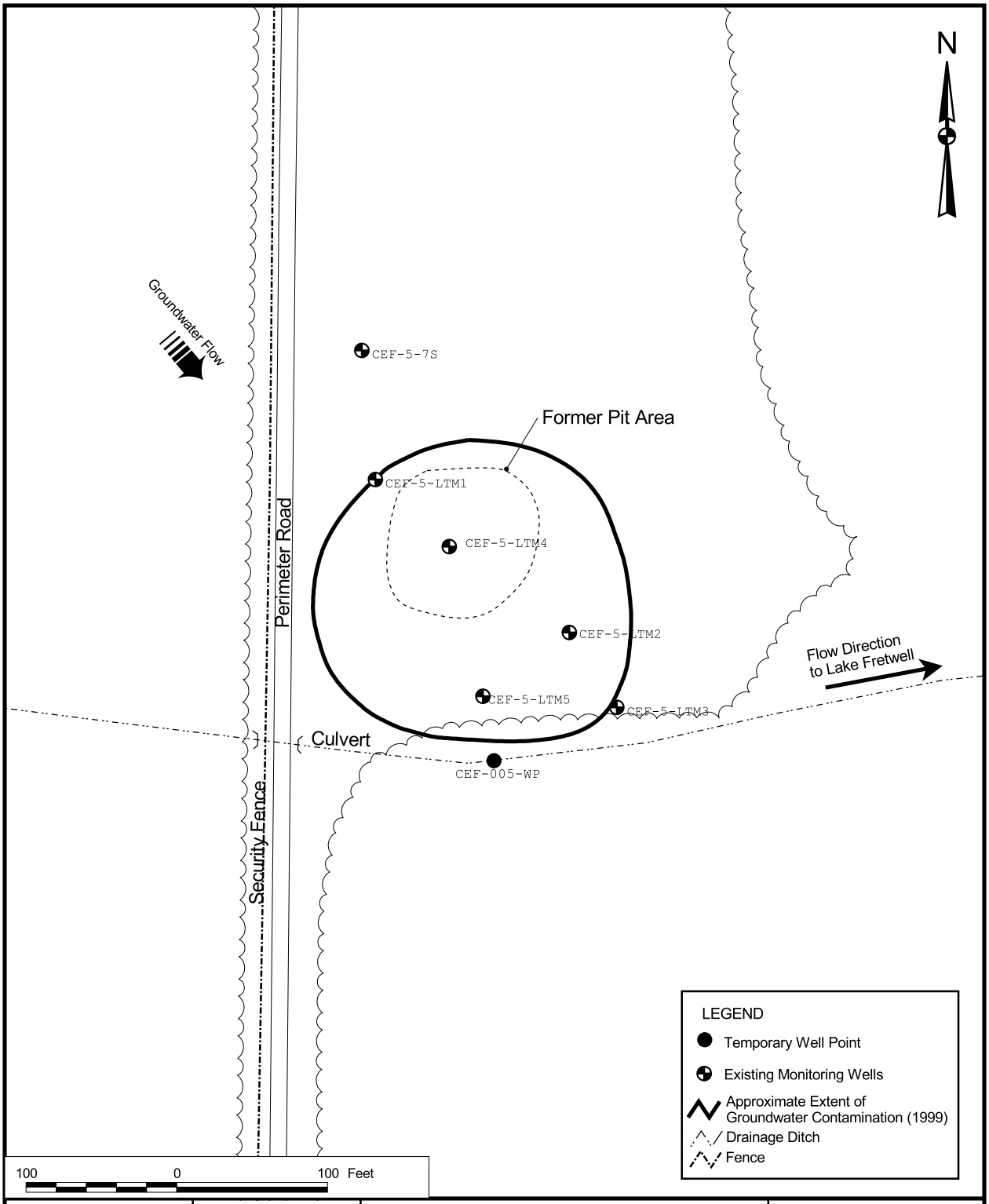
The primary surface feature at Site 5 is the drainage ditch. The ditch drains a wetland area located approximately 200 feet west of Perimeter Road. The wetland occupies a large part of the area between Perimeter Road and Yellow Water Creek and extends northward to Normandy Boulevard. Water in the Site 5 drainage ditch flows eastward (from the west side of Perimeter Road) along the south side of the site and discharges into the wetland area east of Site 5 and eventually into Lake Fretwell.



8000 0 8000 Feet

DRAWN BY YLI	DATE 1/26/99	GENERAL LOCATION MAP OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY RD	DATE 1/30/99		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

P:\GIS\CECIL\7898dko12b205.apr 13Sept99 MJJ Layout Site Location



DRAWN BY YLI	DATE 6/26/99	SITE LAYOUT (1999) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 / REV 0

P:\GIS\CECIL\7898dko12b205.apr 27Sept99 MJJ Layout LTMs

Site 5 is relatively flat, with no prominent hills or depressions. The ground surface slopes primarily to the south toward the drainage ditch. The eastern side of the site slopes toward the eastern wetland. The area immediately west of Perimeter Road slopes toward the drainage ditch to the south.

At Site 5, groundwater flow is from the northwest to the southeast. Vertical hydraulic gradients are downward in the northwestern part of Site 5 and move upward in the vicinity of the drainage ditch, Groundwater from Site 5, therefore, discharges to the drainage ditch, which is topographically and hydraulically downgradient of the disposal pit.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The first environmental studies for the investigation of waste handling and/or disposal sites at NAS Cecil Field were conducted between 1983 [Geraghty and Miller (G&M), 1983] and 1985 (G&M, 1985). These studies were followed in 1985 by an initial assessment study (IAS) [Envirodyne Engineers (EE), 1985]. A Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) was completed in 1988 [Harding Lawson Associates (HLA), 1988]. The RFI acted on the recommendations of the IAS. OU 2, Site 5 was included in the IAS and the RFI.

NAS Cecil Field was placed on the National Priorities List (NPL) by the U.S. EPA and the Office of Management and Budget in December 1989. A Federal Facility Agreement (FFA) for NAS Cecil Field was signed by the FDEP (formerly the Florida Department of Environmental Regulation), U.S. EPA, and the DON in 1990. Following the listing of NAS Cecil Field on the NPL and the signing of the FFA, remedial response activities at the facility have been completed under CERCLA authority. OU 2 is one of nine operable units that have been identified as needing further investigation.

The site-specific history of Site 5 is presented below.

The Site 5 pit was an unlined, shallow excavation and, as reported in the IAS (1985), used in the 1950s for the disposal of waste oil. Oil-stained soil and a petroleum odor were noted at Site 5 in 1985 and again in 1988, indicating that the site may have been used some time after the 1950s. A 15- by 20-foot area of oil-stained soil, void of vegetation, was located in the southern half of the former pit area. No precise historical information is available concerning waste disposal practices at the site, including specific source(s) and volumes for the waste material dumped there, the actual period of operation of the site, or the exact operation processes. Reportedly, bowsers (small trailer-mounted tanks) or drums were tipped over, allowing liquid waste to flow into the pit. Wastes were allowed to evaporate or percolate into the sandy soil. Other wastes (possibly solvents, paints, and strippers) may have been mixed with the oil prior to disposal, since this was a common practice at the time.

A review of available historical aerial photographs indicates that a pit containing liquid was present in November 1969. The outline of this disturbed area remains fairly constant in 1970, 1972, and 1973 photographs. In 1972 to 1973, the site had begun to revegetate.

In late 1993, an RI was initiated to evaluate residual site contamination and associated risks. Samples of surface and subsurface soil, sediment, surface water, and groundwater were collected and analyzed. Results of these analyses were used to perform a BRA to determine human health and ecological risks. A summary of analytical results of the investigation and the BRA are contained within the RI report (ABB-ES, 1995a).

During the RI, approximately 300 gallons of weathered jet fuel or kerosene were found in the northeastern part of the Site 5 disposal pit. To reduce exposure risks and the source of groundwater contamination, a focused FS (ABB-ES, 1994a) for OU 2, Site 5 was prepared to evaluate alternatives for controlling this source area. An IROD was issued in September 1994 (ABB-ES, 1994b) to document the selected interim remedy for soil. The IROD selected excavation of contaminated soil in the vadose zone with subsequent on-site biological treatment of the soil. The associated IRA for soil commenced in April 1995. In 1995 and 1996, approximately 5,000 cubic yards of soil were excavated from Site 5 and biologically treated (Bechtel, 1999).

After submittal of the RI report, an FS for groundwater and sediment was performed to define remedial action objectives (RAOs) and evaluate a range of clean-up alternatives to meet these objectives (ABB-ES, 1995b). Based on the recommendations of the FS, a Proposed Plan was prepared to identify the preferred clean-up alternative for OU 2 sediment and groundwater (ABB-ES, 1995c). A public meeting was held at NAS Cecil Field on July 25, 1995 to present this Proposed Plan and to respond to public comments. The Proposed Plan and other documents related to the environmental evaluation of OU 2 (e.g., RI, BRA, and FS) were made available for public review and comments for a 30-day period from July 17 to August 17, 1995. Based on the resolution of the comments received at the public meeting and during the comment period, a ROD (ABB-ES, 1995d) was issued. The ROD selected excavation and biological treatment (alternative SD-2) for sediment and either air sparging (alternative GW-3) or in-situ air stripping and biological treatment (alternative GW-6) for groundwater as the clean-up alternatives for OU 2, Site 5. The two technologies for groundwater were to be evaluated and the most promising technology was to implemented for treatment of OU 2, Site 5 groundwater.

In May 1996, during operation of the on-site biological treatment facility, it was determined that there was a potential for contaminants to migrate to clean areas, possibly exposing nearby populations and wetlands. Consequently, other alternatives for soil and sediment were evaluated and implemented in 1998, as documented in the Action Memorandum for Soil and Sediment Removal for OU 2, Site 5 (ABB-

ES, 1998). In summary, the following decisions regarding soil removal were made by the NAS Cecil Field BRAC Cleanup Team (BCT).

- Leachability of total recoverable petroleum hydrocarbons (TRPH) into the groundwater was a driving factor for subsurface soil removal. Based on leaching to groundwater, a TRPH clean-up goal of 10,000 milligrams per kilogram (mg/kg) was established for subsurface soil.

- A surface soil [0 to 2 feet below land surface (ft bls)] TRPH clean-up goal of 250 mg/kg or less was established to be ecologically protective. Since this time, the TRPH surface soil cleanup goal has been modified from 250 mg/kg to 340 mg/kg based on Florida legislation (F.A.C. 62-777).

As part of the removal action for soil and sediment, approximately 2,255 cubic yards of soil at concentrations above the site-specific TRPH leaching criterion of 10,000 mg/kg were excavated and shipped off site for disposal. Bioremediated soil and other stockpiled soil on site with TRPH concentrations less than 10,000 mg/kg were used to backfill excavation areas within 2 feet of the surface, and soil with concentrations less than 250 mg/kg was used to backfill the remaining 2 feet of excavations. Also as part of the removal action, 330 cubic yards of sediment were excavated and disposed off site (Bechtel, 1999).

An air sparging pilot test was conducted at Site 5 in 1997. Analysis of groundwater samples collected at the beginning of this test showed lower concentrations of VOCs compared to the groundwater samples taken during the RI in 1993. Based on these results, the Cecil Field BCT decided that four rounds of quarterly groundwater sampling should be collected to determine whether natural attenuation was a feasible remedial alternative. The results of this quarterly sampling showed decreased concentrations of VOCs, semivolatile organic compounds (SVOCs), pesticides, and inorganics and that these chemicals were not migrating outside the boundaries of Site 5 at unacceptable concentrations. Natural attenuation parameters were also collected to monitor for biological activity. These data indicated that naturally occurring biological processes are degrading VOCs in the groundwater. These results led to the preparation of a revised Proposed Plan [Tetra Tech NUS, Incorporated (TtNUS), 1999a] and of this amended ROD.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public notices of the availability of the Proposed Plan were placed in the Metro section of the *Florida Times-Union* on July 16 and 23, 1995. A notice was also placed in the local editions of the *Florida Times-Union* (i.e., the Clay, Southside, and Westside editions) on July 19, 1995. These local editions targeted the communities closest to NAS Cecil Field. A 30-day comment period was held from July 17 through August 17, 1995. A public meeting was held on July 25, 1995, to present the results of the RI and BRA,

the alternatives of the FS, and the preferred alternatives to the Proposed Plan and to solicit comments from the community. No comments were received during the public comment period.

Public notice of the availability of the Revised Proposed Plan was placed in the Metro section of the *Florida Times-Union* on September 7, 1999. A 30-day comment period was held from September 7 to October 6, 1999. No comments were received during the 30-day comment periods.

Documents pertaining to OU 2 are available to the public at the Information Repository located at the Charles D. Webb Wesconnett Branch of the Jacksonville Library, 6887 103rd Street, Jacksonville, Florida. This ROD amendment will become part of the Administrative Record File [NCP §300.825(a)(2)].

2.4 SCOPE AND ROLE OF OPERABLE UNIT

The environmental concerns at NAS Cecil Field are complex. As a result, work at the 20 sites has been organized into nine OUs. More than 200 other areas are undergoing evaluation in the Base Realignment and Closure (BRAC) and Underground Storage Tank (UST) petroleum programs.

This amended ROD presents the final remedy for OU 2, Site 5. Final RODs have been approved for OU 1; OU 2, Site 17; OU 3; OU 4; OU 5, Site 14; OU 6; OU 7 and OU 8. An RI, BRA, and FS were completed for OU 5, Site 15. Based on an additional data-gap investigation, a revised FS, Proposed Plan, and subsequent ROD are pending for OU 5, Site 15. An FS is currently being written for OU 9, Sites 36 and 37.

Investigations at OU 2, Site 5 indicated the presence of free product, soil, sediment, and groundwater contamination from past disposal practices. The Site 5 IRA and 1998 removal action for soil and sediment adequately addressed risks associated with free product, soil, and sediment. The purpose of this amended ROD is to describe the changed conditions that have led to the modification in treatment and disposition of contaminated soils and the treatment of groundwater.

The following RAO was established for groundwater at OU 2, Site 5:

- Protect humans from exposure from potable water use of groundwater at Site 5 that contains concentrations of VOCs, SVOCs, pesticides, and metals above drinking-water-based ARARs or risk assessment remedial goal options.

The remedy documented in this amended ROD will achieve this RAO for groundwater.

2.5 SUMMARY OF SITE CHARACTERISTICS

Contaminant sources, detections, fate and transport, contaminated media, and geologic and hydraulic conditions of OU 2 are discussed in Sections 3.0, 4.0, and 5.0 of the OU 2 RI report. These site characteristics are summarized in the following paragraphs.

2.5.1 Geology and Hydroeology

The subsurface at Site 5 is composed primarily of sand and silty sand to approximately 56 ft bls. Below 56 feet, there are varying layers of sand and clay and, eventually, a layer of dolomite at about 101 ft bls. The surficial aquifer system extends from the water table to the first clay layer approximately 56 ft bls. The hydraulic conductivity for the soil is estimated to range from 0.58 ft/day to 0.91 ft/day. The elevation of the groundwater table is highly seasonal, ranging from 1 foot to 7 ft bls. Groundwater is interpreted to flow to the southeast.

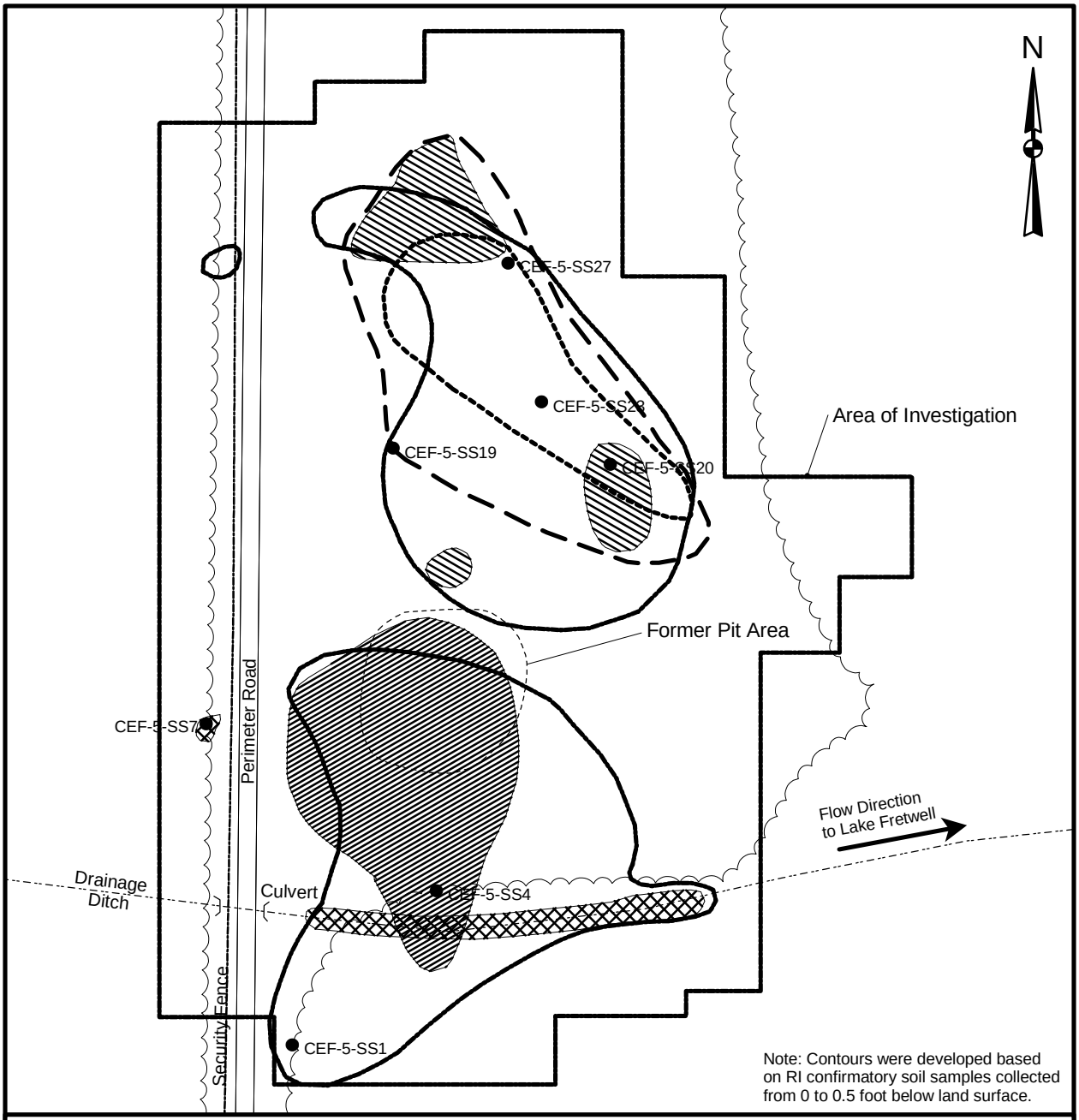
2.5.2 Contaminant Sources

The contaminant sources at OU 2, Site 5 consisted of the contaminated soil in the disposal pit and adjacent areas and free product. Contaminated surface soil was detected over much of the area of investigation, including areas away from the disposal pit. There are no known upgradient contaminant sources at Site 5 with respect to groundwater flow.

2.5.3 Surface Soil

Site 5 surface soil contaminants included SVOCs, particularly polynuclear aromatic hydrocarbons (PAHs), TRPH, pesticides, one polychlorinated biphenyl (PCB) (Aroclor 1260), and inorganics. VOCs were detected, but at relatively low concentrations, and appeared to be randomly distributed. SVOCs, pesticides, and inorganics were detected over much of the area of investigation. Most detections and the highest concentrations, however, were detected in an area north of the disposal pit and not in the pit itself. TRPH was detected over most of the area of investigation. Aroclor 1260 was detected primarily in the pit and adjacent areas, with the greatest concentration at a location just north of the drainage ditch.

The distribution of surface soil contamination prior to the IRA is shown on Figure 2-3. Figure 2-4 illustrates the areas of surface and subsurface soil excavated from 1994 to 1998 as part of IRA and removal action activities.



LEGEND

Source: (ABB-ES, 1995d)

- Total recoverable petroleum hydrocarbons greater than 50 milligrams per kilogram
- Semivolatile organic compounds greater than 6,000 micrograms per kilogram
- Inorganics (manganese, berylium, and cadmium) detected at greater than 2 times background value
- Surface soil sample and designation
- Polychlorinated biphenyls, Aroclor-1260 greater than 100 micrograms per kilogram
- 4,4'-Dichlorophenyl trichloroethane detected
- Volatile organic compounds greater than 10 micrograms per kilogram

100 0 100 Feet

DRAWN BY MJJ	DATE 17Sept99	EXTENT OF SURFACE SOIL CONTAMINATION (1993) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-3 / REV 0

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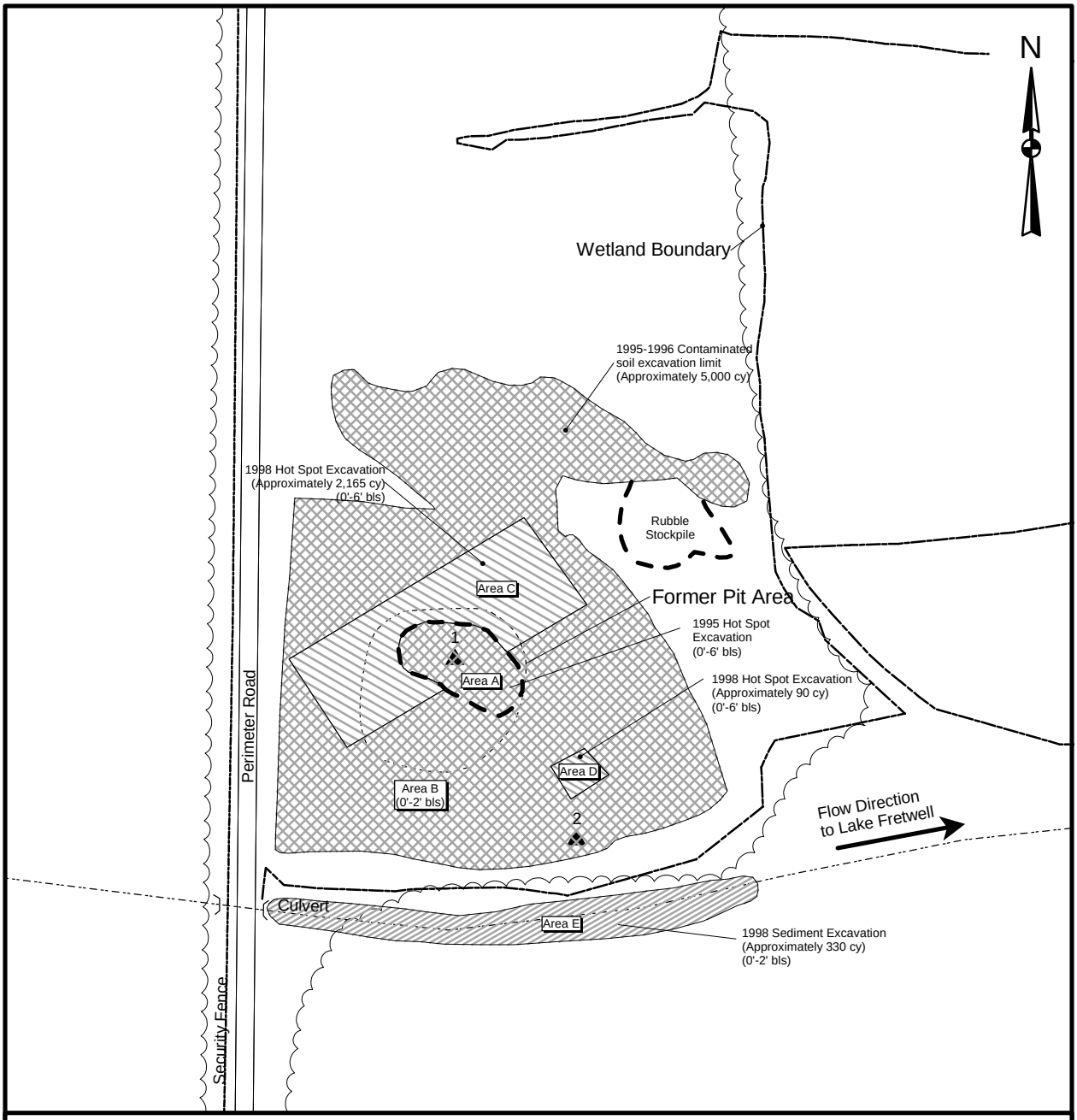

LEGEND

▲ Surface Water sample and designation

Source: (Betchel, 1999)

Notes:
1) Areas A and B excavated in 1995 - 1996.
2) Areas C, D, and E excavated in 1998.

100 0 100 Feet

DRAWN BY MJJ	DATE 17Sept99	SOIL EXCAVATION AREAS (1995 - 1998) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 / REV 0

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2.5.4 Subsurface Soil

VOCs in the subsurface soil at Site 5 include solvents and petroleum-related contaminants. The greatest VOC concentrations were detected within the disposal pit and west and north of this pit. SVOCs were detected in the disposal pit, the areas immediately adjacent to the pit, and along the northern side of the drainage ditch. SVOCs were also detected in the northernmost part of the area of investigation. This northern location appeared to have contamination separate from that detected in the disposal pit area and was included in the IRA. TRPH was detected over much of the area of investigation. Highest TRPH concentrations, however, were associated with the disposal pit. Pesticides were detected at perimeter locations of the area of investigation and appeared to be randomly distributed. Aroclor 1260 was detected in the southern part of the area of investigation, extending from just north of the disposal pit to the drainage ditch. Concentrations greater than 1 mg/kg were detected in the western part of the disposal pit and at one location north of the drainage ditch. Inorganics were detected throughout the area of investigation at concentrations not significantly different from background concentrations.

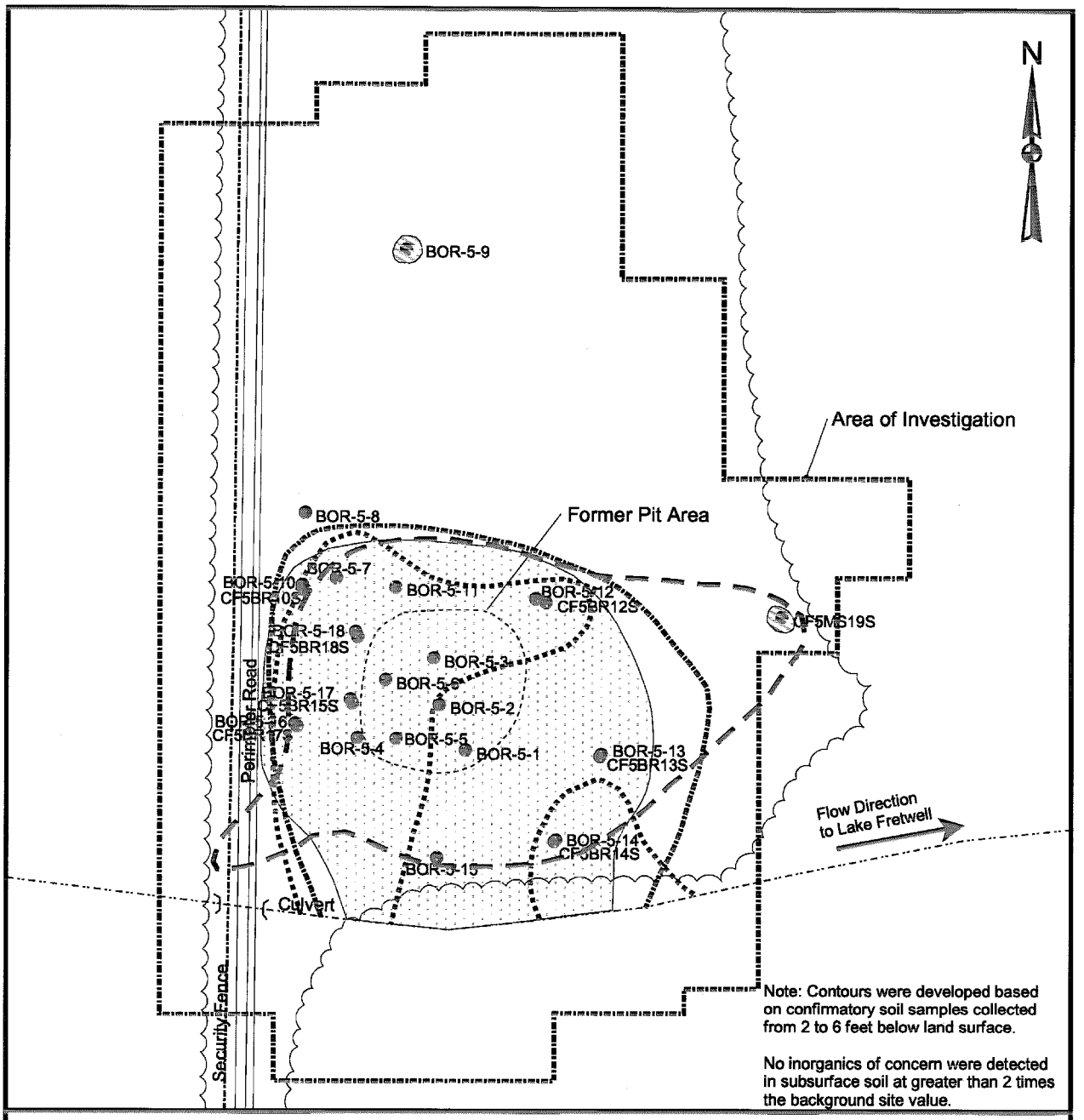
The distribution of subsurface soil contamination prior to the IRA at Site 5 is shown on Figure 2-5. Figure 2-4 illustrates the areas of surface and subsurface soil excavated from 1994 to 1998 as part of IRA and removal action activities.

2.5.5 Surface Water and Sediment

Surface water and sediment samples were collected from the drainage ditch at Site 5. VOCs and inorganics were detected in the surface water at concentrations such that the contaminants pose acceptable risks. VOCs, SVOCs, TRPH, pesticides and PCBs, and inorganics were detected in the sediment samples. The greatest number of detections and greatest concentrations were in sediment collected immediately downgradient of the disposal pit area. The presence of pesticides, PCBs, and TRPH posed ecological risks. Sediment sample results are presented on Figure 2-6. Figure 2-4 illustrates the areas of sediment excavated in 1998 as part of removal action activities.

2.5.6 Surficial Aquifer Groundwater

Contamination at OU 2, Site 5 was limited to surficial aquifer, generally to the upper 25 feet of the aquifer. Approximately 300 gallons of free product were detected at Site 5. The free product was located in the northeastern part of the disposal pit. Analysis and evaluation indicated that the product was either weathered kerosene or jet fuel containing 26 milligrams per liter (mg/l) PCBs.



LEGEND

Source: (ABB-ES, 1995d)

- Total recoverable petroleum hydrocarbons greater than 50 milligrams per kilogram
- Semivolatile organic compounds greater than 6,000 micrograms per kilogram
- Volatile organic compounds greater than 100 micrograms per kilogram
- Subsurface soil sample and designation
- Polychlorinated biphenyls, Aroclor-1260 greater than 100 micrograms per kilogram
- 4,4'-Dichlorophenyl trichloroethane detected

100 0 100 Feet

DRAWN BY MJJ	DATE 17Sept99	EXTENT OF SUBSURFACE SOIL CONTAMINATION (1993) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-5 / REV 0

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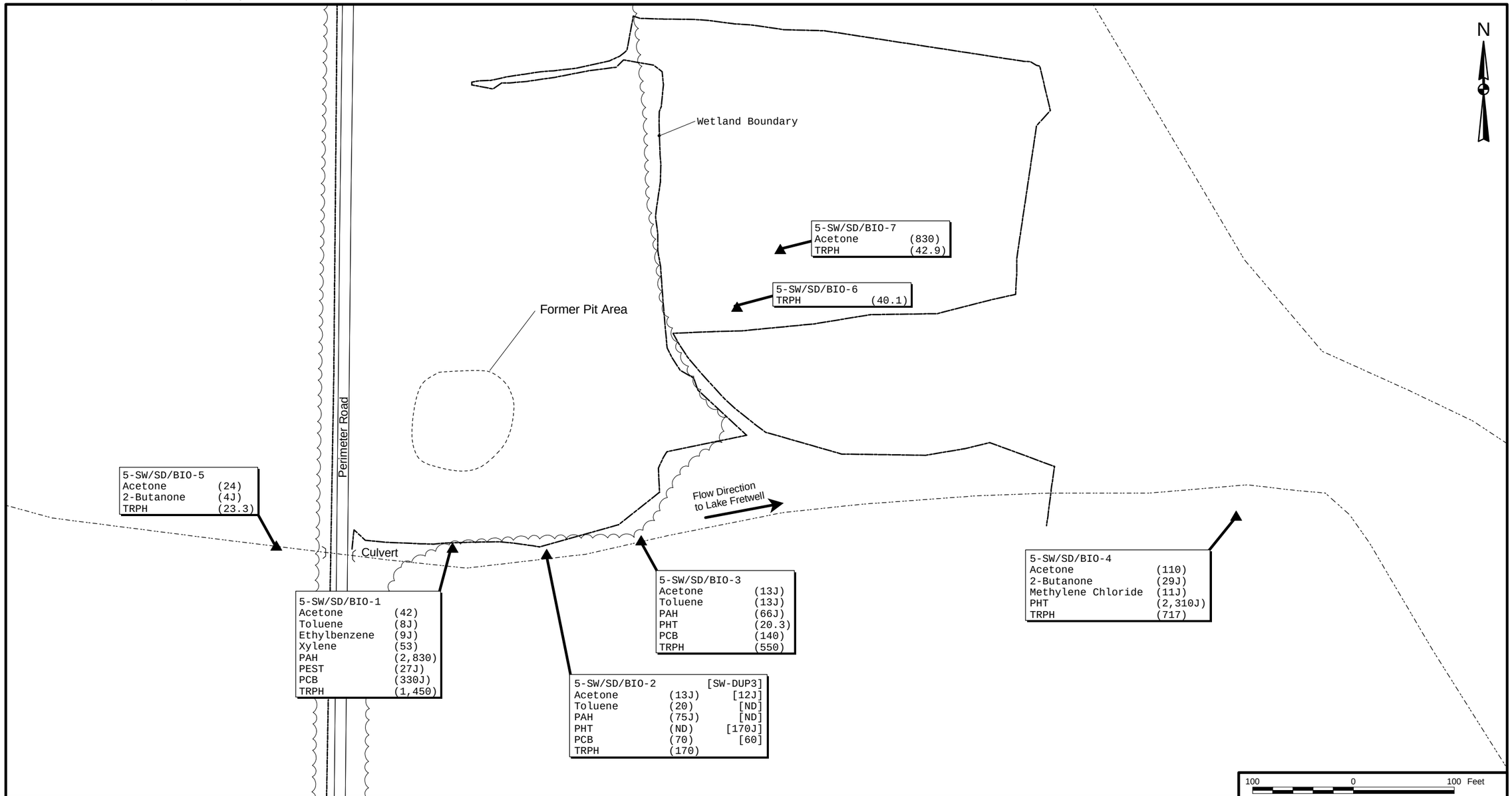


LEGEND

▲ Sediment and surface water sample and designation (sediment results shown)

(13J)	Reported concentration of compound
[12J]	Reported concentration of compound in duplicate sample
ND	Not detected
J	Estimated value
PAH	Total non-phthalate polynuclear aromatic hydrocarbons
PHT	Total phthalate esters
PEST	Total pesticides
PCB	Total polychlorinated biphenyls

Source: (ABB-ES, 1995d)

Notes:

TRPH reported in milligrams per kilogram (mg/kg)

All other compounds reported in micrograms per kilogram (ug/kg)

* SW-DUP3 is a duplicate sediment sample.

DRAWN BY MJJ	DATE 17Sept99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

ORGANICS IN SEDIMENT (1993)
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7898	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-6	REV. 0

VOCs and SVOCs detected in Site 5 groundwater included solvents and petroleum-related contaminants. VOCs, SVOCs, and TRPH were detected from the disposal pit area southward to the drainage ditch. (Acetone was detected at low concentrations in samples from two monitoring wells located south of the drainage ditch).

Pesticides were detected at two locations, one in the disposal pit and associated with the free product (from monitoring well CEF-5-6S) and one just southeast and downgradient of the free product (from monitoring well CEF-5-5S). PCBs were not detected in the groundwater.

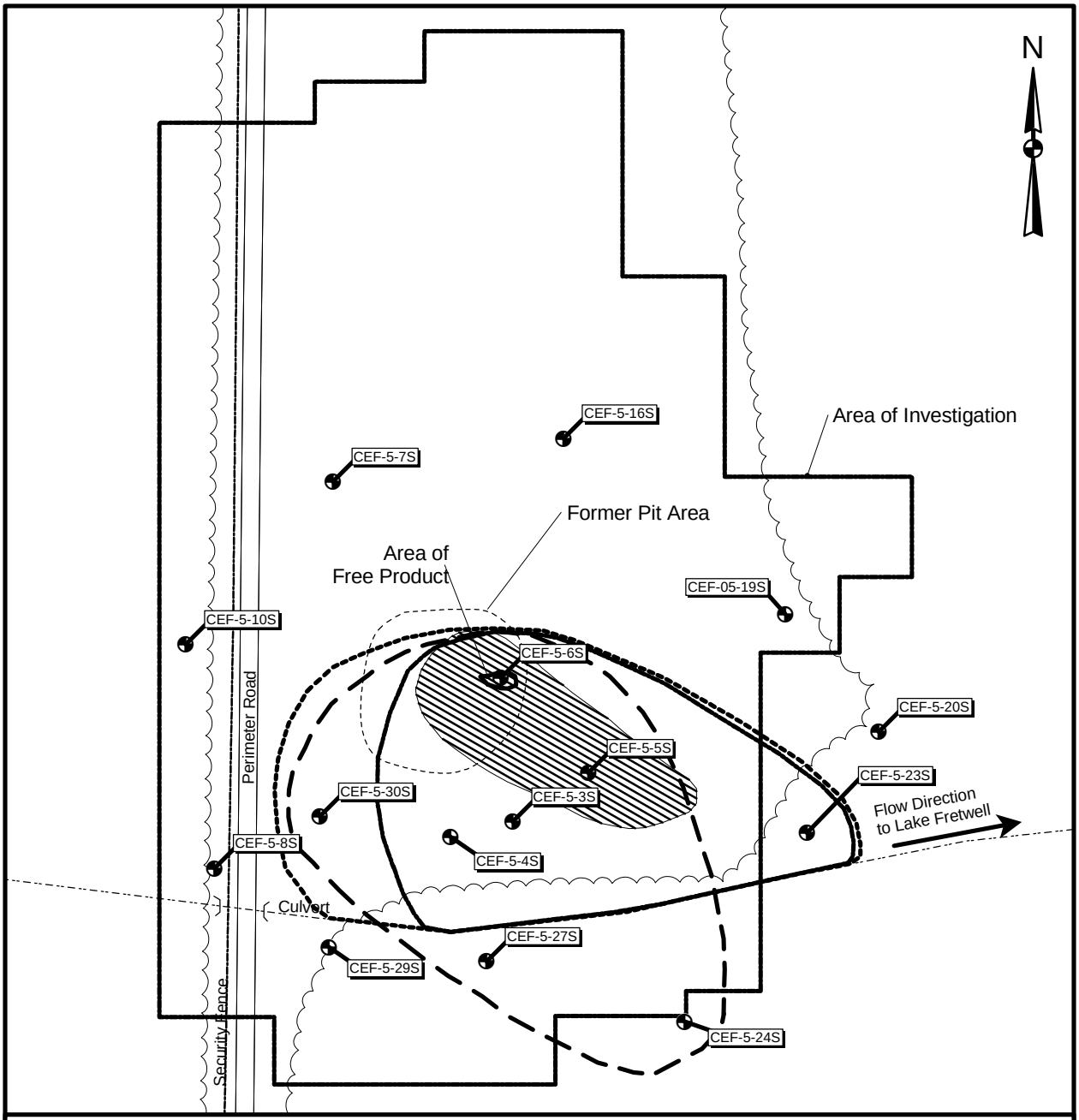
Groundwater data collected in 1993 indicated several inorganics at concentrations in excess of drinking water standards. Groundwater samples, however, were turbid and those concentrations were associated with particulate matter and not the groundwater itself. Additional groundwater samples were collected in 1995 using quiescent sampling methods, and the observed inorganic concentrations were below drinking water standards or similar to background concentrations. Only one upgradient sample concentration from the 1995 groundwater sampling event posed a human health risk (arsenic at 4.4 μg/l at CEF-5-MW-14I).

The distribution of groundwater contamination, as indicated by 1993 RI groundwater data, is shown on Figure 2-7. The range of site-related COC concentrations from the 1993 RI sampling event is presented in Table 2-1.

An air sparging pilot test was conducted at Site 5 in 1997. Three groundwater samples were collected from temporary wells to evaluate groundwater conditions prior to the start of the pilot test. The samples were analyzed for VOCs. Figure 2-8 presents the analytical results of this sampling, and Table 2-1 provides the range of detected VOCs in these groundwater samples. Analysis of these groundwater samples showed lower concentrations of VOCs compared to the groundwater samples collected during the RI in 1993.

Based on this information from the air sparging pilot test, four rounds of quarterly groundwater samples were collected to determine whether natural attenuation was a feasible remedial alternative for groundwater. Figures 2-9 through 2-12 illustrate the detections of VOCs, SVOCs, TRPH, and inorganics observed during the four quarterly sampling events. Pesticides were not detected during these sampling rounds.

The results of quarterly sampling showed decreased concentrations of VOCs, SVOCs, pesticides, and inorganics and that these chemicals were not migrating outside the boundaries of Site 5 at unacceptable



LEGEND

Source: (ABB-ES, 1995d)

- Total recoverable petroleum hydrocarbons greater than 5 milligrams per liter
- Semivolatile organic compounds greater than 10 milligrams per liter
- Volatile organics compounds detected
- Monitoring Well and designation
- Pesticides detected

Note: Contours were developed based on 1993 RI groundwater analytical results from monitoring wells screened in the upper surficial aquifer.

100 0 100 Feet

DRAWN BY MJJ	DATE 17Sept99	EXTENT OF GROUNDWATER CONTAMINATION (1993) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-7 REV 0

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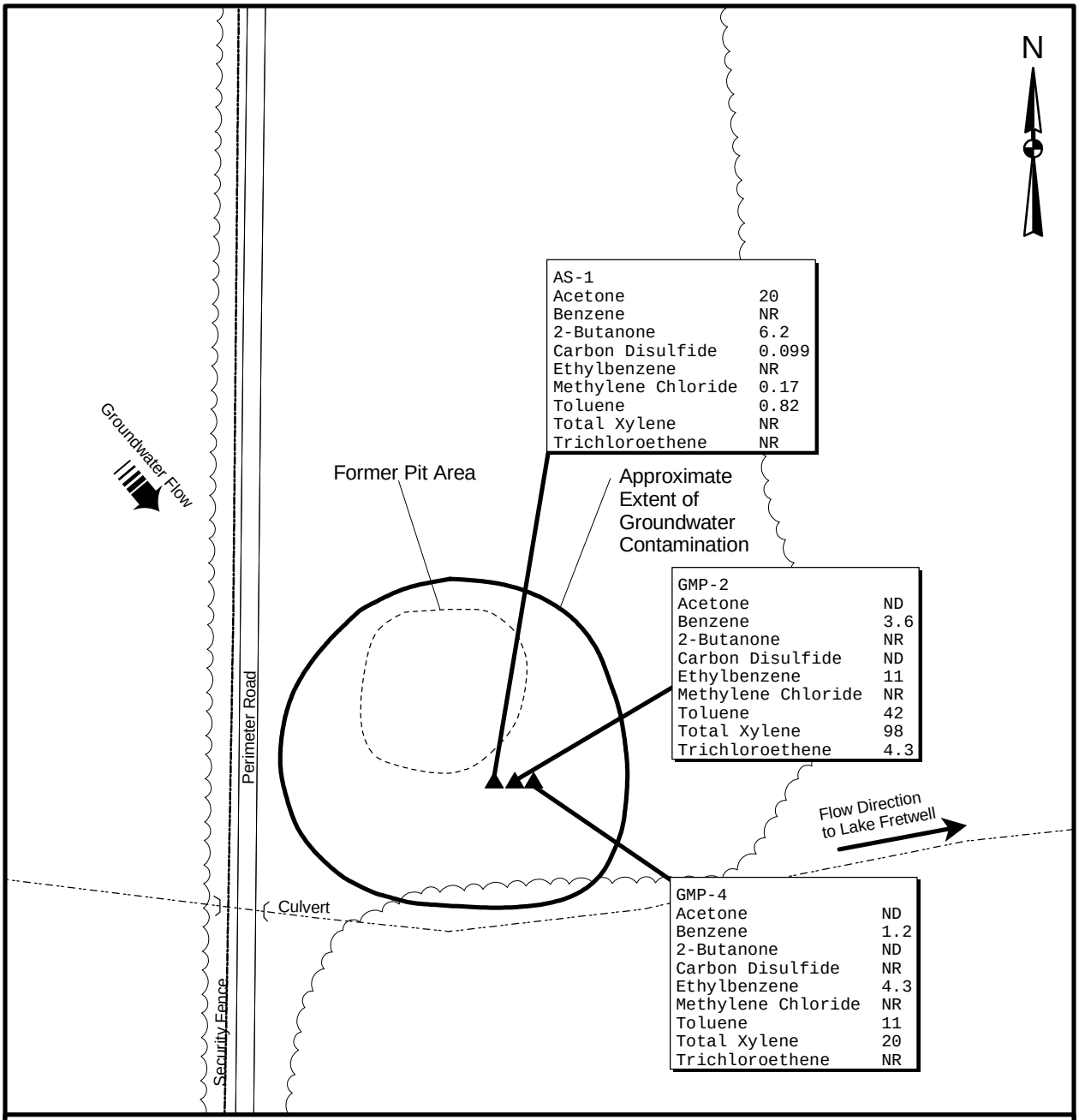
TABLE 2-1

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Site-Related Chemicals of Concern (COCs)	Range of Detections in Groundwater (µg/L)			Site-Specific Clean-up Level[1] (µg/L)
	RI 1993	Air Sparge Pilot-scale Test 1997	1998 - 1999 Sampling	
Volatile Organic Compounds				
Acetone	1 – 1,100	20	4.9 – 13.8	700
Benzene	16	1.2 – 3.6	0.2 – 2	1
Trichloroethene	< 33	4.3	0.3 – 33.7	3
Ethylbenzene	11 – 30	4.3 –11	1 – 10.1	30
Toluene	21 – 170	11 – 42	1.5 – 28.1	40
Total Xylenes	56 – 140	20 – 98	8.4 – 49	20
Semivolatile Organic Compounds				
4-Methylphenol	160 – 820	Not collected	1 – 60	4
bis(2-Ethylhexyl) phthalate	0.5 – 130	Not collected	1 – 8	6
Naphthalene	0.5 – 270	Not collected	2 – 82	20
2,4-Dimethylphenol	76 – 110	Not collected	1 – 20	140
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons	2,600 – 160,000	Not collected	1,080 – 13,000	5,000
Pesticides				
alpha-Chlordane	0.15	Not collected	0.14 – 0.15	2
beta-HCH	0.18	Not collected	< 0.02	0.02
Inorganics				
Antimony	24.2 – 29.4	Not collected	Not detected	44.5[2]
Arsenic	2.2 – 79	Not collected	20	50
Beryllium	4.5 – 12.5	Not collected	Not detected	4
Cadmium	3.5 – 5.9	Not collected	Not detected	6[2]
Chromium	5.9 – 583	Not collected	6.7 – 29.15	100
Manganese	3.6 – 263	Not collected	6.2 – 216	96.2[2]
Vanadium	2.1 – 489	Not collected	5.8 – 235	49

NOTES:

1 Florida Department of Environmental Protection, Florida Administrative Code (FAC) 62-777, unless otherwise noted (FDEP, 1999).
2 NAS Cecil Field Inorganic Background Data Set (HLA, 1998).



LEGEND

▲ Former Air Sparging Test Points and designation

Approximate Extent of Groundwater Contamination (1999)

ND Not Detected
NR Not Reported

Note: All results in mg/L

100 0 100 Feet

DRAWN BY MJJ	DATE 17Sept99	ORGANICS DETECTED IN GROUNDWATER (1997) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-8 REV 0

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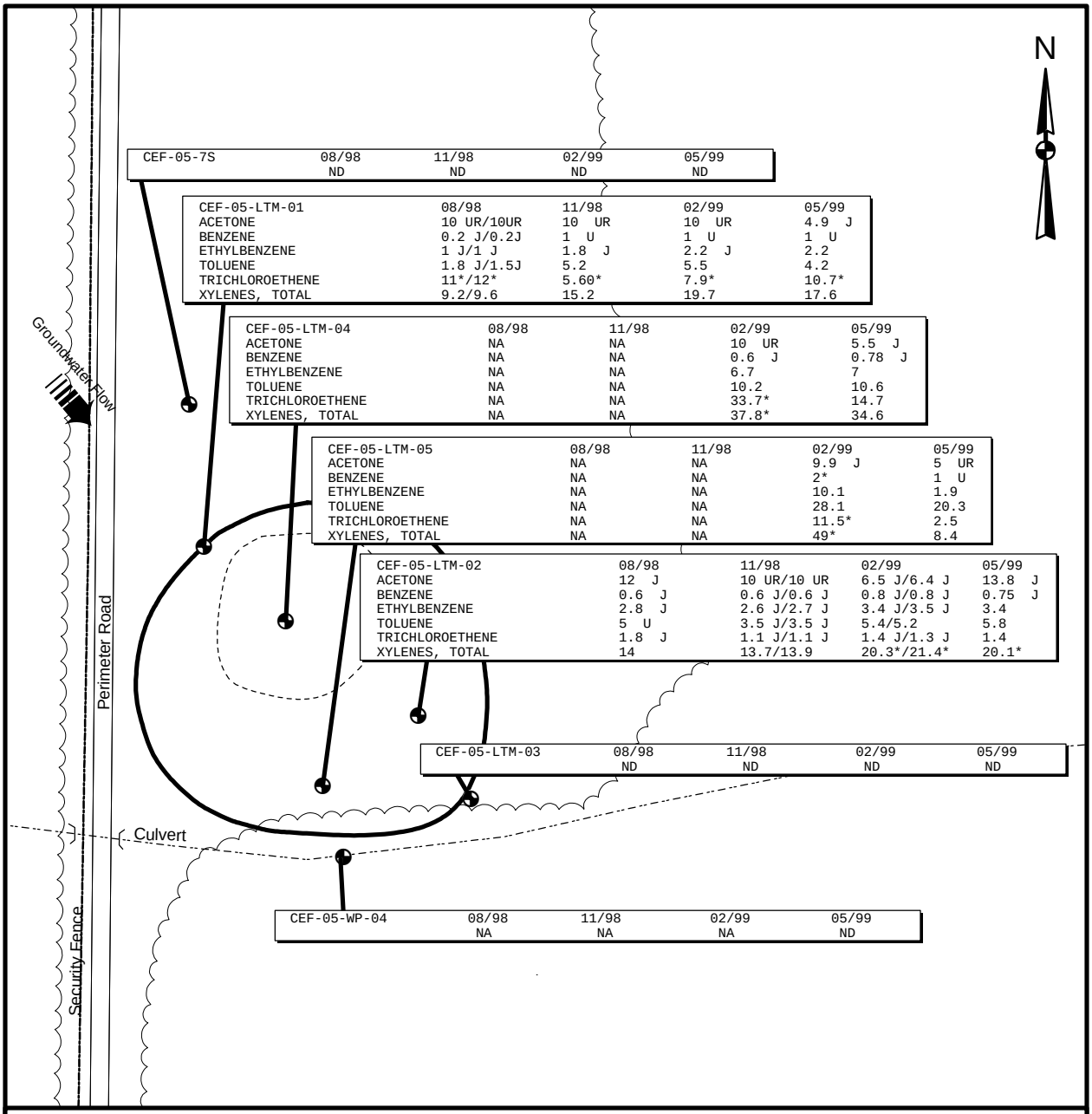

LEGEND

NA = Not Analyzed
ND = None Detected
J = Estimated Concentration
U = Not Detected At Or Above Method Detection Limit (Associated Value)
R = Surrogate Recovery Noncompliance
* = Detected Concentration Exceeds Target Cleanup Goal
Duplicate Results Reported As Sample/Duplicate

Monitoring Well
Approximate Extent Of Groundwater Contamination (1999)
Drainage Ditch
Fence
Former Pit Area

All Results in ug/L

Source: (TtNUS, 1999b)

100 0 100 Feet

DRAWN BY YLI	DATE 04/07/99	VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (1998 - 1999) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY BD	DATE 1/30/99		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-9 REV 0

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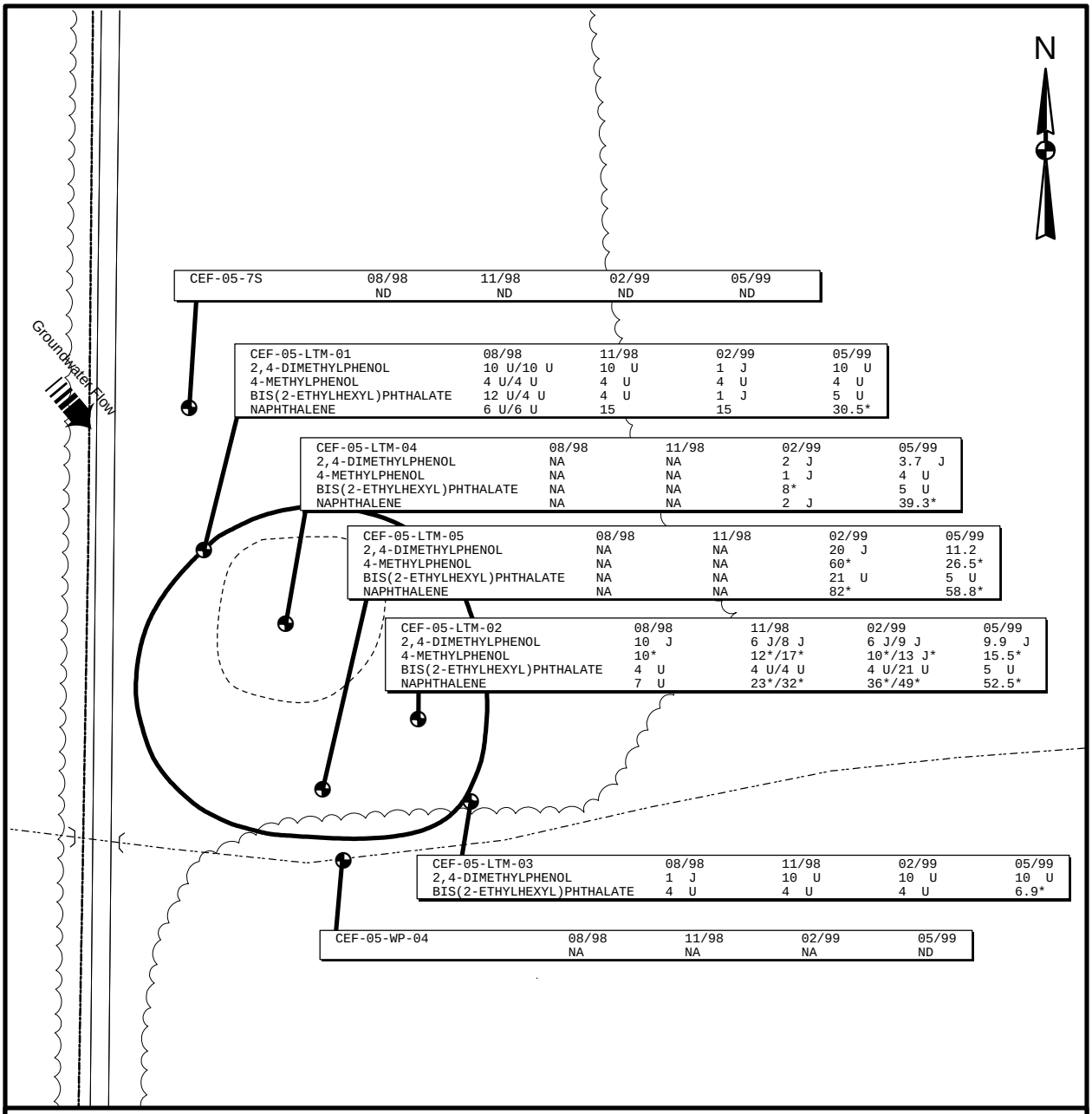

LEGEND

Source: (TtNUS, 1999b)

NA = Not Analyzed
ND = None Detected
J = Estimated Concentration
U = Not Detected At Or Above Method Detection Limit (Associated Value)
* = Detected Concentration Exceeds Target Cleanup Goal
Duplicate Results Reported As Sample/Duplicate

Monitoring Well
Approximate Extent Of Groundwater Contamination (1999)
Drainage Ditch
Fence
Former Pit Area

All Results in ug/L

100 0 100 Feet

DRAWN BY YLI	DATE 04/07/99	SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (1998 - 1999) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY BD	DATE 1/30/99		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-10 REV 0

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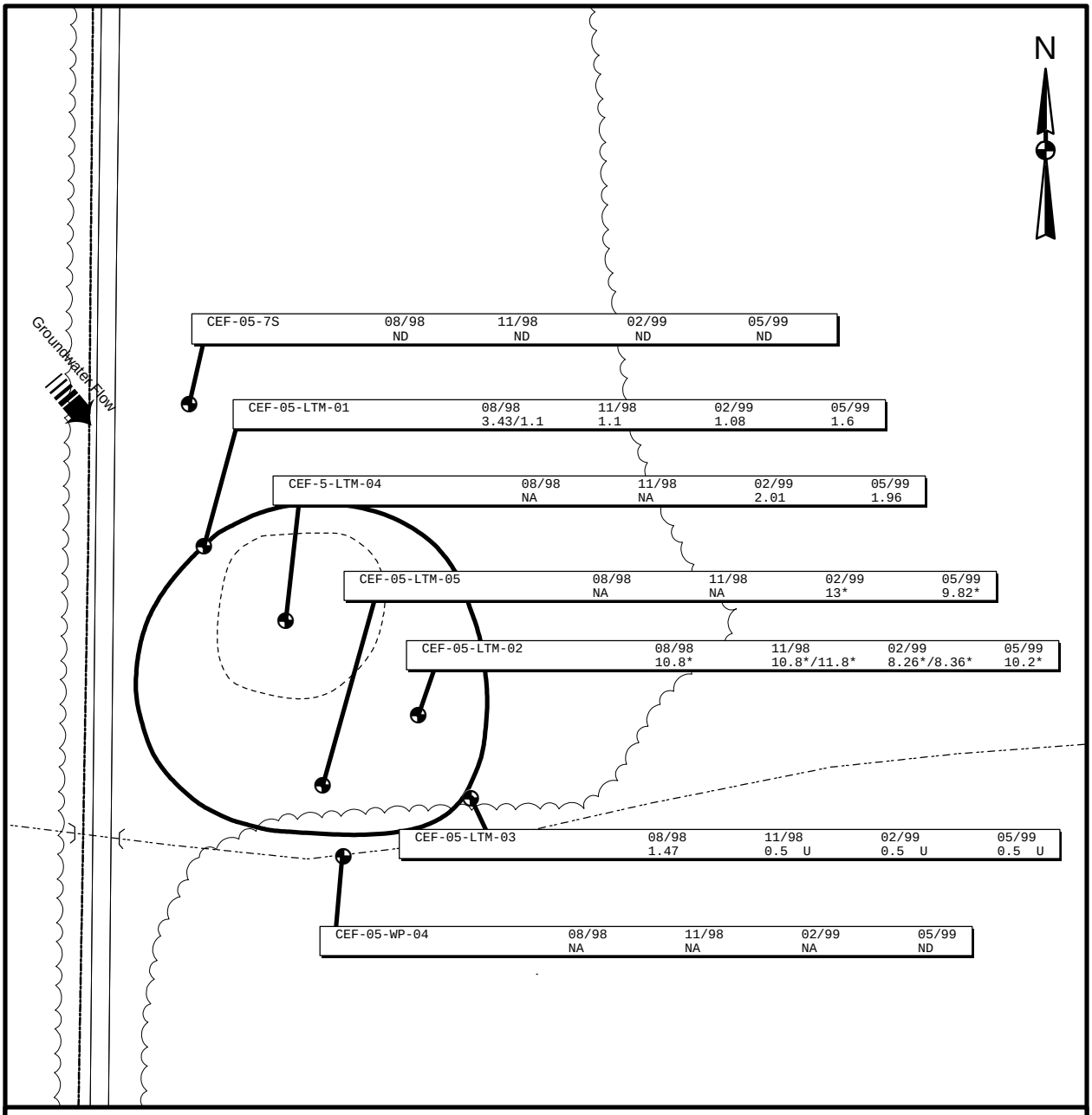

LEGEND

Source: (TtNUS, 1999b)

NA = Not Analyzed
ND = None Detected
U = Not Detected At Or Above Method Detection Limit (Associated Value)
* = Detected Concentration Exceeds Target Cleanup Goal
Duplicate Results Reported As Sample/Duplicate

Monitoring Well
Approximate Extent Of Groundwater Contamination (1999)
Drainage Ditch
Fence
Former Pit Area

All Results in mg/L

100 0 100 Feet

DRAWN BY YLI	DATE 04/07/99	TRPH IN GROUNDWATER (1998 - 1999) OPERABLE UNIT 2, SITE 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY BD	DATE 1/30/99		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-11 REV 0

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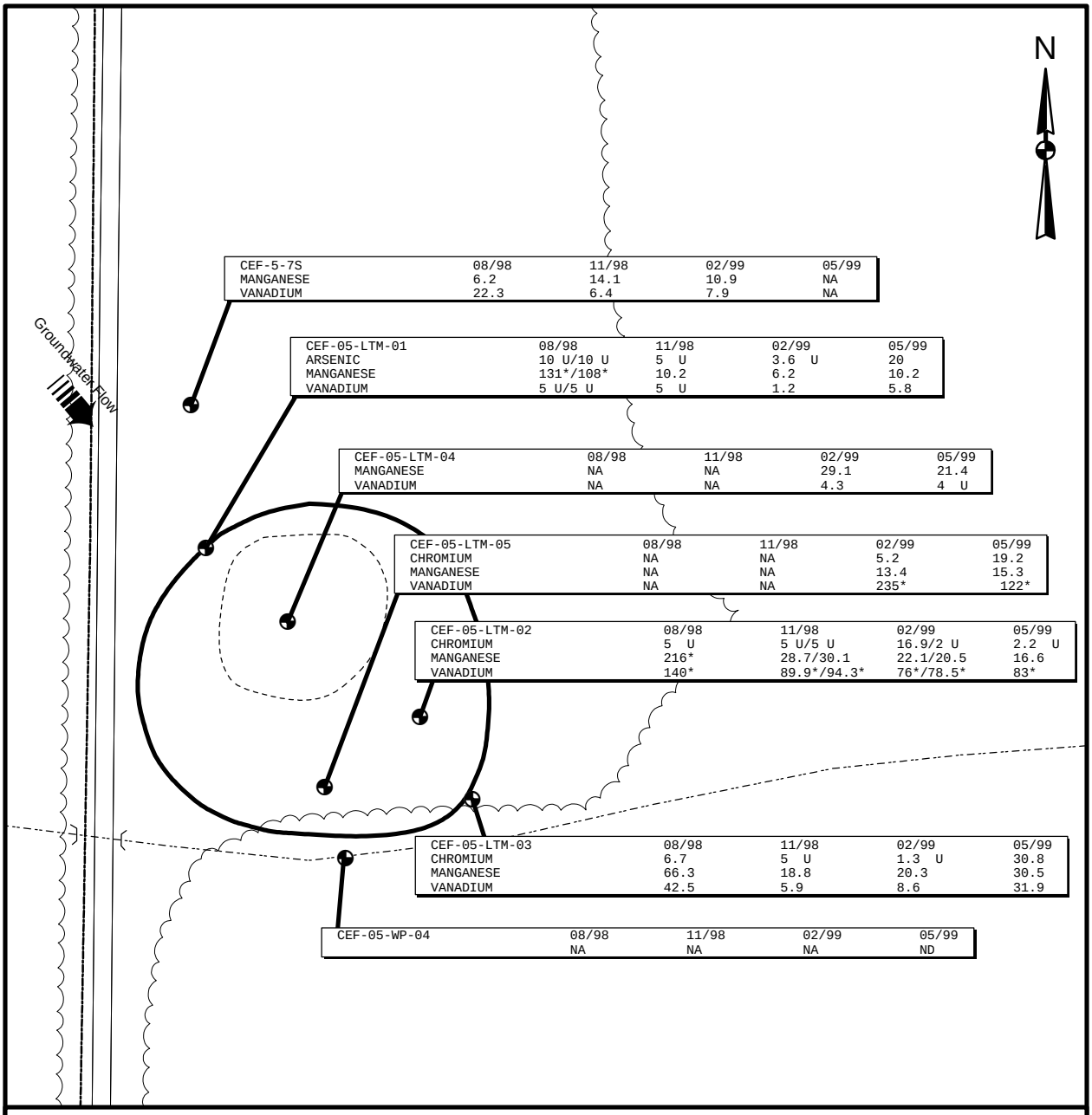

LEGEND

NA = Not Analyzed
ND = None Detected
J = Estimated Concentration
U = Not Detected At Or Above Method Detection Limit (Associated Value)
* = Detected Concentration Exceeds Target Cleanup Goal
Duplicate Results Reported As Sample/Duplicate

Monitoring Well
Approximate Extent Of Groundwater Contamination (1999)
Drainage Ditch
Fence
Former Pit Area

All Results in ug/L

Source: (TtNUS, 1999b)

100 0 100 Feet

DRAWN BY	DATE			CONTRACT NUMBER
YLI	04/07/99	INORGANICS IN GROUNDWATER		7898
CHECKED BY	DATE	(1998 - 1999)	APPROVED BY	DATE
BD	1/30/99	OPERABLE UNIT 2, SITE 5	APPROVED BY	DATE
COST/SCHEDULE-AREA		NAVAL AIR STATION CECIL FIELD		
SCALE		JACKSONVILLE, FLORIDA	DRAWING NO.	REV
AS NOTED			FIGURE 2-12	0

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concentrations. Natural attenuation parameters were also collected to monitor for biological activity. These data indicated that naturally occurring biological processes are degrading VOCs in the groundwater.

2.6 SUMMARY OF SITE RISKS

The BRA is performed to provide the basis for taking action. It indicates the exposure pathways to be addressed by the remedy and serves as a baseline, indicating what risk could exist if no action is taken at the site. This section of the amended ROD summarizes the results of the BRA that was conducted for OU 2, Site 5. Detailed information from the BRA on identification of COCs, exposure assessment, toxicity assessment, and risk characterization is provided in the RI (ABB-ES, 1995a). The BRA completed for OU 2 evaluated Site 5 for both human health and ecological risk.

Human health threats include both a cancer risk and a noncancer Hazard Index (HI) in accordance with the NCP. The NCP establishes 1 in 1,000,000 (1.0E-06) to 1 in 10,000 (1.0E-04) as an " acceptable" incremental lifetime cancer risk (ILCR) from chemicals of potential concern (COPCs) (U.S. EPA, 1990). For noncarcinogenic chemicals, an HI of equal to or less than one is acceptable. The state of Florida established an acceptable ILCR as equal to or less than 1.0E-06 and an HI equal to or less than one.

2.6.1 Human Health Risk Assessment

At Site 5, the calculated ILCR and noncancer hazards associated with surface soil, subsurface soil, surface water, and sediment were acceptable per U.S. EPA guidance of 1 in 10,000 to 1 in 1,000,000 (1.0E-04 to 1.0E-06 for carcinogenic endpoints and an HI of less than 1 for noncarcinogenic endpoints). The cancer risk derived for domestic use of the groundwater from the surficial aquifer (ingestion of groundwater and inhalation of VOCs while showering with groundwater) by an adult was 3 in 10,000 (3.0E-04). The risk was due primarily to beta-hexachlorocyclohexane (HCH) and beryllium. An HI of 10 was associated with domestic use of groundwater by an adult. The noncarcinogenic hazard is due primarily to the ingestion of the SVOCs 4-methylphenol and naphthalene and the VOC acetone. Risks posed by inorganics indicated only arsenic from the groundwater sample from well CEF-5-MW-14I poses a human health ILCR of 8 in 100,000 (8.0E-05). Arsenic was detected at a concentration of 4.4 micrograms/liter (μg/l), well below the drinking water standard of 50 μg/l. Monitoring well CEF-5-MW-14I is located in the northwest part of Site 5, approximately 280 feet from and upgradient of the former disposal pit. A summary of human health risks for OU 2, Site 5 is presented on Table 2-2.

Since 1993, the concentrations of these compounds observed during natural attenuation monitoring have decreased; consequently, risk posed to human health through groundwater ingestion/showering has also

TABLE 2-2

SUMMARY OF HUMAN HEALTH RISK ASSESSMENT
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Medium	Risks Above U.S. EPA Risk Range?(1)		Risks Above FDEP Risk Range?(4)		Concentrations Above Florida Soil Clean-up Goals or Groundwater Clean-up Target Levels?(6)
	Current Land Use(2)	Future Land Use(3)	Current Land Use(2)	Future Land Use(3)	
Surface Soil	No	No	No	No	Yes
Subsurface Soil	NA(5)	No	NA(5)	No	Yes
Surface Water	No	No	No	No	NA
Sediment	No	No	No	No	NA
Surficial Aquifer Groundwater	NA(5)	Yes	NA(5)	Yes	Yes(7)

NOTES:

FAC.: Florida Administrative Code
U.S. EPA: U.S. Environmental Protection Agency
NA: Not applicable

1 U.S. EPA has established an acceptable ILCR range of 1.0E-06 to 1.0E-04 (U.S. EPA, 1990) and a maximum non-carcinogen HI of 1.0.
2 Current land uses evaluated in this report include nonresidential exposures with no current use of groundwater.
3 Potential future land uses evaluated in this report include residential exposures with the use of groundwater as drinking water.
4 FDEP has established an acceptable ILCR threshold of 1.0E-06 and a maximum non-carcinogen HI of 1.0.
5 Human exposure to subsurface soil and groundwater was not evaluated under the current land-use scenario.
6 Florida soil clean-up goals and groundwater clean-up target levels for Chapter 62-777 FAC, (FDEP, 1998).
7 In the surficial aquifer, the maximum detected concentrations of several VOCs, SVOCs, TRPH, pesticides, and inorganics exceeded either their respective Florida target clean-up levels or the NAS Cecil Field Inorganic Background Data Set. See Table 2-1 for these compounds.

decreased. However, actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other measures considered, may present a current or potential threat to public health, welfare, or the environment.

2.6.2 Ecological Risk Assessment

Potential risks for ecological receptors at Site 5 were evaluated for ecological contaminants of potential concern in surface soil, surface water, sediment, and groundwater. A summary of the ecological risk assessment for OU 2, Site 5 is presented in Table 2-3.

Risks for soil invertebrates and plants were evaluated based on the results of laboratory toxicity testing of surface soil samples from Site 5 with earthworms (*Eisenia foetida*) and one plant species, lettuce (*Lactuca sativa*). With the exception of soil from sample location CF5-SS-4, no risks associated with exposure to surface soil were identified for terrestrial wildlife, soil invertebrates, or plants. At sample location CF5-SS-4, significant worm mortality and reduced lettuce seed germination rates were observed. It is likely that elevated TRPH or Aroclor 1260 concentrations (28,000 and 2.2 mg/kg, respectively) contributed to the observed effects in the surface soil laboratory toxicity tests.

Evaluation of contamination in surface water and sediment is based on collection of analytical samples from the drainage ditch and wetland adjacent to Site 5. At each sampling location, surface water and sediment samples were analyzed to determine the extent and type of contamination. Additionally, sediment samples were submitted for laboratory toxicity testing with two organisms [the water flea (*Ceriodaphnia dubia*) and the amphipod (*Hyalella azteca*)] and samples of the benthic macroinvertebrate community were collected. The results of the three analyses were analyzed in a weight-of-evidence approach to identify and characterize risks for aquatic receptors.

Review of analyses of the benthic macroinvertebrate sampling results indicated little impairment of the benthic community at the Site 5 tributary. However, evaluation of the sediment toxicity test data suggested that certain organisms may be affected by exposure to sediment. The data suggested that the responses may be associated with elevated concentrations of Aroclor 1260, 4,4'-DDT, or TRPH emanating from Site 5.

2.7 DESCRIPTION OF REMEDIAL ALTERNATIVES

This section provides a narrative of each alternative evaluated for soil, sediment, and groundwater at OU 2, Site 5. For further information on the remedial alternatives, see the focused FS (ABB-ES, 1994a), the FS (ABB-ES, 1995b), the original Proposed Plan (ABB-ES, 1995c) and ROD (ABB-ES, 1995d), and the

TABLE 2-3

SUMMARY OF ECOLOGICAL RISK ASSESSMENT
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Receptor	Compounds That May Pose An Ecological Risk (per Medium)			
	Surface Soil	Surface Water	Sediment	Future Groundwater Discharge
Terrestrial and wetland wildlife	None	None	None	NA
Terrestrial and wetland plants	PCB, TRPH	NA	NA	NA
Soil invertebrates	PCB, TRPH	NA	NA	NA
Benthic macroinvertebrates	NA	None	PCB, TRPH, 4,4' - DDT	None

NOTES:

NA: Not Applicable

Revised Proposed Plan (TtNUS, 1999a). Summaries of the treatment alternatives that were evaluated in the focused FS and FS are described in the following sections. The remedies selected for this amended ROD are outlined in Section 2.9.

2.7.1 Source Area Soil Remedial Alternatives

In the focused FS, four alternatives were evaluated for the OU 2, Site 5 source area soils. In addition to the components listed for each alternative, all alternatives included site preparation, treatment performance monitoring, and site restoration activities. The alternatives (as described in the focused FS) are summarized as follows. The IROD selected RA-2, Excavation and On-Site Biological Treatment of Contaminated Soil, as the remedy for the source area soils.

RA-1: Excavation and Off-Site Thermal Treatment of Contaminated Soil

Alternative RA-1 consists of the following components:

- Excavate contaminated soil.
- Separate free product and transport for off-site treatment and disposal.
- Transport contaminated soil to off-site thermal treatment facility.
- Backfill with clean soil.

RA-2: Excavation and On-Site Biological Treatment of Contaminated Soil

Alternative RA-2 consists of the following components:

- Excavate contaminated soil.
- Separate free product and transport for off-site treatment and disposal.
- Treat soil biologically on site.
- Backfill with clean soil

RA-3: Biological Treatment of Contaminated Soil Without Excavation

Alternative RA-3 consists of the following components:

- Install a free-product recovery cistern and transport collected free product for off-site treatment and disposal.
- Treat soil in place by biological mechanisms enhanced with air injection and nutrient addition.

RA-4: Excavation and Off-site Disposal of Contaminated Soil

Alternative RA-4 consists of the following components:

- Excavate contaminated soil.
- Separate free product and transport for off-site treatment and disposal.
- Transport soil to an off-site landfill for disposal.
- Backfill with clean soil.

2.7.2 Sediment Remedial Alternatives

In the FS (ABB, 1995b), three alternatives were analyzed for OU 2, Site 5 sediment. These alternatives (as described in the FS) are summarized as follows. The ROD selected SD-2, Excavation and Biological Treatment, as the remedy for sediment.

SD-1: No Action

Evaluation of the no-action alternative is required by law. This alternative would leave the site as is. Ecological risks from the sediment would not immediately improve because SD-1 relies on natural degradation and dispersion processes that will occur over several years. Contamination would be left in place with potential for movement to other surface water bodies, such as Lake Fretwell. Capital costs and operation and maintenance (O&M) costs to implement SD-1 are $0.

SD-2: Excavation and Biological Treatment

This alternative involved excavating approximately 330 cubic yards of sediment and treating it in a biological treatment cell constructed for the IRA for Site 5 soil. Up to the top 2 feet of sediment would be removed along the length of the drainage ditch. Sampling would be performed to identify the extent of excavation needed. Once in the treatment cell, the sediment would be placed in windrows and monitored for biological activity. Nutrients would be added, the proper moisture content maintained, and the optimum oxygen level would be kept by mechanically turning the windrow when necessary.

The drainage ditch would be backfilled with clean material. Once treated, the sediment would be used as fill material for industrial applications. Excavation of sediment would destroy some wetland habitat, but clean-up would improve wetland over the long term. SD-2 would be expected to be in compliance with ARARs. No treatability study was performed on sediment; however, a treatability study was performed on

Site 5 soil with similar contaminants that concluded that soil could be bioremediated to reach the clean-up goals. The estimated time for design, construction, and implementation was 4 months.

The estimated capital costs were $199,000 and the estimated O&M cost is $37,000. The estimated total cost was $236,000 over an estimated 4-month field implementation period. The cost to construct the treatment cell was estimated to be $700,000.

SD-3: Excavation and Off-Site Disposal

This alternative involved excavating approximately 330 cubic yards of sediment and disposing it in an off-site landfill. For cost estimating purposes, it was assumed the sediment would be transported to a Subtitle C facility. Excavation and backfill would be the same as described in SD-2. SD-3 would be expected to be in compliance with ARARs. No treatability study was performed.

The estimated time for design and construction was 1 month. The estimated capital costs were $327,000. There are no O&M costs associated with SD-3.

2.7.3 Groundwater Remedial Alternatives

In the FS (ABB, 1995b), six alternatives were analyzed for OU 2, Site 5 groundwater. These alternatives (as described in the FS) are summarized as follows. The ROD selected GW-3, Air Sparging, or GW-6, In-situ Stripping and Biological Treatment. Both technologies were to be evaluated and the most promising was to be implemented as the remedy for groundwater.

GW-1: No Action

Evaluation of the no-action alternative is required by law. This alternative would leave the site as is. Potential human health risks from the groundwater would not immediately improve because GW-1 relies on natural degradation and dispersion processes that would occur over several years. Capital costs and O&M costs to implement GW-1 are $0.

GW-2: Natural Attenuation

This alternative consisted of a monitoring and modeling program to determine the effectiveness of naturally occurring biodegradation. A network of monitoring wells would be installed and initially sampled quarterly. Several of these monitoring wells would be installed within the plume to characterize contaminant concentrations. Others would be located downgradient of the plume, beginning at the plume's leading edge and outward to monitor possible contaminant migration and to help determine if additional

enhancement is needed. Analyses would be performed for COCs (to monitor degradation rates) and other geotechnical parameters (to monitor for biological activity) including dissolved oxygen, sulfate, sulfide, total and dissolved iron, methane, ethane, ethene, oxidation/reduction potential, pH, temperature, specific conductance, alkalinity, nitrate, nitrite, carbon dioxide, and chloride. GW-2 would also include implementation of land-use restrictions or other institutional controls to prevent exposure to and use of groundwater as a potable water supply. In the short term, this alternative would not comply with chemical-specific ARARs; however, GW-2 was expected to comply with ARARs in the long term. Until ARARs are met, use of groundwater would be restricted.

The estimated time for design and construction was 6 months. The estimated time of operation was 15 years. The estimated capital costs were $20,000. The estimated present worth of O&M costs, based on 5 percent for 15 years, was $212,000. The estimated present-worth total cost was $232,000.

GW-3: Air Sparging

This alternative would reduce risks by treating groundwater in situ. Air sparging involves pumping air through wells into the groundwater. Organic compounds would be removed from the groundwater by transferring the organic compounds into the gas phase. The gas would then be extracted from the vadose zone (soil above the water table), passed through granular activated carbon, and vented to the atmosphere. VOC contamination would also be reduced by introducing oxygen to the subsurface soil and groundwater to increase biological activity. Remediation under this alternative would proceed until RAOs (including target clean-up levels) are met. The target clean-up levels identified would be in compliance with chemical-specific ARARs. It is possible that health-risk-based RAOs would be met before the individual target clean-up levels have been reached. This alternative would comply with location- and action-specific ARARs.

The estimated time for design and construction was 8 months. The estimated time of operation was 4 years. The estimated capital costs were $1,083,000. The estimated present worth of O&M costs, based on 5 percent for 4 years, was $555,000. The estimated present-worth total cost was $1,633,000.

GW-4: Groundwater Extraction and Treatment by Air Stripping and Granular Activated Carbon Adsorption

Groundwater would be pumped from the shallow aquifer using three to five extraction wells. Extracted groundwater would be treated with an air stripper to remove VOCs. SVOCs and pesticides would be removed using liquid-phase granular activated carbon adsorption. Treated groundwater would be discharged into a specially designed infiltration basin, which would allow the clean groundwater to eventually filter back into the aquifer.

The estimated time for design and construction was 8 months. The estimated time of operation was 6 years. The estimated capital costs were $1,533,000. The estimated present worth of O&M costs, based on 5 percent for 6 years, was $1,482,000. The estimated present-worth total cost was $3,015,000.

GW-5: Groundwater Extraction and Treatment by UV/OX

Groundwater would be pumped from the shallow aquifer using three to five extraction wells. Extracted groundwater would be treated with ultraviolet light (UV) and an oxidant (OX) (e.g., hydrogen peroxide) to destroy contaminants. Treated groundwater would be discharged into a specially designed infiltration basin that would allow the clean groundwater to filter back into the aquifer.

The estimated time for design and construction was 8 months. The estimated time of operation was 6 years. The estimated capital costs were $1,575,000. The estimated present worth of O&M costs, based on 5 percent for 6 years, was $1,304,000. The estimated present-worth total cost was $2,879,000.

GW-6: In-Situ Stripping and Biological Treatment

Vertical wells would be installed that circulate groundwater through the well, and air would be introduced to strip VOCs and promote biological breakdown of other contaminants. Stripped VOCs would be collected from the upper portion of the well and treated as necessary prior to release to the atmosphere. This was an innovative technology that posed the risk of not reaching clean-up goals. This alternative would eventually achieve chemical-specific ARARs for VOCs such as benzene and methylene chloride through in-situ air stripping. It would further achieve removal of SVOCs through biodegradation in groundwater. Groundwater and biological monitoring would be used to model degradation to assess compliance with ARARs. Biological monitoring would include dissolved oxygen, carbon dioxide, sulfate, sulfide, methane, ethane, ethene, total and dissolved iron, oxidation and/or reduction potential, pH, temperature, conductivity, nitrate, and nitrite. Location- and action-specific ARARs would be met. The estimated time for design and construction was 8 months.

The estimated time of operation was 4 years. The estimated capital costs were $1,082,000. The estimated present worth of O&M costs, based on 5 percent for 4 years, was $555,000. The estimated present-worth total cost was $1,632,000.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the alternatives with respect to the nine criteria outlined in Section 300.430(e) of the NCP. These criteria are categorized as threshold, primary balancing, or

modifying. Table 2-4 gives an explanation of the evaluation criteria. A detailed analysis was performed on the alternatives using the nine evaluation criteria to select a site remedy, and Table 2-5 presents this comparison.

2.9 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and U.S. EPA, FDEP, and public comments, a remedy was selected to address the contaminants in the soil, sediment, and groundwater at OU 2, Site 5.

For source area soils, RA-2: Excavation and On-Site Biological Treatment of Contaminated Soil was selected in the IROD (ABB-ES, 1994b). For sediment, SD-2, Excavation and Biological Treatment, was selected in the ROD (ABB-ES, 1995d). The ROD also selected two groundwater technologies: Alternative GW-3, Air Sparging, and GW-6, In-Situ Stripping/Biological Treatment. The most promising of the two technologies was to be implemented after evaluation.

As discussed in Section 2.2, certain site conditions have changed since the publication of the IROD and ROD.

- The concentrations of VOCs, SVOCs, pesticides, and metals in Site 5 groundwater have diminished since the RI and air sparging pilot test. Of the original COCs, three VOCs, one SVOC, two pesticides, and five metals have been reduced to below clean-up criteria.

- During the four rounds of quarterly groundwater sampling in 1998 through 1999, analytical parameters were collected to monitor for biological activity. These data indicate that naturally occurring biological processes are degrading VOCs in the groundwater.

- VOCs, SVOCs, pesticides, and inorganics are not migrating outside the boundaries of Site 5 at concentrations that exceed groundwater clean-up criteria nor are they discharging into the surface water drainage ditch located south of the former disposal pit at unacceptable concentrations.

- The naturally occurring biodegradation processes, which have already been observed in the groundwater at the site and which are part of Alternative GW-2, are well suited for the removal of low concentrations of VOCs.

- Soil and sediment that would pose a threat to human health or the environment have been either biologically treated or during a removal action disposed off site.

TABLE 2-4

EXPLANATION OF REMEDIAL ALTERNATIVE EVALUATION CRITERIA
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Criteria	Description
Threshold	**Overall Protection of Human Health and the Environment.** This criterion evaluates the degree to which each alternative eliminates, reduces, or controls threats to human health and the environment through treatment, engineering methods, or institutional controls (e.g., access restrictions). **Compliance with State and Federal Regulations.** The alternatives are evaluated for compliance with environmental protection regulations determined to be applicable or relevant and appropriate to the site conditions.
Primary Balancing	**Long-Term Effectiveness.** The alternatives are evaluated based on their ability to maintain reliable protection of human health and the environment after implementation. **Reduction of Contaminant Toxicity, Mobility, and Volume through Treatment.** Each alternative is evaluated based on how it reduces the harmful nature of the contaminants, their ability to move through the environment, and the amount of contamination. **Short-Term Effectiveness.** The risks that implementation of a particular remedy may pose to workers and nearby residents (e.g., whether or not contaminated dust will be produced during excavation), as well as the reduction in risks that results by controlling the contaminants, are assessed. The length of time needed to implement each alternative is also considered. **Implementability.** Both the technical feasibility and administrative ease (e.g., the amount of coordination with other government agencies needed) of a remedy, including availability of necessary goods and services, are assessed. **Cost.** The benefits of implementing a particular alternative are weighted against the cost of implementation.
Modifying	**U.S. EPA and FDEP Acceptance.** The final feasibility study and the Proposed Plan, which are placed in the Information Repository, represent a consensus by the Navy, U.S. EPA, and FDEP. **Community Acceptance.** The Navy assesses community acceptance of the preferred alternative by giving the public an opportunity to comment on the remedy selection process and the preferred alternative and then responds to those comments.

TABLE 2-5

SUMMARY OF COMPARATIVE EVALUATION OF ALTERNATIVES
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Alternatives	Threshold Criteria		Primary Balancing Criteria				
	Overall Protection of Human Health & the Environment	**Compliance with ARARs and TBCs**	**Long-Term Effectiveness**	**Reduction in Contaminant Toxicity, Mobility, and Volume**	**Short-Term Effectiveness**	**Implementability**	**Cost[(1)] (Present Worth)**
Soil/Source Area							
RA-1: Excavation and Off-Site Thermal Treatment of Contaminated Soil	Would protect human health and environment by decreasing the risk of contaminant exposure.	Would not comply with ARARs.	Would be effective in long term.	Would achieve significant and permanent reduction in toxicity, mobility, and volume of TRPH contaminants in soil.	Minimal short-term risks.	Contractors, equipment, and laboratories are available.	$4,960,000
RA-2: Excavation and On-Site Biological Treatment of Contaminated Soil	Did not protect human health and environment by decreasing the risk of contaminant exposure.	Would not comply with ARARs.	Not effective in long term.	Did not achieve significant and permanent reduction in toxicity, mobility, and volume of TRPH contaminants in soil.	Minimal short-term risks.	Inclement weather caused problems during implementation.	Implementability issues increased costs from those estimated in the FS.
RA-3: Biological Treatment of Contaminated Soil without Excavation	Would protect human health and environment by decreasing the risk of contaminant exposure.	Would comply with ARARs.	Would be effective in long term.	Would achieve significant and permanent reduction in toxicity, mobility, and volume of TRPH contaminants in soil.	Minimal short-term risks.	Contractors, equipment, and laboratories are available.	$1,256,000
RA-4: Excavation and Off-Site Disposal of Contaminated Soil	Protects human health and environment by decreasing the risk of contaminant exposure.	Complies with ARARs.	Effective in long term.	Contaminants are contained and not treated.	Minimal short-term risks.	Completed in October 1998	$4,776,000
Sediment							
SD-1: No Action	Would not protect human health and environment.	Would not comply with ARARs.	Would not be effective in long-term.	Would not reduce contaminant mobility. Natural reduction in toxicity and volume would not be monitored and would be unknown.	No short-term risks.	No action to implement.	$0

TABLE 2-5

SUMMARY OF COMPARATIVE EVALUATION OF ALTERNATIVES
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Alternatives	Threshold Criteria		Primary Balancing Criteria				
	Overall Protection of Human Health & the Environment	**Compliance with ARARs and TBCs**	**Long-Term Effectiveness**	**Reduction in Contaminant Toxicity, Mobility, and Volume**	**Short-Term Effectiveness**	**Implementability**	**Cost[1] (Present Worth)**
SD-2: Excavation and Onsite Biological Treatment	Did not protect human health and environment by reducing the risk of direct contact or ingestion of the contaminants.	Would not comply with ARARs.	Not effective in long term.	Did not reduce toxicity, mobility, and volume of TRPH contaminants.	Minimal and manageable short-term risks.	Inclement weather caused problems during implementation.	Implementability issues increased costs from those estimated in the FS.
SD-3: Excavation and Offsite Disposal	Would protect human health and environment by reducing the risk of direct contact or ingestion of the contaminants.	Complies with ARARs	Effective in long term.	Contaminants are contained and not treated.	Minimal short-term risks.	Completed in October 1998.	$327,000
Groundwater							
GW-1: No Action	Would not protect human health.	Would not comply with ARARs.	Would not be effective long-termed.	Would not reduce contaminant mobility.	[2]	No action to implement.	$0
GW-2: Natural Attenuation	Would protect human health by preventing exposure to contaminated groundwater.	Would not comply ARARs.	Would be effective in long term.	Would not reduce containminant toxicity and volume but not mobility.	No short-term risks. Would require approximately 10 years to complete.	Would be easy to implement.	$232,000[3]
GW-3: Air Sparging	Would protect human health by preventing exposure to contaminated groundwater.	Would comply with ARARs	Would be effective in long term.	Would reduce contaminant mobility, toxicity, and volume through treatment.	No short-term risks. Would require approximately 4 years to complete.	Materials are readily available.	$1,633,000

TABLE 2-5

SUMMARY OF COMPARATIVE EVALUATION OF ALTERNATIVES
AMENDED RECORD OF DECISION
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Alternatives	Threshold Criteria		Primary Balancing Criteria				
	Overall Protection of Human Health & the Environment	**Compliance with ARARs and TBCs**	**Long-Term Effectiveness**	**Reduction in Contaminant Toxicity, Mobility, and Volume**	**Short-Term Effectiveness**	**Implementability**	**Cost[(1)] (Present Worth)**
GW-4: Air Stripping and Carbon Adsorption	Would protect human health by preventing exposure to contaminated groundwater.	Would comply with ARARs.	Would be effective in long term.	Would reduce contaminant mobility, toxicity, and volume through treatment.	No short-term risks. Would require approximately 6 years to complete.	Materials are readily available.	$3,015,000
GW-5: UV/OX	Would protect human health by preventing exposure to contaminated groundwater.	Would comply with ARARs.	Would be effective in long term.	Groundwater contaminants would be destroyed by UV/OX.	No short-term risks. Would require approximately 6 years to complete.	Materials are readily available.	$2,879,000
GW-6: In-Situ Stripping and Biological Treatment	Would protect human health by preventing exposure to contaminated groundwater.	Would comply with ARARs.	Would be effective in long term.	Would reduce contaminant mobility, toxicity, and volume through treatment.	No short-term risks. Would require approximately 4 years to complete.	Materials are readily available.	$1,632,000

1 Costs as reflected in the focused FS (ABB-ES, 1994a) or FS (ABB-ES, 1995b) unless otherwise noted.
2 Mechanism would not be in place to determine whether the alternative would comply with ARARs or achieve the RAO for groundwater
3 Natural attenuation costs have been revised based on new data.

These factors led to the selection of a different remedy, as documented by this amended ROD. This amended remedy is described as follows.

Natural Attenuation of Groundwater – Within the area of contaminated groundwater, naturally occurring processes such as biological degradation, dispersion, and adsorption will be relied upon to reduce contaminant concentrations to clean-up levels.

Long-Term Monitoring – Groundwater will be sampled and analyzed in accordance with the groundwater monitoring plan to monitor the decrease in contaminant concentrations and to determine whether biological activity is contributing to the reduction of groundwater contaminants. Groundwater wells will be sampled within the area of impacted groundwater and downgradient of groundwater flow to ensure groundwater does not move off site with concentrations of chemicals greater than groundwater clean-up levels. Sampling and analysis of groundwater just below the drainage ditch will be performed to ensure that chemicals are not discharging into the drainage ditch at concentrations greater than surface water clean-up levels. Yearly, recommendations will be made regarding the sampling and analysis program.

Implementation of Institutional Controls – For as long as land use restrictions are necessary to protect human health and the environment, deed restrictions will restrict the type of development and reuse for the area, upon deed transfer of the property that encompasses Site 5. Types of reuse allowed will include industrial, commercial, and recreational. Residential (including housing, daycare, and schools) is allowed only if subsurface soils are not exposed. Agricultural uses are prohibited.

The use of groundwater for all purposes is prohibited (including drinking, irrigation, watering livestock, and recreational). The installation of new wells for any purpose other than groundwater remediation and/or accessing groundwater quality is prohibited. The agency administering the well installation program in Duval County will be provided with a written notification advising them of established groundwater use prohibition at the site. The disturbance of existing groundwater remediation systems, including monitoring wells, is prohibited. All groundwater restrictions shall remain in place until such time when groundwater cleanup goals are met and groundwater use restrictions have been removed.

Excavation, drilling, or other disturbance of soils in a manner that may jeopardize the integrity or function of active remediation or monitoring systems at the site is prohibited. Subsurface soil concentrations may exceed both residential and industrial cleanup levels; therefore, any activities that may expose contaminated subsurface soils in the vicinity of the site are prohibited until such time when soil cleanup goals for residential or industrial use, as appropriate, are met. Surface soil concentrations do not exceed residential or industrial cleanup levels; therefore, no restrictions on the use of surface soils are required.

Five-year Reviews – Prior to reaching subsurface and groundwater remediation goals, inspections to ensure the institutional controls are in place and operating will be conducted and reported at a frequency concurrent with the operation and/or monitoring requirements of the remedial system. In accordance with CERCLA, since the institutional controls are part of the remedy, the Navy will verify that institutional controls at Site 5 are in place and effective while contamination remains, at a frequency of not less than every 5 years.

The length of time institutional controls is needed at Site 5 is directly related to the time needed to remediate the groundwater and subsurface soils. When confirmatory sampling has demonstrated monitoring is no longer required and cleanup goals are met, institutional controls can be removed through the CERCLA site close-out process. Appropriate federal, state, and local agencies will be notified when institutional controls are removed.

Contingency Groundwater Remedy – If it is determined that natural attenuation no longer adequately protects human health and the environment, additional active remedial measures will be evaluated and implemented. In-situ air sparging and enhanced biological treatment are two potential alternative remedial measures.

Soil and Sediment – 2,600 cubic yards of contaminated soil and sediment were disposed off site as part of a soil removal action. Soil treated under the 1994 IROD contained chemicals at concentrations not harmful to human health or the environment and was subsequently used as soil backfill at Site 5 as well as at other sites throughout NAS Cecil Field.

2.10 STATUTORY DETERMINATIONS

The amended remedy selected for OU 2, Site 5 is consistent with the NCP and satisfies CERCLA § 121. The selected amended remedy provides protection of human health and the environment, attains ARARs, and is cost effective. Table 2-6 lists and describes federal and state ARARs to which the selected amended remedy must comply. The selected amended remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The selected amended remedy also provides flexibility to implement additional remedial measures, if necessary, to address RAOs or unforeseen issues.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES

The remedy presented in the IROD for source area soils consisted of excavation and on-site biological treatment of contaminated soil. The remedy presented in the ROD consisted of excavation and biological

TABLE 2-6

SYNOPSIS OF FEDERAL AND STATE REGULATORY REQUIREMENTS
AMENDED RECORD OF DECISION
OPERABLE UNIT 2 SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Resource Conservation and Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes (40 CFR Part 261)	Defines the listed and characteristic hazardous wastes subject to RCRA. Appendix II contains the Toxicity Characteristic Leaching Procedure.	These regulations would apply when determining whether or not a waste is hazardous, either by being listed or exhibiting a hazardous characteristic, as described in the regulations.	Chemical-Specific Action-Specific
Endangered Species Act Regulations (50 CFR Parts 81, 225, 402)	Requires federal agencies to take action to avoid jeopardizing the continued existence of federally listed endangered or threatened species.	If a site investigation or remedial activity potentially could affect endangered species or their habitat, these regulations would apply.	Location-Specific
RCRA Regulations, Land Disposal Restrictions (40 CFR Part 268)	Prohibit the land disposal of untreated hazardous wastes and provides standards for treatment of hazardous waste prior to land disposal.	Remedial actions that involve excavating hazardous soil, treating, and redepositing it require compliance with land disposal restriction (LDRs).	Action-Specific
Florida Hazardous Waste Rules (FAC, 62-730)	Adopts by reference sections of the federal hazardous waste regulations and establishes minor additions to these regulations concerning the generation, storage, treatment, transportation and disposal of hazardous wastes.	These regulations would apply if waste is deemed hazardous and needed be stored, transported, or disposed.	Action-Specific
Safe Drinking Water Act (SDWA) Regulations, Maximum Contaminant Levels (40 CFR Part 131)	Establishes enforceable standards for potable water for specific contaminants that have been determined to adversely affect human health.	MCLs can be used as protection for groundwaters or surface waters that are current or potential drinking water sources.	Chemical-Specific

TABLE 2-6

SYNOPSIS OF FEDERAL AND STATE REGULATORY REQUIREMENTS
AMENDED RECORD OF DECISION
OPERABLE UNIT 2 SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Name and Regulatory Citation	Description	Consideration in the Remedial Action Process	Type
Florida Groundwater Classes, Standards and Exemptions (FAC, 62-520)	Designates the groundwaters of the state into five classes and establishes minimum " free from" criteria. Rule also specifies that Classes I & II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	These regulations may be used to determine cleanup levels for groundwaters that are potential sources of drinking water.	Chemical-Specific
Florida Brownsfields Criteria Rules, 1998	Provide guidance for soil and groundwater cleanup levels that can be developed on a site-by-site basis using the calculations found in Appendix B of the guidance.	These guidelines aid in determining leachability-based cleanup goals for soils and for groundwater	Chemical-Specific Guidance
Florida Drinking Water Standards (FAC, 62-550)	Adopts federal primary and secondary drinking water standards.	These regulation apply to remedial activities that involve discharges to potential sources of drinking water.	Chemical-Specific
Florida Groundwater Guidance, Bureau of Groundwater Protection, June 1994.	Provides maximum concentration levels of contaminants for groundwater in the State of Florida. Groundwater with concentrations less than the listed values are considered " free from" contamination.	The values in this guidance should be considered when determining cleanup levels for groundwater.	Chemical-Specific Guidance
Contaminant Cleanup Target Levels (FAC, 62-777)	Provides target cleanup levels for soil, groundwater, and surface water.	These target cleanup levels would be used in determining cleanup goals.	Chemical-Specific

Notes: OU = Operable Unit.
CFR = Code of Federal Regulations.
LDR = land disposal restriction.
FAC = Florida Administrative Code.
MCL = maximum contaminant level.

treatment of sediment. Furthermore, the ROD selected two groundwater technologies: air sparging and in-situ stripping/biological treatment. The two technologies were to be evaluated and the most promising technology was to be implemented for treatment of groundwater.

As discussed at the end of Section 2.2 and in Section 2.9, certain site conditions have changed and information has become available since the publication of the IROD and ROD. These changes are summarized as follows.

- The concentrations of site COCs in Site 5 groundwater have diminished since 1993. Analytical data indicate that naturally occurring biological processes are degrading VOCs in the groundwater.

- Groundwater COCs are not migrating outside the boundaries of Site 5 at unacceptable concentrations.

- The naturally occurring biodegradation processes, which have already been observed in the groundwater at the site, are well suited for the removal of low concentrations of VOCs.

- The original soil cleanup goals were based on 1993 soil cleanup goals for TRPH that had been established for thermally treated soils. The state cleanup goals for TRPH have been changed and are now based on risk. Therefore, the site-specific cleanup goals were re-evaluated, and 340 mg/kg for surface soils and 10,000 mg/kg for subsurface soils were found to be protective.

- In the original remedy, soil and sediment were to be treated using an on-site biological treatment facility. However, during operation of the treatment facility, it was determined that there was a potential for contaminants to migrate to clean areas, possibly exposing nearby populations and wetlands. Consequently, other alternatives for soil and sediment were evaluated and implemented in 1998 as documented in the Action Memorandum for Soil and Sediment Removal for OU 2, Site 5 (ABB-ES, 1998). Soil and sediment that would pose a threat to human health or the environment have been either biologically treated or, during a removal action, disposed off site.

- The removal of contaminated soils has greatly reduced the migration of contaminants from soil to groundwater.

A Revised Proposed Plan (TtNUS, 1999a) was released for public comments on September 7, 1999. This Revised Proposed Plan identified the use of monitored natural attenuation as the preferred remedy for groundwater. Naturally occurring processes such as biological degradation, dispersion, and adsorption will be relied upon to reduce contaminant concentrations to clean-up levels. The preferred groundwater

remedy also includes the application of institutional controls to limit groundwater use until clean-up goals have been reached. Additionally, the Revised Proposed Plan indicated that soil and sediment that would pose a threat to human health or the environment has been either biologically treated or disposed off site.

The public was invited to comment upon the Revised Proposed Plan from September 7 to October 6, 1999. No comments were received during the public comment period.

REFERENCES

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ABB-ES, 1994b. Interim Record of Decision, Operable Unit 2, Site 5, NAS Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (September).

ABB-ES, 1995a. Remedial Investigation, Operable Unit 2, Sites 5 and 17, NAS Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (May).

ABB-ES, 1995b. Feasibility Study, Operable Unit 2, NAS Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina (July).

ABB-ES, 1995c. Proposed Plan, Operable Unit 2, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHDIVNAVFACENGCOM, North Charleston, South Carolina (July).

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APPENDIX A

RESPONSIVENESS SUMMARY

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Public notice of the availability of the Revised Proposed Plan was placed in the Metro edition of the *Florida-Times Union* on September 7, 1999. This local edition targets the communities closest to NAS Cecil Field. A 30-day public comment period was held from September 7 to October 6, 1999. Provisions for the public to request a public meeting to discuss the Revised Proposed Plan were also described in the public notice. No comments were received during the 30-day comment period.