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FINAL RECORD OF DECISION FOR OPERABLE UNIT 9 (OU 9) SITE 57 AND SITE 58 NAS CECIL FIELD FL

9/1/2005

TETRA TECH NUS INC

Comprehensive **L**ong-term **E**nvironmental **A**ction **N**avy

CONTRACT NUMBER N62467-94-D-0888

Record Of Decision
Operable Unit 9, Sites 57 and 58

Naval Air Station Cecil Field
Jacksonville, Florida

Contract Task Order 0078

September 2005

Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

RECORD OF DECISION
FOR
OPERABLE UNIT 9, SITES 57 AND 58

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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This document that describes the Record of Decision for Operable Unit 9, Sites 57 and 58, at Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ARAR	Applicable or relevant and appropriate requirement
AS	Air sparging
AST	Aboveground storage tank
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	Cubic foot (or feet) per minute
CFR	Code of Federal Regulations
COC	Chemical of concern
CSF	Cancer Slope Factor
DCA	Dichloroethane
DCE	Dichloroethene
DPT	Direct-push technology
DO	Dissolved oxygen
EBS	Environmental Baseline Survey
EE	Envirodyne Engineers
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facility Agreement
FS	Feasibility Study
ft^2	Square foot/feet
GAC	Granular activated carbon
GCTL	Groundwater Cleanup Target Level
G&M	Geraghty & Miller
gpm	Gallon(s) per minute
HLA	Harding Lawson Associates
HQ	Hazard Quotient
HRC	Hydrogen release compound
HSWA	Hazardous and Solid Waste Amendments
i	Hydraulic gradient

IBDS	Inorganic Background Data Set
ICR	Incremental cancer risk
IR	Installation Restoration
K_h	Horizontal hydraulic conductivity
KAG	Kerosene Analytical Group
LUC	Land use control
MCL	Maximum Contaminant Level
µg/L	Microgram(s) per liter
n_e	Effective porosity
NAS	Naval Air Station
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPW	Net present worth
O&M	Operation and maintenance
ORC	Oxygen release compound
ORP	Oxidation/reduction potential
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PRE	Preliminary Risk Evaluation
PRG	Preliminary Remedial Goal
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RfD	Reference dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SAOR	Sampling and Analysis Outline and Report
SAR	Sampling and Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SCTL	Soil Cleanup Target Level
SDWA	Safe Drinking Water Act

SMCL	Secondary MCL
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
SPECAP	Specific capacity
SVOC	Semivolatile organic compound
TBC	To be considered
TCA	Trichloroethane
TCE	Trichloroethene
TOC	Total organic carbon
TRPH	Total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
USCS	United Soil Classification System
U.S. EPA	United States Environmental Protection Agency
UST	Underground storage tank
V_h	Horizontal hydraulic velocity
VOC	Volatile organic compound

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Operable Unit (OU) 9, Sites 57 and 58 consists of the contaminated groundwater identified at Sites 57 and 58 at Naval Air Station (NAS) Cecil Field, Jacksonville, Florida [United States Environmental Protection Agency (U.S. EPA) ID FL5 170 022 474]. Sites 57 and 58 are located in the central portion of the Main Base. Contaminated soil at Site 58 is being addressed separately.

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial action for contaminated groundwater at OU 9, Sites 57 and 58, NAS Cecil Field. Site 58 contaminated soil is being addressed under the Petroleum Program. The Sites 57 and 58 remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations (CFR) §300]. This decision document was prepared in accordance with U.S. EPA decision document guidance (U.S. EPA, 1999). This decision is based on the Administrative Record for the site. The United States Department of the Navy (Navy) and U.S. EPA Region IV issue this ROD (jointly). The Florida Department of Environmental Protection (FDEP) concurs with the selected remedy.

1.3 ASSESSMENT OF THE SITES

The response action selected in this ROD is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances into the environment or of pollutants or contaminants from this site that may present an imminent and substantial endangerment to public health or welfare.

1.4 DESCRIPTION OF THE SELECTED REMEDY

OU 9, Sites 57 and 58 are a part of a comprehensive environmental investigation and cleanup currently being performed at NAS Cecil Field under the CERCLA program. This ROD addresses only the groundwater at OU 9, Sites 57 and 58. The selected remedy eliminates unacceptable exposure to chlorinated volatile organic compounds (VOCs), benzene, toluene, ethylbenzene and xylenes (BTEX), polynuclear aromatic hydrocarbons (PAHs), and total recoverable petroleum hydrocarbons (TRPH) in groundwater. The selected remedy for OU 9, Sites 57 and 58 groundwater includes monitored natural attenuation and land use controls (LUCs) that will restrict extraction and prohibit consumption of

groundwater from taking place at this location. The selected remedy was determined based on evaluation of the site conditions, site-related risks, anticipated future land use, applicable or relevant and appropriate requirements (ARARs), and Remedial Action Objectives (RAOs).

The major components of the selected remedy are as follows:

- LUCs, in the form of deed restrictions, will be implemented to restrict the use of the groundwater from the surficial aquifer until the cleanup goals have been met.

- Long-term monitoring of groundwater to verify that no unacceptable contaminant migration is occurring and to evaluate reduction in contaminant concentrations through naturally occurring processes such as biodegradation, dispersion, and dilution will be performed.

The Navy shall prepare in accordance with U.S. EPA Guidance and submit to the U.S. EPA and FDEP for review and comment a LUC Remedial Design (RD) as well as all other post-ROD documents as specified in the Federal Facility Agreement (FFA) for the former NAS Cecil Field dated October 23, 1990 and further described in the 2003 Navy Principles.

1.5 STATUTORY DETERMINATIONS

The selected 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 remedial action. The nature of the selected remedy for OU 9, Sites 57 and 58 is such that ARARs for groundwater will eventually be met through monitored natural attenuation. The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at these sites. Of those alternatives that are protective of human health and the environment and comply with ARARs, the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment. Although the selected remedy does not provide for treatment as a principal element, reduction of groundwater contaminant concentrations is expected over time due to dispersion, advection, and adsorption processes. Because this remedy would result in groundwater with contaminant concentrations greater than health-based levels remaining on site, CERCLA Five-Year Reviews will be conducted to verify that the cleanup goals and RAOs are being achieved.

1.6 DATA CERTIFICATION CHECKLIST

The information required to be included in the ROD is summarized on Table 1-1. These data are presented in Section 2.0: Decision Summary of this ROD. Additional information, if required, can be found in the Administrative Record for OU 9, Sites 57 and 58.

1.7 SIGNATURES AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

3/15/05

Joe McCauley, PE
Director
Environmental Services
NAVFAC EFD SOUTH

Date

for

9/14/05

Winston A. Smith
Director
Waste Management Division
U.S. EPA Region 4

Date

TABLE 1-1

DATA CERTIFICATION CHECKLIST
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Information	ROD Reference
Chemicals of Concern (COCs) and their concentrations	Section 2.5.2, pages 2-11 and 2-12; Tables 2-1 & 2-3 Figures 2-4 through 2-9
Baseline risk represented by the COCs	Section 2.6, page 2-13
Cleanup Goals established for the COCs	Section 2.7, pages 2-14 & 2-15
Disposition of source materials constituting principal threat	Section 2.2.2.1, 1st bullet, pages 2-3 & 2-4; Section 2.5.2.1 last paragraph, page 2-12
Current and reasonably anticipated future land and groundwater use scenarios used for risk assessment	Section 2.5.3, page 2-12
Potential land and groundwater uses available at the sites as a result of the selected remedy	Section 2.10.4, pages 2-21 & 2-22
Estimated capital, operating and maintenance (O&M), and net present worth (NPW) costs of selected remedy. Discount rate used and timeframe over which these costs are projected	Section 2.10.3, page 2-21; Appendix B
Key factors which lead to the selection of the remedy	Section 2.10.1, page 2-19

2.0 DECISION SUMMARY

2.1 SITE NAMES, LOCATIONS, AND DESCRIPTIONS

OU 9, Sites 57 and 58 are located within the boundaries of the former NAS Cecil Field (U.S. EPA ID No. FL5 170 022 474), which is located 14 miles southwest of Jacksonville, Florida, as shown on Figure 2-1. The majority of Cecil Field is located within Duval County and 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. Since the closure of NAS Cecil Field in September 1999, most of the Facility has been transferred to the Jacksonville Port Authority (now Jacksonville Airport Authority) and the City of Jacksonville. According to the reuse plan, the Facility will have multiple uses but will be used primarily for aviation-related activities.

OU 9 consists of the contaminated groundwater identified at Sites 57 and 58. The contaminated soil identified at Site 58 is being cleaned up under Chapter 62-770, Florida Administrative Code (FAC), Florida Petroleum Contamination Criteria rule and is not discussed in this ROD. As shown on Figure 2-1, Sites 57 and 58 are located in the central portion of the Main Base, west of the north-south runway.

2.1.1 Site 57

As shown on Figure 2-2, Site 57 includes Buildings 293, 817, 824, 824A, 824ALS, 825, 825LS, 841, 846, 852, 870, and 1848, and the adjacent land areas. These buildings were used for aircraft maintenance and/or aircraft and aircraft parts storage. Also located at Site 57 is the Day Tank 1 area. Day Tank 1 was a 200,000-gallon jet fuel aboveground storage tank (AST) that was removed in 1999 along with 24,000 tons of petroleum-contaminated soil. Following this removal action, a biosparge and vapor collection system was installed and started in 2000 and groundwater contamination was monitored for progress of biosparging and natural attenuation. Although the Day Tank 1 area is physically located within Site 57, the soil in this area is currently being investigated and remediated as part of the Petroleum Program and is thus not covered by this ROD.

2.1.2 Site 58

As shown on Figure 2-3, Site 58 includes Buildings 312 and 312LS and the adjacent land areas. Building 312 was a corrosion control facility that housed two paint booths and administrative offices. Structures associated with Building 312 included a hydraulic lift, an aircraft wash rack, an oil/water separator, and a waste oil underground storage tank (UST), all of which have been removed. Building 312LS is a sanitary sewer lift station that serves Building 312 and used to serve the adjacent wash rack.

2.2 SITE HISTORIES 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 and 1985 [Geraghty and Miller (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].

NAS Cecil Field was placed on the National Priorities List (NPL) by the U.S. EPA in December 1989. A Federal Facility Agreement (FFA) for NAS Cecil Field was signed by the FDEP, U.S. EPA, and the Navy 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 9 is one of twelve OUs that have been identified. A Hazardous and Solid Waste Amendments (HSWA) permit was issued on October 13, 1996. The HSWA permit was renewed on August 25, 2000 and is still in effect.

2.2.1 Sites 57 and 58 Histories

2.2.1.1 Site 57

Building 824, built in 1957, and Building 824A, annexed in 1988, were used as an electronics maintenance and support facility for jet aircraft. The buildings were used for testing and repair of electrical equipment including activities such as welding, painting, sandblasting, hydraulics repair, corrosion control, and parts cleaning. Floor drains in various areas of the building reportedly discharged to the sanitary sewer system. Wastewater from parts cleaning activities outside the building reportedly drained into the storm sewer system. Building 293, the Day Tank 1 administrative office building, was constructed in 1955.

Building 817, constructed in 1971, housed diesel-powered generators for use at Building 825, an aircraft hangar, if Main Base power was unavailable. Buildings 824ALS and 825LS are sanitary sewer lift stations that received discharges for over 20 years from Building 824/824A and outside aircraft wash racks, respectively. Building 825 was built in 1966 and was used as an aircraft storage and maintenance area and also as a hazardous waste satellite accumulation point. Building 841, constructed in 1993, was a flammable materials locker used for the storage of hazardous materials and petroleum products. The locker was located on a raised grassy area next to the paved aircraft wash rack between Buildings 824 and 825. Wash water from the rack discharged to storm drains in the pavement and eventually to storm sewers.

Building 846, the ground support equipment storage facility, was constructed in 1974 and was used to temporarily store equipment and materials until they were transferred to Building 1846. Hazardous materials reportedly stored at this facility included hydraulic fluid, jet fuel, compressed gas, epoxy resin, and petroleum naphtha. Buildings 852 and 870, constructed in 1988 and 1980, respectively, were used as hazardous materials storage lockers. Materials stored in these lockers may have included paint, floor adhesive, epoxy resin, polyamide epoxy, aliphatic naphtha, paint thinner, polyurethane coating, hydraulic fluid, and insulating oil. Building 1848 was built in 1985 and was used to store ground support equipment before it was issued for use on the runway [ABB Environmental Services, Inc. (ABB-ES), 1994].

The Day Tank 1 site is the former location of a 200,000-gallon AST that received jet fuel from the North Fuel Farm and supplied it to high-speed refuelers along the flightline. A retention pond north of the tank received wastewater and drained to the storm sewer system. Numerous spills were reported over the course of site operations.

2.2.1.2 Site 58

Building 312, a corrosion control hangar, was built in 1957 and previously housed administrative offices and two paint booths. Activities conducted in this building included sanding, priming, and corrosion control for jet aircraft and equipment. Associated structures included an abandoned hydraulic lift, an aircraft wash rack, an oil-water separator, and a waste oil UST. Wastewater from the wash rack appears to have discharged to the storm sewer and sanitary sewer systems. Building 312LS, a sanitary sewer lift station built in 1957, served Building 312 and the wash rack. A small unnumbered building to the northeast of Building 312 was used as a hazardous waste satellite accumulation point (ABB-ES, 1994).

2.2.2 Site Investigations

Several environmental investigations were performed at Sites 57 and 58 starting with an Environmental Baseline Survey (EBS) (ABB-ES, 1994) through a Remedial Investigation (RI) [Tetra Tech NUS, Inc. (TtNUS), 2002a], a Feasibility Study (FS) (TtNUS, 2002b), and a Proposed Plan (TtNUS, 2003). These investigations showed that the Site 58 soil is contaminated with PAHs. These investigations also showed that groundwater at Site 57 and 58 is contaminated with VOCs, PAHs, and TRPH.

2.2.2.1 Site 57

The following investigations and studies have been conducted in and around Site 57:

- A contamination assessment conducted in 1996 documented soil and groundwater contamination at the site, and a Remedial Action Plan (RAP) was subsequently developed for the excavation of

20,000 tons of soil and installation of a biosparging/vapor collection groundwater remediation system (ABB-ES, 1997). In November 1999, the AST and approximately 24,000 tons of petroleum-contaminated soil were removed. Startup of the biosparge/vapor collection system was on February 29, 2000.

- As part of the Sampling and Analysis Outline and Report (SAOR) at Main Base Area 18 (MB-18), trichloroethene (TCE) and 1,1-dichloroethane (DCA) were detected in a direct-push technology (DPT) groundwater sample (85Q01301) collected from 13 feet below ground surface (bgs) in a temporary well located southeast of Building 824A (HLA, 1999). The concentration of TCE detected was greater than the FDEP Groundwater Cleanup Target Level (GCTL). A permanent monitoring well, CEF-824A-01Sa, was installed at this location, and analytical results from the sample identified as 85G01801 showed naphthalene and 2-methylnaphthalene at concentrations in excess of their GCTLs, and 1,1-DCA at a concentration less than its GCTL. TCE was not detected in this sample. This permanent well was re-sampled in May 2000, and analytical data indicated TCE and 2-methylnaphthalene at concentrations in excess of their GCTLs and naphthalene at a concentration less than its GCTL (TtNUS, 2000b).

- Because of the proximity of existing wells installed and sampled as part of the Day Tank 1 investigation to the 824A wells and because of the presence of common groundwater contaminants (petroleum-related and chlorinated), it was decided that a more comprehensive evaluation of groundwater in the area was necessary. Four additional shallow monitoring wells (CEF-824A-02S through CEF-824A-05S) were installed to delineate groundwater contamination detected during the previous sampling and were sampled along with CEF-824A-01Sa in July 2000. In September 2000, an intermediate well (CEF-824A-06I) was installed at the CEF-824A-01Sa location, and a shallow well (CEF-824A-07S) was installed downgradient (southeast) of CEF-824A-01Sa to the north of the storm sewer running east-west through the area (TtNUS, 2000b). The intermediate well was installed to investigate potential vertical migration of contamination, and CEF-824A-07S was installed to investigate potential impacts of the storm sewer on contaminant migration. These wells, along with six wells from the Day Tank 1 monitoring program (CEF-293-10, -11, -19, -20, -21, and -22) and CEF-825LS-1S, were sampled in January 2001. In addition, a round of synoptic water level measurements was obtained to investigate groundwater flow conditions.

- A quarterly groundwater monitoring program is ongoing for the biosparging and soil vapor extraction system at Day Tank 1. This program includes sampling of wells CEF-293-4, -9, -13, -20, and -21, and eight vapor extraction wells (VEW-1 through VEW-8) and analysis for VOCs and semivolatile organic compounds (SVOCs). VEW-1 was not sampled during the quarterly events, and VEW-2 was not sampled during the third quarterly event due to the presence of free product in these wells.

VEW-1 has been bailed weekly since October 2000, and as of February 2001, approximately 10 gallons of free product had been recovered. The thickness of free product did not significantly decrease in VEW-1 during this time period. Free product was minimal in VEW-2 after June 2000, and no recovery has been conducted at this well (CH2MHill, 2001).

- A groundwater investigation was performed as part of the RI (TtNUS, 2002a). The objective of this investigation was to evaluate the nature and extent of groundwater contaminated with chlorinated VOCs and BTEX in the Building 824A/Day Tank 1 area. Ten new permanent wells, including five shallow, three intermediate, and two deep wells, were installed in the shallow surficial aquifer to delineate the horizontal and vertical extent of groundwater contamination. Shallow wells were installed to a depth of 15 feet bgs, intermediate wells were installed to 40 feet bgs, and deep wells were set at the bottom of the surficial sand unit. One round of groundwater level measurements and sampling were performed in September 2001 on the 10 new wells and 31 existing wells. Two of the new wells and four of the existing wells were re-sampled in December 2001. Samples were analyzed for VOCs, PAHs, and TRPH. In addition, samples collected from nine selected wells were analyzed for natural attenuation parameters.

- A free product investigation was performed as part of the RI. The objective of this investigation was to delineate the extent of the area of floating free product previously detected in well CEF-293-VEW-1. Thirteen temporary wells were installed to a depth of 15 feet bgs using DPT. Depth to groundwater and depth to free product were measured in these wells (TtNUS, 2002a).

- As part of the RI, one surface water sample was collected at the discharge of the storm sewer in the area of wells CEF-824A-03S and -07S to investigate the potential impact of infiltration of contaminated groundwater into the storm sewers. Specific capacity (SPECAP) tests were performed in one shallow and one intermediate well to determine the hydrogeological characteristics of the surficial aquifer in the Site 57 area. Also as part of the RI, a soil sample was collected from the 36 to 38 feet bgs interval in well CEF-824A-15I and analyzed for geotechnical characteristics (grain size, porosity, specific gravity, and bulk density).

- The results of site investigations were used to prepare an FS (TtNUS, 2002b). This FS identified chemicals of concern (COCs) and established cleanup goals. As part of the FS, remedial technologies were screened and remedial alternatives were assembled, analyzed, and compared.

- A Proposed Plan (TtNUS, 2003) was prepared based on the findings of the FS. This Proposed Plan identified a proposed remedy for the Site 57 groundwater and presented a rationale for the selection of this proposed remedy.

2.2.2.2 Site 58

The following investigations and studies have been conducted in and around Site 58:

- As part of field activities associated with the Sampling and Analysis Report (SAR) for Building 312, two groundwater samples, two sediment samples, and one subsurface soil sample were collected (ABB-ES, 1996). Sediment and subsurface soil samples were analyzed for SVOCs, pesticides, and inorganic compounds, and groundwater samples were analyzed for VOCs, SVOCs, and inorganic compounds. Groundwater samples were collected from wells CEF-312-01, located southeast of the wash rack catch basin, and CEF-312-02, located at the northeast corner of Building 312. Sediment samples were collected from a drainage swale south of Building 312 that received discharge from the wash rack. The subsurface soil sample was collected from 2 to 3 feet bgs at a location adjacent to the subsurface hydraulic lift cylinder housing. Naphthalene, aluminum, arsenic, iron, and manganese were detected in unfiltered groundwater samples at concentrations greater than screening criteria. Arsenic was detected in sediment in excess of screening criteria. No analytes were detected in subsurface soil in excess of screening criteria. Based on human health and ecological Preliminary Risk Evaluations (PREs) performed as part of the SAR investigation, it was concluded that concentrations of analytes in groundwater, sediment, and subsurface soil did not pose risks to human health or the environment.

- To investigate previous exccedances of groundwater criteria, monitoring well CEF-312-01 was resampled in 1999 for total and dissolved iron and manganese and naphthalene. Total and dissolved manganese concentrations were less than the FDEP GCTL and NAS Cecil Field Inorganic Background Data Set (IBDS) value (HLA, 1998). Total and dissolved iron concentrations were greater than their GCTL and IBDS values, and the naphthalene concentration was greater than its GCTL. Based on the SAR Addendum issued with these results, it was decided that the groundwater at the site would be evaluated under the Petroleum Program (TtNUS, 2000a).

- The Phase I Groundwater Assessment included the installation and sampling three shallow monitoring wells at the site. CEF-B312-1S was installed west of existing well CEF-312-01, and CEF-B312-02S and CEF-B312-03S were installed northeast and southeast, respectively, of CEF-312-01. Groundwater samples from these wells were analyzed for constituents of the FDEP Kerosene Analytical Group (KAG) including VOCs, PAHs, and lead. Naphthalene and TRPH concentrations exceeded their GCTLs in the three wells, and the vinyl chloride concentration detected in well CEF-B312-03S exceeded its GCTL.

- The Phase II Groundwater Assessment included installation of five additional shallow wells (CEF-B312-04S, -05S, -06S, -07S, and -08S) and one intermediate well (CEF-B312-01I). Groundwater samples were collected from CEF-312-01 and the nine new and existing Phase I and Phase II wells and analyzed for KAG parameters. Exceedances of GCTLs in Phase II sampling included:

  - CEF-312-01 – Naphthalene
  - CEF-B312-01S – 1-Methylnaphthalene, 2-methylnaphthalene, naphthalene, and TRPH
  - CEF-B312-02S – Naphthalene
  - CEF-B312-03S – Naphthalene, vinyl chloride, and 1,1-dichloroethene (DCE)
  - CEF-B312-06S – Naphthalene
  - CEF-B312-08S – 1,1-DCE, 1,1-DCA, naphthalene

  Based on the results of the Phase I and Phase II Groundwater Assessments, it was decided that groundwater in the Building 312 area would be addressed under the Installation Restoration (IR) program.

- A groundwater investigation was performed as part of the RI (TtNUS, 2002a). The objective of this investigation was to evaluate the nature and extent of groundwater contaminated with chlorinated compounds, naphthalene, and BTEX in the Building 312 area. A total of seven new permanent wells, including six shallow and one intermediate well, were installed to delineate the horizontal and vertical extent of groundwater contamination. Shallow wells were installed to approximately 15 feet bgs, and the intermediate well was installed to a depth of 40 feet bgs. One round of groundwater level measurements and sampling was performed in September 2001 on the 7 new and 11 existing wells. In December 2001, a second round of groundwater level measurements was performed, and one well (CEF-B312-08S) was re-sampled. Samples were analyzed for VOCs, PAHs, and TRPH. In addition, samples collected from five selected wells were analyzed for natural attenuation parameters. Three chlorinated VOCs [1,1,1-trichloroethane (TCA), 1,1-DCA, and 1,1-DCE] and xylenes were detected in well CEF-B312-08S at concentrations greater than the GCTLs in September 2001, but not in December 2001. Naphthalene and TRPH were detected at concentrations greater than GCTLs both in September and December 2001.

- As part of the RI, a SPECAP test was performed in one shallow well to determine the hydrogeological characteristics of the surficial aquifer in the Building 312 area. Three sediment samples were collected from the drainage ditch south of Building 312 to investigate potential migration of contaminants. These samples were analyzed for VOCs, PAHs, and TRPH. Also as part of the RI, a

soil sample was collected from the 6 to 8 feet bgs interval in well CEF-B312-10S and analyzed for geotechnical characteristics (grain size, porosity, specific gravity, and bulk density).

- The results of site investigations were used to prepare an FS (TtNUS, 2002b). This FS identified COCs and established cleanup goals. As part of the FS, remedial technologies were screened and remedial alternatives were assembled, analyzed, and compared.

- A Proposed Plan (TtNUS, 2003) was prepared based on the findings of the FS. This Proposed Plan identified a proposed remedy for the Site 58 groundwater and presented a rationale for the selection of this proposed remedy.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public notices of the availability of the Proposed Plan (TtNUS, 2003) were placed in the Metro section of the *Florida Times-Union* on July 14, 2003. A 30-day comment period was held from July 14 through August 13, 2003. The results of the RI (TtNUS, 2002a) and PRE, the remedial alternatives of the FS (TtNUS, 2002b), and the preferred alternatives of the Proposed Plan (TtNUS, 2003) were also presented and discussed at a Restoration Advisory Board (RAB) meeting held on October 15, 2002, during which comments were solicited from the community. Public comments and the responses to these comments are presented in the Responsiveness Summary that is provided in Appendix A.

Documents pertaining to OU 9, Sites 57 and 58 are available to the public at the Information Repository located at Building 907, 13357 Lake Newman Street, Cecil Commerce Center, Jacksonville, Florida 32252 [Telephone (904) 573-0336]. This ROD 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 24 sites in the IR Program has been organized into 12 OUs. More than 200 other areas have undergone or are undergoing evaluation in the BRAC and Petroleum Programs.

This ROD is the final action for OU 9, Sites 57 and 58 groundwater. Final RODs have been approved for OU 1 through OU 4; OU 5, Site 14; OU 6 through OU 8; OU 9, Sites 36 and 37, OU 11, Site 45, and OU12, Sites 42 and 44, and Old Golf Course. An RI, BRA, and FS have also been prepared for OU 5, Site 15, but the FS is currently being re-evaluated. RI and FS reports have been completed and Proposed Plans and RODs are being drafted for OU 10, Sites 21 and 25. An interim action has been completed for OU 12, Site 32, and decision documents will be forthcoming for this site.

Investigations at OU 9, Sites 57 and 58 indicated the presence of soil and groundwater contamination from past operating practices. Soil contamination is being addressed under the Petroleum Program. This contamination could pose an unacceptable human health risk if the groundwater was used as a potable water source at Sites 57 and 58.

The following RAOs were established for groundwater at OU 9, Sites 57 and 58:

- Prevent unacceptable risk from exposure to Site 57 groundwater with concentrations of chlorinated VOCs, BTEX, PAHs, and TRPH greater than the cleanup goals that are the federal Maximum Contaminant Levels (MCLs) and FDEP GCTLs.

- Prevent unacceptable risk from exposure to Site 58 groundwater with concentrations of naphthalene and TRPH greater than the cleanup goals that are the federal MCLs and FDEP GCTLs.

- Restore contaminated groundwater concentrations at Sites 57 and 58 to less than cleanup goals, which are the federal MCLs and FDEP GCTLs.

The remedy documented in this ROD will achieve these RAOs.

2.5 SUMMARY OF SITE CHARACTERISTICS

Contaminant sources, detected concentrations, fate and transport, contaminated media, and geologic and hydrogeologic conditions of OU 9, Sites 57 and 58 are discussed in Sections 4.0, 5.0, and 6.0 of the RI Report (TtNUS, 2002a). These site characteristics are summarized in the following paragraphs.

2.5.1 Geology and Hydrogeology

Soils at Site 57 and 58 and the surrounding areas are classified as Urban land as a result of disturbances to natural soils by construction activities. Urban land soils are areas that are 85 percent or more covered by streets, buildings, parking lots, and other man-made structures.

Surficial sediments encountered during drilling at both sites included fine to very fine sands with varying minor amounts of silt and clay. Sieve analyses indicated that the sample from the shallow screened interval (6 to 8 feet bgs) of Site 58 was composed of approximately 91 percent fine to very fine sand and approximately 9 percent silt and/or clay. The United Soil Classification System (USCS) soil classification for soil with this composition is well sorted to silty sand (SP/SM). The sample from the intermediate

screened interval (36 to 38 feet bgs) of Site 57 was composed of approximately 96 percent fine to very fine sand and 4 percent silt and/or clay and has a USCS classification of well sorted sand (SP).

Three main hydrogeologic units underlie the sites. These units, in ascending order, are the Floridan aquifer system, the intermediate aquifer system or confining unit, and the surficial aquifer.

Depth to groundwater at Site 57, as measured in September 2001, ranged from approximately 3 to 8 feet bgs. In December 2001, depth to groundwater ranged from 7 to 9 feet bgs at Site 57. At Site 58, depth to groundwater in September 2001 ranged from approximately 4 to 7 feet bgs. The surficial aquifer system in which the wells are installed is approximately 85 to 100 feet thick at NAS Cecil Field.

The calculated hydraulic conductivity values are 13.6 feet per day for the shallow well and 40.1 feet per day for the intermediate well at Site 57 and 14.1 feet per day for the shallow well at Site 58. These are similar to Sites 36 and 37 hydraulic conductivity values of 1 to 4 feet per day for the shallow zone and 25 to 36 feet per day in the intermediate zone.

The direction of groundwater flow at Site 57 is to the southeast, consistent with nearby sites such as Sites 36 and 37. The groundwater gradient changes across Site 57 from approximately 0.01 in the northwest (in the open area associated with the Day Tank 1 excavation) to 0.003 in the southeast (beneath the concrete apron). The average gradient across all of Site 57 is approximately 0.005, similar to the gradients measured at Sites 36 and 37 (0.001 to 0.007). At Site 58, groundwater flow appears to be influenced by the storm sewer system. Flow is to the southeast in the western portion of Site 58, but in the eastern portion of the site, groundwater appears to move to the west toward a portion of the storm sewer. The groundwater gradient at the site averages approximately 0.01.

The velocity of groundwater flow can be calculated from a modified form of Darcy's equation:

$$V_h = K_h \times i/n_e$$

Where

V_h is horizontal velocity, feet per day
K_h is horizontal hydraulic conductivity, feet/day
i is hydraulic gradient, dimensionless
n_e is effective porosity, dimensionless (assumed at 0.15 for fine sands)

For Site 57, values used to calculate groundwater velocity in the shallow zone were as below:

K_h = 13.6 feet/day
i = 0.005
n_e = 0.15.

The resulting V_h is 0.45 feet per day or 165 feet per year.

For Site 58, values used to calculate groundwater velocity in the shallow zone were as below:

K_h = 14.1 feet/day
i = 0.01
n_e = 0.15.

The resulting V_h is 0.94 feet per day or 343 feet per year.

2.5.2 Nature and Extent of Groundwater Contamination

2.5.2.1 Site 57

Analytical results for the groundwater samples collected at Site 57 are summarized on Table 2-1 and illustrated on Figures 2-4 through 2-6. As indicated by these results, a Site 57 Petroleum Plume, defined by benzene concentrations greater than the GCTL of 1.0 microgram per liter (µg/L), extends from the eastern side of Building 846 toward the southeast to the area east of Building 824A. This plume outline also generally encompasses exceedances of toluene, ethylbenzene, xylenes, PAHs, and TRPH. Just east of Building 846, the Site 57 Petroleum Plume is limited to the shallow portion of the surficial aquifer, but extends into the intermediate zone to the west (CEF-824A-12I). The Site 57 Petroleum Plume extends approximately 750 feet to the southeast and has an average width of approximately 225 feet.

A Site 57 TCE Plume, defined by TCE concentrations greater than the GCTL of 3 µg/L, is centered to the east of the Site 57 Petroleum Plume and partially overlaps that plume. The Site 57 TCE Plume extends to the intermediate zone of the surficial aquifer and, with the exception of the 1,1-DCE exceedance at CEF-824A-08S, the outline of this plume encompasses other chlorinated exceedances at Site 57. The Site 57 TCE Plume extends approximately 250 feet to the southeast and has and average width of approximately 180 feet.

Chlorinated VOCs detected during the RI and in previous investigations in wells to the southeast of the Site 57 TCE Plume (CEF-824A-01Sa, CEF-824A-07S, CEF-824A-08S) do not appear to be associated

with that plume as defined by current data. The lack of detections of chlorinated VOCs in wells CEF-293-20, CEF-293-21, and CEF-824A-04S, located between the downgradient edge of the plume and these wells, supports this conclusion. No potential sources of chlorinated VOCs were identified in either area and the presence of this type of contamination is likely a result of past spills, leaks, and/or poor materials handling practices. Solvents were reportedly used and stored in several buildings associated with Site 57.

Analytical results from a surface water sample collected from the storm sewer outfall that receives discharge from Site 57 indicated that surface water quality is not being affected by contaminated groundwater potentially infiltrating into the storm sewer. Surface water analytical data are summarized on Table 2-2.

An area of floating free product, approximately 400 square feet (ft^2) in size, was also delineated during the RI. This area is located east of the Day Tank 1 excavation area and extends beneath Building 846. The suspected source of the free product is a pipeline that transported fuel from Day Tank 1 to the north-south high-speed refueler. The line was capped, but not purged, during Day Tank 1 excavation activities. Because the BCT decided to address this area of floating free product under the Petroleum Program as part of the ongoing remedial activities for Day Tank 1, it will not be covered by this ROD.

2.5.2.2 Site 58

Analytical results for the groundwater samples collected at Site 58 are summarized on Table 2-3 and illustrated on Figures 2-7 through 2-9. As indicated by these results, naphthalene was detected in excess of its FDEP GCTL in four shallow wells, and the Site 58 Naphthalene Plume is delineated by naphthalene concentrations greater than the GCTL of 20 µg/L. This plume is located southeast of Building 312 and is approximately 100 feet by 60 feet in size. This Site 58 Naphthalene Plume encompasses the TRPH exceedance at CEF-B312-01S, which is the only other confirmed GCTL exceedance detected during the RI. The outline of the Site 58 Naphtahlene Plume also encompasses well CEF-B312-08S where three chlorinated VOCs (1,1-DCA, 1,1-DCE, 1,1,1-TCA) and xylenes were detected at concentrations greater than their GCTLs during the September 2001 sampling but not during the December 2001 sampling.

2.5.3 Current and Potential Future Site Uses

Sites 57 and 58 are currently used for aviation-maintenance activities and will probably continue to be used for this purpose under civilian ownership. The Jacksonville Economic Development Commission (JEDC) Reuse Plan provides for continued aviation reuse of the sites by the Jacksonville Airport Authority. Potential future uses for the sites are limited to commercial or industrial land use.

2.6 SUMMARY OF SITE RISKS

2.6.1 Human Health Risk Assessments

A PRE was performed as part of the RI for Sites 57 and 58. This PRE is a screening-level evaluation of potential risks from site constituents to human receptors at the site. The risks calculated in a PRE are derived by a comparison of exposure concentrations to GCTLs and MCLs. These GCTLs and MCLs are derived using default exposure assumptions established by the FDEP and U.S. EPA, respectively. Because there are no deviations between the Navy and the regulatory agencies regarding those exposure assumptions or pathways defined by the regulatory agencies for residential and industrial exposures, this approach was used to streamline the evaluation of risk.

2.6.1.1 Site 57

The PRE performed as part of the RI for Site 57 indicated that exposure to groundwater could potentially result in adverse health effects (TtNUS, 2002a). Constituents resulting in incremental cancer risks (ICRs) exceeding the U.S. EPA's risk range of 1.0E-06 to 1.0E-04 and the FDEP's target risk of 1.0E-06 included benzene, 1,1-DCE, and TCE. Constituents resulting in non-carcinogenic risks exceeding the allowable Hazard Quotient (HQ) of 1.0 included cis-1, 2-DCE and naphthalene.

2.6.1.2 Site 58

The PRE performed as part of the RI for Site 58 indicated that exposure to groundwater could potentially result in adverse health effects (TtNUS, 2002a). Some naphthalene concentrations could result in non-carcinogenic risks exceeding an HQ of 1.0. The PRE also established that adverse effects would be expected as a result of direct residential exposure to soil from the drainage ditch. The potential risks resulting from this latter scenario are not addressed in this ROD but will be addressed under the Petroleum Program.

2.6.2 Ecological Risk Assessments

Sites 57 and 58 consist primarily of buildings and parking lots. Most areas are either paved or consist of buildings. The limited terrestrial habitat is of marginal quality and results in little use of these sites by terrestrial wildlife; therefore, the soil exposure pathway is negligible. There is not a complete groundwater exposure pathway for ecological receptors at the site. No ecological risk assessment was performed.

2.7 PRELIMINARY REMEDIAL GOALS

A Preliminary Remedial Goal (PRG) is the target concentration that a COC must be reduced to within a particular medium of concern to achieve one or more of the established RAOs. PRGs are developed to ensure that contaminant concentrations left on site are protective of human and ecological receptors. For OU 9, Sites 57 and 58, PRGs were established based on the following criteria:

- Protection of human health from direct exposure to contaminated groundwater
- Compliance with ARARs and, to the extent practicable, To-Be-Considered criteria (TBCs)

2.7.1 Site 57 Groundwater PRGs

The Site 57 groundwater PRGs correspond to the federal MCLs if available and to the FDEP GCTLs. These PRGs are summarized as follows:

Chemical of Concern	Frequency of Detection	Range of Concentrations	Location of Maximum	PRG
VOCs (µg/L)				
Benzene	11 / 41	0.87 - 248	CEF-824A-4S	1[(2)]
cis-1,2-DCE	5 / 39	0.94 - 825	CEF-293-19	70[(1) (2)]
1,1-DCA	7 / 41	1.1 - 97.2	CEF-824A-14S	70[(1) (2)]
1,1-DCE	2 / 41	5 - 33.8	CEF-824A-8S	7[(1) (2)]
Ethylbenzene	11 / 41	1 - 150	CEF-293-11	30[(2)]
Toluene	7 / 41	1 - 63	CEF-293-11	40[(2)]
TCE	4 / 41	1 - 43	CEF-293-19	3[(2)]
Xylenes	12 / 41	1.9 - 560	CEF-293-11	20[(2)]
PAHs (µg/L)				
1-Methylnaphthalene	13 / 41	1.2 - 160	CEF-824A-11S	20[(2)]
2-Methylnaphthalene	12 / 41	1.6 - 184	CEF-824A-11S	20[(2)]
Naphthalene	15 / 41	1.2 - 396	CEF-824A-11S	20[(2)]
TRPH (µg/L)				
TRPH	21 / 41	203 - 14,300	CEF-824A-11S	5,000[(2)]

1 U.S. EPA MCL (U.S. EPA, 1998).
2 FDEP GCTL (FDEP, 1999a).

2.7.2 Site 58 Groundwater PRGs

The Site 58 groundwater PRGs correspond to the federal MCLs if available and to the FDEP GCTLs. These PRGs are summarized as follows:

Chemical of Concern	Frequency of Detection	Range of Concentrations	Location of Maximum	PRG
VOCs (µg/L)				
1,1-DCA	10/18	1.0 - 421	CEF-B312-08S	70[(1) (2)]
1,1-DCE	2/18	1.6 - 130	CEF-B312-08S	7[(1) (2)]
1,1,1-TCA	1/18	841	CEF-B312-08S	200[(1) (2)]
Xylenes	4/18	0.6 - 65	CEF-B312-08S	20[(2)]
PAHs (µg/L)				
Naphthalene	9 / 18	1.3 - 156	CEF-B312-01S	20[(2)]
TRPH (µg/L)				
TRPH	9 / 18	587 - 9,000	CEF-B312-01S	5,000[(2)]

1 U.S. EPA MCL (U.S. EPA, 1998).
2 FDEP GCTL (FDEP, 1999a).

2.8 DESCRIPTION OF REMEDIAL ALTERNATIVES

This section provides a narrative of each alternative evaluated for the remediation of groundwater at OU 9, Sites 57 and 58. For further information on the remedial alternatives, refer to the FS (TtNUS, 2002b) and the Proposed Plan (TtNUS, 2003). The remedy selected for this ROD is presented in Section 2.10. As part of the FS, each of the following alternatives was evaluated for compliance with related ARARs. Section 2.0 of the FS presents a complete list of these ARARs. The ARARs presented in Section 2.11 of this ROD are specific to the selected remedy.

This ROD has selected Alternative 2: Natural Attenuation, LUCs, and Monitoring to address COCs in groundwater. The alternatives evaluated, as described in the FS and summarized in Table 2-5, are as follows:

2.8.1 Alternative 1: No Action

Under this alternative, no remedial activities would occur to remove groundwater contamination, and no controls would be implemented to reduce exposure of human receptors. Although COCs would eventually attenuate naturally, no periodic monitoring would be performed to evaluate the effectiveness of the No Action alternative in meeting the cleanup goals and preventing the potential downgradient migration of COCs.

This alternative would not protect human health because risks from direct exposure to contaminated groundwater would continue to exist. This alternative would not achieve the RAOs or comply with ARARs. There would be no reduction of contaminant mobility, and reductions in toxicity and volume would occur only through long-term natural attenuation and would not be monitored. Because no

remedial action would take place, this alternative would not result in any short-term risks and would be very easy to implement. There would be no cost associated with this alternative.

2.8.2 Alternative 2: Natural Attenuation, LUCs, and Monitoring

Natural processes, such as biodegradation, dispersion, advection, and adsorption would eventually reduce the concentrations of COCs to their PRGs. A long-term groundwater monitoring program would be implemented to evaluate the decrease of COC concentrations in groundwater. Groundwater monitoring would also be used to detect the potential downgradient migration of COCs. Compliance monitoring wells located downgradient of the contaminant plumes (CEF–0824A-19S at Site 57, and CEF-B312-12S at Site 58) would be sampled to verify that the plumes are not expanding past these sentinel wells. A LUC in the form of an enforceable deed restriction that will run with the land will prevent the use of groundwater at the sites. Maintenance of this LUC will be addressed in a LUC RD to be submitted to U.S. EPA and FDEP for review and comment.

This alternative would protect human health because it would reduce the risk from direct exposure to contaminated groundwater. This alternative would achieve the RAOs, and monitoring would establish eventual compliance with ARARs through natural attenuation. There would be no reduction of contaminant toxicity, mobility, or volume through active treatment, but contaminant toxicity and volume would be reduced through long-term natural attenuation. There would be minimal short-term risks associated with the performance of groundwater monitoring activities that would be addressed through appropriate health and safety procedures. Based on modeling results, it is anticipated that the PRGs would be attained within 18 years at Site 57 and 3 years at Site 58. The activities for this alternative would be easy to implement. The capital cost, 20 year-net present worth (NPW) of operation and maintenance (O&M) costs, and 20-year NPW cost for this alternative are estimated at $5,000, $519,000, and $524,000, respectively.

2.8.3 Alternative 3: In-Situ Biological Treatment (ORC®/HRC®), LUCs, and Monitoring

This alternative would consist of injecting oxygen release compound (ORC®) and/or hydrogen release compound (HRC®) in the groundwater to accelerate biodegradation of COCs. ORC® would be used to promote the aerobic biodegradation of the BTEX, PAHs, and TRPH in the Site 57 Petroleum Plume (ORC System No. 1) and of the naphthalene and TRPH in the Site 58 Naphthalene Plume (ORC System No. 2). HRC® would be used to promote the anaerobic biodegradation of chlorinated VOCs in the Site 57 TCE Plume (HRC System). ORC System No. 1 would consist of injecting a total of 16,500 pounds of ORC® through 138 DPT injection points. The HRC System would consist of injecting a total of 19,800 pounds of HRC® through 120 DPT injection points. ORC System No. 2 would consist of injecting a total of

10,200 pounds of ORC® through 60 DPT injection points. LUCs and monitoring would be similar to those of Alternative 2.

This alternative would protect human health because it would actively reduce groundwater contamination in the surficial aquifer and thus reduce the risk from direct exposure. This alternative would achieve the RAOs and comply with ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 525 pounds of COCs would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the ORC/HRC injection systems and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on information provided by the technology vendor (REGENESIS) and experience with similar installations, the PRGs would be attained within approximately 3 years at Site 57 and 2 years at Site 58. The activities for this alternative would be relatively easy to implement. The capital cost, 5-year NPW of O&M costs, and 5-year NPW cost for this alternative are estimated at $1,265,000, $352,000, and $1,617,000, respectively.

2.8.4 Alternative 4: In-Situ AS Treatment, LUCs, and Monitoring

This alternative would consist of injecting air in the groundwater to promote the volatilization of BTEX and chlorinated VOCs and the aerobic biodegradation of BTEX, PAHs, and TRPH. There would be one air sparging (AS) system for each of the three contaminant plumes. AS System No. 1 would treat the Site 57 Petroleum Plume and include 97 sparging wells, one 750 cubic feet per minute (cfm) compressor, and one 300 cfm compressor. AS System No. 2 would treat the Site 57 TCE Plume and include 19 sparging wells and one 200 cfm compressor. AS System No. 3 would treat the Site 58 Naphthalene Plume and include 16 sparging wells and one 200 cfm compressor. Because the maximum anticipated amount of VOC emissions from the AS systems (4 pounds/day for Site 57, 1 pound/day for Site 58) would be much lower than the 13.75 pounds per day limit established by FDEP, no treatment system would be required for these emissions. LUCs and monitoring would be similar to those of Alternative 2.

This alternative would protect human health because it would actively reduce groundwater contamination in the surficial aquifer and thus reduce the risk from direct exposure. This alternative would achieve the groundwater RAOs and comply with ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 525 pounds of COCs would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the AS systems and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on the performance of similar AS systems currently operating at NAS Cecil Field, the PRGs would be attained within approximately 3 years at Site 57 and 2 years at Site 58. The activities for

this alternative would be relatively easy to implement. The capital cost, NPW of O&M costs, and 5-year NPW cost for this alternative are estimated at $1,636,000, $564,000, and $2,200,000, respectively.

2.8.5 Alternative 5: Extraction, On-Site Treatment, Surface Water Discharge, LUCs, and Monitoring

This alternative would consist of removing the contaminated groundwater through extraction wells and treating the extracted groundwater in an on-site system prior to discharge to local drainage ditches. Separate extraction and on-site treatment systems would be installed and operated for Sites 57 and 58. The Site 57 system would have a design capacity of 37.5 gallons per minute (gpm) and would feature five extraction wells and an on-site treatment system consisting of equalization, filtration, air stripping, and liquid-phase granular activated carbon (GAC) adsorption. The Site 58 system would have a design capacity of 22.5 gpm and would include three extraction wells and an on-site treatment system consisting of equalization, filtration, and liquid-phase GAC adsorption. LUCs and monitoring would be similar to those for Alternative 2.

This alternative would protect human health because it would actively remove contaminated groundwater from the surficial aquifer and thus reduce the risk from direct exposure. This alternative would achieve the groundwater RAOs and comply with ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 525 pounds of COCs would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the groundwater extraction and treatment system and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on modeling results, the PRGs would be attained within approximately 12 years at Site 57 and 3 years at Site 58. The activities for this alternative would be relatively easy to implement. The capital cost, 15-year NPW of O&M costs, and 15-year NPW cost for this alternative are estimated at $1,109,000, $1,542,000, and $2,651,000, respectively.

2.9 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the groundwater remedial alternatives with respect to the nine criteria outlined in Section 300.430(e) of the NCP. These criteria are categorized as threshold, primary balancing, and modifying and are further explained in Table 2-4. A detailed analysis was performed for each alternative using the nine criteria to select a site remedy. Table 2-5 presents a summary comparison of this analysis.

2.10 SELECTED REMEDY

2.10.1 Summary of Rationale For Remedy Selection

The goals of the selected remedy are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by Sites 57 and 58 groundwater and to meet the ARARs. Based on consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and U.S. EPA, FDEP, and public comments, Alternative 2 was selected to address groundwater contamination at OU 9, Sites 57 and 58.

This remedy was selected for the following reasons:

- Although several chemicals exceeded the FDEP GCTLs in the surficial aquifer groundwater at Sites 57 and 58, detected concentrations of these COCs were relatively low and do not present an unacceptable threat to human health or the environment under the current and foreseeable future site use scenario.

- The surficial aquifer groundwater at Sites 57 and 58 is not currently being used, nor are there any plans for its future use. Therefore, humans and the environment are not currently exposed to groundwater COCs and the selected remedy ensures that exposure will continue to be prevented in the future, unless otherwise allowed by the Navy, U.S. EPA, and FDEP.

- To date, groundwater monitoring shows no evidence of migration of the three groundwater contaminant plumes identified at Sites 57 and 58. Free product and contaminated soil source removal actions conducted at Site 57 under the Chapter 62-770 FAC Petroleum Program are expected to significantly decrease the potential for contaminated groundwater migration at that site. The modeling performed as part of the FS (TtNUS, 2002b) predicted that concentrations of COCs would decrease to less than PRGs prior to reaching the selected compliance wells (CEF-0824A-19S at Site 57 and CEF-B312-12S at Site 58).

2.10.2 Remedy Description

The remedy is illustrated on Figure 2-10 and consists of two major components: (1) LUCs and (2) long-term groundwater monitoring.

2.10.2.1 Component 1: LUCs

Groundwater contamination remains at Sites 57 and 58 at concentrations that preclude unrestricted reuse; therefore, the remedy includes LUCs to prevent unacceptable risk. These LUCs apply only to

groundwater and will be implemented to prohibit usage of the surficial aquifer beneath the sites and thereby preclude unacceptable risks from exposure to contaminated groundwater (see Figures 2-4 and 2-7). The following are the LUC performance objectives for OU 9, Sites 57 and 58:

- Prohibit the consumption of groundwater that exceeds federal MCLs or State GCTLs.

- Prohibit all use of the groundwater from the surficial aquifer underlying the site (including, but not limited to, dewatering, irrigation, heating/cooling purposes, and other industrial processes) without prior written approval from the Navy, U.S. EPA, and FDEP.

- Maintain the integrity of any existing or future monitoring or remediation system(s).

The LUCs shall be maintained for as long as they are required to prevent unacceptable exposures to contaminated groundwater or to preserve the integrity of the remedy. The Navy or any subsequent owners shall not modify, delete, or terminate any LUC without U.S. EPA and FDEP concurrence. The LUCs shall be maintained until the concentrations of COCs in the groundwater beneath Sites 57 and 58 have been reduced to levels that allow for unlimited exposure.

The Navy is responsible for implementing, inspecting, reporting, and enforcing the LUCs described in this ROD in accordance with the LUC RD. Although the Navy will retain ultimate responsibility for the performance of these obligations, the Navy may arrange, by contract or otherwise, for another party(ies) to carry them out. Should any LUC remedy fail, the Navy will ensure that appropriate actions are taken to reestablish the remedy's protectiveness and may initiate legal action to either compel action by a third party(ies) and/or to recover the Navy's costs for remedying any discovered LUC violation(s).

Within 90 days of ROD signature, the Navy shall prepare and submit to U.S. EPA and FDEP for review and comment, the LUC RD for Sites 57 and 58.

2.10.2.2 Component 2: Long-Term Groundwater Monitoring

Monitoring will consist of the periodic collection and analysis of groundwater samples to verify that no COCs are migrating past selected compliance wells (CEF-0824A-19S at Site 57 and CEF-B312-12S at Site 58). Long-term monitoring will also be used to assess natural attenuation of COCs.

Based on the results of groundwater modeling, performance monitoring will take place over a period of 20 years at Site 57 and 5 years at Site 58. This monitoring will consist of collecting groundwater samples from eight existing monitoring wells at Site 57 and four existing wells at Site 58. Samples will be analyzed for VOCs, PAHs, and TRPH. In addition, during the first 5 years, samples will also be analyzed for

natural attenuation indicator parameters such as oxidation/reduction potential (ORP), dissolved oxygen (DO), pH, alkalinity, temperature, conductivity, total organic carbon (TOC), ferrous and total iron, sulfur compounds (sulfates, sulfides), nitrogen compounds (nitrate, nitrite), orthophosphate, chloride, and metabolic gases (methane, ethane, ethene, and carbon dioxide). Sampling frequency will be quarterly for the first year, semi-annually for the next 2 years, and annually thereafter. The number of wells to be sampled, the sampling frequency, and the parameters to be analyzed may change over time dependent upon monitoring results and with approval of the Navy, U.S. EPA, and FDEP.

As agreed by the BCT, if the results of two consecutive sampling events indicate that the PRGs have been met, the sites will be considered fully remediated.

2.10.2.3 Contingency Remedy

If the results for either Site 57 or 58 show that (1) the implemented LUCs have failed to prevent unacceptable risks from exposure to groundwater contamination; (2) contaminated groundwater has migrated to an unacceptable degree as determined by sentinel well sampling results; or (3) groundwater contamination is not attenuating as expected, then additional active remedial measures will be evaluated and may be implemented. Potential contingency remedial measures could include in-situ enhanced bioremediation or extraction, on-site treatment, and surface discharge of contaminated groundwater.

2.10.3 Summary of Estimated Remedy Costs

The estimated capital, O&M, and NPW costs of the selected remedy are as follows:

- Capital cost: $5,000
- 20-Year NPW of O&M costs: $519,000
- 20-Year NPW cost: $524,000

The above cost figures have been rounded to the nearest $1,000 to reflect the preliminary nature of the estimates. The NPW is based upon an annual discount rate of 7 percent. A detailed breakdown of the above estimates is provided in Appendix B.

2.10.4 Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy may be summarized as follows:

- Within 20 years for Site 57 and 5 years for Site 58, the groundwater PRGs will be attained, and the surficial aquifer will become available for unrestricted use.

- LUCs will be required to prevent use of the surficial aquifer at Sites 57 and 58. These controls will be required for as long as groundwater COC concentrations preclude unrestricted reuse.

- Sites 57 and 58 are currently used for aviation-maintenance activities and will probably continue to be used for this purpose in the foreseeable future. It is anticipated that the reuse of NAS Cecil field, including Sites 57 and 58, will be beneficial to the Jacksonville area and expand the tax base of Duval County.

2.11 STATUTORY DETERMINATIONS

Under CERCLA § 121 and the NCP, the selected remedy must be protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The following sections discuss how the selected remedy meets these statutory requirements.

2.11.1 Protection of Human Health and the Environment

The selected remedy for both sites, Alternative 2, will protect human health and the environment. LUCs will prohibit use of groundwater from the surficial aquifer beneath the sites. Consequently, there will continue to be no exposure to contaminated groundwater.

The PRE indicates that exposure to the surficial aquifer groundwater at Sites 57 and 58 could result in ICRs that exceed the U.S. EPA's target risk range of 1.0E-04 to 1.0E-06 and the FDEP target risk of 1.0E-06 as well as in non-carcinogenic hazard indices greater than 1.0.

2.11.2 Compliance with ARARs

The selected remedy for both sites, Alternative 2, will comply with all ARARs. The ARARs that the selected remedy complies with are presented below and in more detail in Table 2-6 through Table 2-11. There are no Location-Specific ARARs.

The Chemical- and Action-Specific ARARs include the following:

- Safe Drinking Water Act (SWDA) MCLs (40 CFR Part 141). This is a Chemical-Specific ARAR that specifies acceptable concentration levels in groundwater that serves as a potential drinking water aquifer.

- Groundwater Classes, Standards, and Exemptions (FAC Chapter 62 520). This is a Chemical-Specific ARAR that designates the groundwater of the State into five classes and establishes minimum "free from" criteria (i.e., what contaminants are prohibited from being present in a particular class of aquifer).

- Occupational Safety and Health Act (OSHA), General Industry Standards (29 CFR Part 1910). This is an Action-Specific ARAR that requires the establishment of programs to assure worker health and safety at hazardous waste sites.

- OSHA Occupational Safety and Health Regulations (29 CFR Part 1910, Subpart Z). This is an Action-Specific ARAR that establishes permissible exposure limits for workplace exposure to specific chemicals.

- OSHA Recordkeeping, Reporting, and Related Regulations (29 CFR Part 1904). This is an Action-Specific ARAR that dictates recordkeeping and reporting requirement for remedial activities.

- OSHA, Health and Safety Standards (29 CFR Part 1926). This is an Action-Specific ARAR that specifies the type of safety training, equipment, and procedures to be used during remediation.

- Florida Water Well Permitting and Construction Requirement - March 1992. This is an Action-Specific ARAR that establishes minimum standard for location, construction, repair, and abandonment of water wells.

- Florida Rules on Hazardous Waste Warning Signs - July 1991. This is an Action-Specific ARAR that requires appropriate warning signs for public protection at NPL and FDEP hazardous waste sites.

- Drinking Water Criteria (FAC Chapter 62-550). This Chemical-Specific ARAR provides primary and secondary drinking water quality criteria.

2.11.3 Other Criteria, Advisories, or Guidance To Be Considered for This Remedial Action

In implementing the selected remedy, the Navy, U.S. EPA and the FDEP have agreed to consider a number of non-binding criteria that are TBCs. These include:

- SDWA Regulations, National Secondary Drinking Water Standards (SMCLs), (40 CFR 143). This Chemical-Specific TBC establishes welfare-based standards for public water systems.

- Cancer Slope Factors (CSFs) (Integrated Risk Information System). This Chemical-Specific TBC provides guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.

- Reference Dose Factors (RfDs) (Integrated Risk Information System). This Chemical-Specific TBC provides guidance values used to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.

- Contaminant Cleanup Target Levels Rule (FAC Chapter 62-777). This Chemical-Specific TBC provides values for soil, groundwater, and surface water cleanup.

- U.S. EPA Monitored Natural Attenuation Guidance. This provides guidance on evaluation of monitored natural attenuation.

2.11.4 Cost-Effectiveness

The selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if it costs are proportional to its overall effectiveness." [NCP §300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., both were protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money spent.

The estimated 20-year NPW cost of the selected remedy is $524,000.

2.11.5 Utilization of Permanent Solutions and Alternative Treatment Technologies

The Navy and U.S. EPA, in consultation with FDEP, have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at Sites 57 and 58. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Navy and U.S. EPA, in consultation with FDEP, have determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principle element and bias against off-site treatment and disposal and considering State and Community acceptance.

2.11.6 Preference for Treatment as a Principal Element

Although the selected remedy does not provide for treatment as a principal element, reduction of groundwater contaminant concentrations are expected over time due to such naturally occurring processes as biological degradation, dispersion, advection, and adsorption.

2.11.7 Five-Year Review Requirement

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years of ROD signature to ensure that the remedy is, or will be, protective of human health and the environment.

2.12 DOCUMENTATION OF SIGNIFICANT CHANGES

The Navy, U.S. EPA and FDEP provided an opportunity for the public to review and comment on the Sites 57 and 58 Proposed Plan. A Public Notice was publishing in the Florida Times-Union Newspaper on July 14, 2003 informing the public that the Proposed Plan was available for review at the Cecil Field Information Repository and requested that all comments be submitted to the Navy by August 13, 2003. However, no comments were received from the public during the comment period; therefore no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-1	CEF-293-3	CEF-293-4	CEF-293-5	CEF-293-8	CEF-293-10	CEF-293-11	
								Sep-01	Dec-01
VOLATILE ORGANIC COMPOUNDS (VOCs) (ug/L)									
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	250 U	250 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	**30.5**	**32**
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	2 U	2 U	**148**	**151**
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Toluene	40	2 U	2 U	2 U	2 U	2 U	2 U	**66**	**59.6**
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Xylenes, total*	20	6 U	6 U	6 U	6 U	6 U	6 U	**572**	**549**
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs) (ug/L)									
Acenaphthene	20	4.4 U	4.4 U	4.4 U	4 U	4.4 U	4.4 U	21 U	20 U
1-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	2 U	2.2 U	2.2 U	**60.4**	**84.8**
2-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	2 U	2.2 U	2.2 U	**57.5**	**84.8**
Naphthalene	20	2.2 U	2.2 U	2.2 U	2 U	**2.2**	**5.6**	**126**	**155**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)									
TRPH	5	**0.254 J**	0.28 U	0.28 U	0.28 U	**0.643**	**0.335**	**2.46**	**5.95**

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-13		CEF-293-14	CEF-293-15D	CEF-293-19	CEF-293-20	CEF-293-21		CEF-293-22
		Sample	Duplicate					Sample	Duplicate	
VOCs (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	**190**	50 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	**1.8**	**0.87 J**	**30.8**	**28.9**	**5.3**
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	**825**	**136**	2 U	2 U	2 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	**58.6**	**1.6 J**	2 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	**5**	2 U	**2.7**	**2.8**	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	**76.1**	10 U	10 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	**33.4**	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	**5.1**	**0.52 J**	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	**43**	**3.3**	2 U	2 U	2 U
Xylenes, total*	20	6 U	6 U	6 U	6 U	**31.8**	6 U	**4.1 J**	**4.9 J**	6 U
SVOCs (ug/L)										
Acenaphthene	20	4 U	4 U	4 U	4.4 U	8 U	4 U	4.4 U	4.4 U	4.4 U
1-Methylnaphthalene	20	**1.4 J**	**2.0**	2 U	2.2 U	4 U	2 U	**2.2**	**2.5**	**10.9**
2-Methylnaphthalene	20	**1.6 J**	**2.4**	2 U	2.2 U	4 U	2 U	**2.2**	**2.6**	**11.6**
Naphthalene	20	2 U	2 U	**2.9**	2.2 U	**46**	**1.2 J**	**2.5**	**3**	**14.7**
TRPH (mg/L)										
TRPH	5	**0.404**	**0.372**	**0.944**	0.28 U	**4.44**	**0.58**	**0.269**	**0.242 J**	**0.946**

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-01S	CEF-824A-01Sa		CEF-824A-2S	CEF-824A-3S	CEF-824A-4S		CEF-824A-5S	CEF-824A-6I
			Sep-01	Dec-01			Sample	Duplicate		
VOCs (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	**254**	**242**	1 U	1 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	2 U	**27.8**	**20.7**	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	2 U	**2.3**	**1.7 J**	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Xylenes, total*	20	6 U	6 U	6 U	6 U	6 U	**71.6**	**51.9**	6 U	6 U
SVOCs (ug/L)										
Acenaphthene	20	**2.4 J**	4.4 U	4 U	4.4 U	4 U	8.8 U	8.8 U	4.4 U	4.4 U
1-Methylnaphthalene	20	2 U	**2.1 J**	**1.2 J**	**0.93 J**	2 U	**7.8**	**7.4**	2.2 U	2 U
2-Methylnaphthalene	20	2 U	**3.7**	**2**	**1.6 J**	2 U	**8.9**	**8.6**	2.2 U	2 U
Naphthalene	20	2 U	2.2 U	2 U	2.2 U	2 U	**30.3**	**30.8**	2.2 U	2 U
TRPH (mg/L)										
TRPH	5	0.28 U	**0.482**	**0.438**	0.28 U	0.25 U	**1.72**	**1.69**	0.28 U	**0.267**

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-7S		CEF-824A-8S	CEF-824A-9S	CEF-824A-10S	CEF-824A-11S		CEF-824A-12I	CEF-824A-13D
		Sep-01	Dec-01				Sep-01	Dec-01		
VOCs (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	250 U	50 U	50 U
Benzene	1	**3.8**	**2**	**1.5**	1 U	1 U	**8.7**	**7.6**	**3.5**	1 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	**0.94 J**	2 U	**3.7**	2 U	10 U	2 U	2 U
1,1-Dichloroethane	70	**1.1 J**	**2.9**	**9.9**	**2.4**	**1.1 J**	2 U	10 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	**33.8**	2 U	2 U	2 U	10 U	2 U	2 U
Ethylbenzene	30	**2.3**	**2.1**	2 U	2 U	**8.6**	**84.9**	**85.4**	**10.4**	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	**3 J**	5 U	25 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	**1 J**	2 U
Toluene	40	2 U	2 U	2 U	2 U	**1.0 J**	**56.6**	**43.2**	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
Trichloroethene	3	**4.8**	**0.84 J**	2 U	**1 J**	2 U	2 U	10 U	2 U	2 U
Xylenes, total*	20	**2.8 J**	6 U	**1.9 J**	6 U	**4.0 J**	**334**	**305**	**36.2**	6 U
SVOCs (ug/L)										
Acenaphthene	20	4 U	4 U	4.4 U	4 U	20 U	80 U	40 U	4.4 U	4 U
1-Methylnaphthalene	20	**25.5**	**24.6**	2.2 U	2 U	**15.7**	**175**	**145**	**12.5**	2 U
2-Methylnaphthalene	20	**30.4**	**30.9**	2.2 U	2 U	**16.8**	**196**	**172**	**12.3**	2 U
Naphthalene	20	**13.9**	**25.7**	2.2 U	2 U	**128**	**438**	**354**	**49.1**	2 U
TRPH (mg/L)										
TRPH	5	**1.67**	**2.13**	0.30 U	**0.352**	**4.83**	**13.6**	**15.0**	**3.28**	0.25 U

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-14S	CEF-824A-15I	CEF-824A-16D	CEF-824A-17I	CEF-824A-18S	CEF-824A-19S	CEF-824A-20S	CEF-824A-21I**
VOCs (ug/L)									
Acetone	700	100 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzene	1	2 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.8**
Chloroform	5.7	4 U	4 U	**0.92 J**	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	**139**	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	**97.2**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
1,1-Dichloroethene	7	**5.0**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
Ethylbenzene	30	**4.4**	**1.0 J**	2 U	2 U	2 U	2 U	1 U	**2.2**
4-Methyl-2-pentanone	560	20 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	4 U	**1.5 J**	2 U	2 U	2 U	2 U	1 U	2 U
Toluene	40	**4.9**	2 U	2 U	2 U	2 U	2 U	1 U	**1.5 J**
trans-1,2-Dichloroethene	31	4 U	2 U	2 U	2 U	2 U	2 U	NA	2 U
Trichloroethene	3	**9.0**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
Xylenes, total*	20	**4.9 J**	**5.2 J**	6 U	**4.3 J**	6 U	6 U	1 U	**9**
SVOCs (ug/L)									
Acenaphthene	20	4 U	4 U	4.4 U	4.4 U	4.4 U	4 U	4.4 U	4 U
1-Methylnaphthalene	20	2 U	**2.0**	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**10.5**
2-Methylnaphthalene	20	2 U	2 U	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**13.3**
Naphthalene	20	2 U	**2.4**	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**6.3**
TRPH (mg/L)									
TRPH	5	**2.01**	**1.21**	0.28 U	**0.533**	0.28 U	0.28 U	0.28 U	**0.744**

TABLE 2-1

SUMMARY OF SITE 57 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-22S**		CEF-825LS-1S	CEF-16-38S		CEF-16-39I	CEF-16-40D	REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sample	Duplicate		Sample	Duplicate				
VOCs (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	50 U	610	NC
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.35	5
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.16	NC
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	NA	2 U	2 U	2 U	61	70
1,1-Dichloroethane	70	2 U	2 U	2 U	1 U	2 U	2 U	2 U	810	NC
1,1-Dichloroethene	7	2 U	2 U	2 U	1 U	2 U	2 U	2 U	0.046	7
Ethylbenzene	30	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1300	700
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	160	NC
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	4.3	NC
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	20	NC
Tetrachloroethene	3	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1.1	5
Toluene	40	2 U	2 U	2 U	1 U	2 U	2 U	2 U	720	1000
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	1 U	2 U	2 U	2 U	120	100
Trichloroethene	3	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1.6	5
Xylenes, total*	20	6 U	6 U	6 U	6 U	6 U	6 U	6 U	1400	10000
SVOCs (ug/L)										
Acenaphthene	20	4 U	4.8 U	4 U	4.4 U	4.4 U	4.4 U	4.4 U	NC	NC
1-Methylnaphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	NC	NC
2-Methylnaphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	NC	NC
Naphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	6.2	NC
TRPH (mg/L)										
TRPH	5	0.28 U	0.28 U	**0.203 J**	0.28 U	0.25 U	0.25 U	0.25 U	NC	NC

U = Not detected at or above method detection limit as listed.
J = Estimated value.
NA = Not analyzed.
NC = No criterion.
Bolded values exceed detection limits.
Shaded values exceed target cleanup goals.

RI sampling was conducted in September/October 2001.
1 FDEP GCTL, F.A.C. 62-777, 1999.
2 U.S. EPA Region IX PRGs.
3 U.S. EPA federal MCLs.
* Total of o-, m-, and p-xylenes.
** Wells CEF-824A-21I and CEF-824A-22S were installed in December 2001.

TABLE 2-2

SUMMARY OF SITE 57 SURFACE WATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-SW01
VOLATILE ORGANIC COMPOUNDS (VOCs) (ug/L)		
Benzene	71.28	1 U
cis-1,2-Dichloroethene	NC	2 U
1,1-Dichloroethane	NC	2 U
1,1-Dichloroethene	3.2	2 U
Ethylbenzene	605	2 U
Tetrachloroethene	8.85	2 U
Toluene	475	2 U
trans-1,2-Dichloroethene	11000	2 U
Trichloroethene	80.7	2 U
Xylenes, total	370	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs) (ug/L)		
1-Methylnaphthalene	95	2 U
2-Methylnaphthalene	30	2 U
Naphthalene	26	2 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)		
TRPH	5	0.28 U

NOTES:

1 Florida Department of Environmental Protection (FDEP) Freshwater Surface Water Criteria, Florida Administrative Code (FAC) Chapter 62-777 (FDEP, 1999a).

NC = No criterion.

U = Not detected at or above detection limit (associated value).

CEF-824A-SW01 was collected at Runway Outfall PSC 39 location No. 4, the discharge point for storm sewer runoff from the Site 57 area.

TABLE 2-3

SUMMARY OF SITE 58 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-						
		312-01	312LS-01Sa	B312-01I	B312-01S	B312-02S	B312-03S	B312-04S
VOLATILE ORGANIC COMPOUNDS (VOCs) (ug/L)								
Acetone	700	50 U	50 U	50 U	**122 J**	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	4200	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	**9.1**	2 U	2 U	**6.8**	**14.3**	2 U	**2.2**
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	**0.48 J**	2 U	2 U	2 U	2 U	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	**36.9**	10 U	10 U	10 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	**1.6 J**	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vinyl chloride	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes, total	20	**0.60 J**	6 U	6 U	**4.1 J**	6 U	6 U	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs) (ug/L)								
1-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	16 U	2 U	**2**	2 U
2-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	16 U	2 U	2 U	2 U
Naphthalene	20	**49.5**	2.2 U	2.2 U	**156**	**8.3**	**1.9 J**	**0.96 J**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)								
TRPH	5	**1.36**	0.28 U	0.28 U	**9.00**	**3.10**	**1.85**	0.28 U

TABLE 2-3

SUMMARY OF SITE 58 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-								
		B312-05S		B312-06S	B312-07S	B312-08S*			B312-09S	B312-10S
						Sep-01		Dec-01		
		Sample	Duplicate			Sample	Duplicate			
VOCs (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	500 U	500 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	10 U	10 U	1 U	1 U	1 U
2-Butanone	4200	10 U	10 U	10 U	10 U	100 U	100 U	10 U	10 U	10 U
Chloroform	5.7	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	**1 J**
1,1-Dichloroethane	70	**1.7 J**	**1.7 J**	**1.0 J**	2 U	**426**	**416**	**24.1**	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	**131**	**129**	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	**15.1 J**	**12.3 J**	**1.9 J**	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	100 U	100 U	10 U	10 U	10 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	**24.6**	**21.7**	**1.3 J**	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	2 U
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	**871**	**811**	**66.1**	2 U	2 U
Vinyl chloride	1	1 U	1 U	1 U	1 U	10 U	10 U	1 U	1 U	1 U
Xylenes, total	20	6 U	6 U	6 U	6 U	**70.3**	**59.7 J**	**8.7**	6 U	6 U
SVOCs (ug/L)										
1-Methylnaphthalene	20	2.2 U	2.2 U	**4.5**	2 U	**5.1**	**5.1**	NA	2.2 U	2.2 U
2-Methylnaphthalene	20	2.2 U	2.2 U	**3.5**	2 U	**4.7**	**4.6**	NA	2.2 U	2.2 U
Naphthalene	20	2.2 U	**1.3 J**	**47.6**	2 U	**80**	**76.3**	NA	2.2 U	2.2 U
TRPH (mg/L)										
TRPH	5	**0.567**	**0.607 J**	**2.89**	0.25 U	**1.29**	**1.18**	NA	0.28 U	0.28 U

TABLE 2-3

SUMMARY OF SITE 58 GROUNDWATER RI ANALYTICAL DATA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-					REGION IX PRGs(2)	FEDERAL MCLs(3)
		B312-11S	B312-12S	B312-13S	B312-14S	B312-15I		
VOCs (ug/L)								
Acetone	700	50 U	50 U	50 U	50 U	50 U	610	NA
Benzene	1	1 U	1 U	1 U	1 U	1 U	0.35	5
2-Butanone	4200	10 U	**5.1 J**	10 U	10 U	10 U	1900	NA
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	0.16	NA
1,1-Dichloroethane	70	**5.7**	**3.7**	**5.1**	2 U	2 U	810	NC
1,1-Dichloroethene	7	**1.6 J**	**1.8 J**	2 U	2 U	2 U	0.046	7
Ethylbenzene	30	**1.1 J**	2 U	2 U	2 U	2 U	1300	700
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	1600	NA
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	20	NA
Toluene	40	2 U	2 U	2 U	2 U	2 U	720	1000
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	1.6	5
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	2 U	540	200
Vinyl chloride	1	1 U	1 U	1 U	1 U	1 U	0.014	2
Xylenes, total	20	**3 J**	6 U	6 U	6 U	6 U	1400	10000
SVOCs (ug/L)								
1-Methylnaphthalene	20	**3.5**	2 U	2.2 U	2 U	2.2 U	NC	NC
2-Methylnaphthalene	20	2 U	2 U	2.2 U	2 U	2.2 U	NC	NC
Naphthalene	20	2 U	**1.7 J**	2.2 U	2 U	2.2 U	6.2	NC
TRPH (mg/L)								
TRPH	5	**2.19**	0.25 U	**0.84**	0.25 U	0.28 U	NC	NC

NOTES:

Bolded values exceed detection limits.
Shaded values exceed GCTLs.
J = Estimated value
NC = No criterion
U = Not detected at or above method detection limit as listed.

1 FDEP GCTL, F.A.C. 62-777, 1999
2 U.S. EPA Region IX PRGs
U.S. EPA Federal MCLs
RI sampling was conducted in September/October 2001
* CEF-B312-08S was resampled in December 2001

TABLE 2-4

EXPLANATION OF DETAILED ANALYSIS CRITERIA
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Criterion	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 land use controls (e.g., site use 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 and Permanence.** 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 Administrative Record, 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 ANALYSIS OF SITES 57 AND 58 GROUNDWATER REMEDIAL ALTERNATIVES
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Natural Attenuation, LUCs, and Monitoring	Alternative 3: In-Situ Biological Treatment (ORC/HRC), LUCs, and Monitoring	Alternative 4: In-Situ AS Treatment, LUCs, and Monitoring	Alternative 5: Extraction, On-Site Treatment & Surface Discharge, LUCs, and Monitoring
Overall Protection of Human Health and Environment	Would not be protective of human health and the environment because no action would occur. Potential migration of COCs would continue and remain undetected.	Would be protective of human health and the environment because natural attenuation would reduce COC concentrations down to cleanup goals over a reasonable timeframe. LUCs and monitoring would provide immediate protection until the cleanup goals are met by restricting use of the aquifer for drinking purposes and checking for potential migration of COCs.	Would be more protective of human health and the environment than Alternative 2 because, in addition to LUCs and monitoring, it would include active treatment that would accelerate the removal of COCs.	Would be as protective of human health and the environment as Alternative 3 because it would provide most of the same protective components (i.e., LUCs and monitoring) and would also accelerate the removal of COCs but through in-situ AS treatment rather than in-situ bioremediation.	Would be as protective of human health and the environment as Alternatives 3 and 4 because it would provide most of the same protective components (i.e., LUCs and monitoring) and also accelerate the removal of COCs but through extraction and on-site treatment rather than in-situ bioremediation or in-situ AS treatment.
Compliance with ARARs and TBCs: Chemical-Specific Location-Specific Action-Specific	 Would not comply Not applicable (no ARARs) Not applicable	 Would comply Not applicable (no ARARs) Would comply	 Would comply Not applicable (no ARARs) Would comply	 Would comply Not applicable (no ARARs) Would comply	 Would eventually comply Not applicable (no ARARs) Would comply
Long-Term Effectiveness and Permanence	Would have very limited long-term effectiveness and permanence because no action would occur. Contaminant reduction or migration would remain undetected because no monitoring would occur.	Would be long-term effective and permanent. Natural attenuation would eventually reduce COC concentrations to cleanup goals. LUCs would effectively prevent unacceptable human health and ecological risk from exposure to contaminated groundwater. Monitoring would effectively evaluate the progress of remediation and detect potential migration of COCs.	Would be more long-term effective and permanent than Alternative 2 by significantly accelerating the removal of COCs through active in-situ bioremediation. However, the effectiveness of HRC injection would have to be verified through treatability testing. The long-term effectiveness and permanence of the LUCs and monitoring would be the same as for Alternative 2.	Would be more long-term effective and permanent than Alternative 3 because it would provide the same accelerated removal of COCs but through in-situ AS treatment that does not need to be tested. The long-term effectiveness and permanence of the LUCs and monitoring would be the same as for Alternative 2.	Would be slightly less long-term effective and permanent than Alternative 4 but more so than Alternative 3. Would provide the same accelerated removal of COCs through active extraction and on-site-treatment, which is well-proven as in-situ AS treatment but somewhat slower. The long-term effectiveness and permanence of the LUCs and monitoring would be the same as for Alternative 2.
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would not reduce contaminant toxicity, mobility, or volume through treatment because no treatment would occur.	Would irreversibly and permanently reduce contaminant toxicity, mobility, and volume by removing an estimated 525 pounds of COCs through in-situ bioremediation.	Would irreversibly and permanently reduce contaminant toxicity, mobility, and volume by removing an estimated 525 pounds of COCs through in-situ AS treatment.	Would irreversibly and permanently reduce contaminant toxicity, mobility, and volume by removing an estimated 525 pounds of COCs through extraction and on-site treatment.
Short-Term Effectiveness	Would not result in any short-term risk to site workers or adversely impact the surrounding community or environment because no action would occur. The RAOs would never be achieved with the implementation of this alternative.	Would result in a slight possibility of exposing site workers to contaminated groundwater as a result of monitoring activities. This risk would be reduced through compliance with appropriate site-specific health and safety procedures. There would be no risk to the surrounding community and environment. The first two RAOs would be achieved immediately upon implementation of the LUCs and monitoring. The third RAO and the cleanup goals would be met within 18 years at Site 57 and within 3 years at Site 58.	Would result in a possibility of exposing site workers to contaminated groundwater during bioremediation and monitoring activities. This risk would be reduced through compliance with appropriate site-specific health and safety procedures. There would be no risk to the surrounding community and environment. The first two RAOs would be achieved immediately upon implementation of the LUCs and monitoring. The third RAO and the cleanup goals would be met within 3 years at Site 57 and within 2 years at Site 58.	Would result in a possibility of exposing site workers to contaminated groundwater during the installation and O&M of the in-situ AS treatment system and of monitoring activities. This risk would be reduced through compliance with appropriate site-specific health and safety procedures. There would be no risk to the surrounding community and environment. The first two RAOs would be achieved immediately upon implementation of the LUCs and monitoring. The third RAO and the cleanup goals would be met within 3 years at Site 57 and within 2 years at Site 58.	Would result in a possibility of exposing site workers to contaminated groundwater during extraction, treatment, and monitoring activities. This risk would be reduced through compliance with appropriate site-specific health and safety procedures. There would be no risk to the surrounding community and environment. The first two RAOs would be achieved immediately upon implementation of the LUCs and monitoring. The third RAO and the cleanup goals would be met within an estimated 12 years at Site 57 and within 3 years at Site 58.

TABLE 2-5

SUMMARY OF COMPARATIVE ANALYSIS OF SITES 57 AND 58 GROUNDWATER REMEDIAL ALTERNATIVES
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Natural Attenuation, LUCs and Monitoring	Alternative 3: In-Situ Biological Treatment (ORC/HRC), LUCs, and Monitoring	Alternative 4: In-Situ AS Treatment, LUCs, and Monitoring	Alternative 5: Extraction, On-Site Treatment & Surface Discharge, LUCs, and Monitoring
Implementability	Technical and administrative implementation would be extremely simple because there would be no action to implement.	Technical implementation of the monitoring would be simple. Administrative implementation of the LUCs would be simple.	Technical implementation of the in-situ bioremediation would be simple although it would create temporary site disruptions, and the number of qualified contractors would be limited. Technical implementation of the monitoring would be simple. Administrative implementation of the LUCs would be simple. A construction permit might be required for the installation of the ORC/HRC injection points.	Technical implementation of the in-situ AS treatment would be significantly more complex than that of in-situ bioremediation and create much greater site disruptions. However, implementation would still be technically possible and site disruptions would be acceptable. Technical implementation of the monitoring would be simple. Administrative implementation of the LUCs would be simple. Construction permits would be required for the installation of the in-situ AS treatment systems.	Technical implementation of the extraction and on-site treatment would be simpler than that of the in-situ AS treatment. Installation and O&M of the limited number of extraction wells and small on-site treatment systems would be simple and would not create significant site disruptions. Implementation of the surface discharge, disposal of treatment residues, and monitoring would be simple. Administrative implementation of the LUCs would be simple. A construction permit would be required, and the substantive requirements of an NPDES permit would have to be met.
Costs:					
Capital	$0	$5,000	$1,265,000	$1,636,000	$1,109,000
NPW of O&M	$0	$519,000 (20 Years)	$352,000 (5 Years)	$564,000 (5 Years)	$1,542,000 (15 Years)
NPW	$0	$524,000 (20 Years)	$1,617,000 (5 Years)	$2,200,000 (5 Years)	$2,651,000 (15 Years)

NOTES:

ARARs	Applicable or relevant and appropriate requirements
AS	Air sparging
COCs	Chemicals of concern
HRC	Hydrogen release compound
LUCs	Land use controls
NPDES	National Pollutant Discharge Elimination System
NPW	Net present worth
ORC	Oxygen release compound
O&M	Operation and maintenance
RAO	Remedial Action Objective
TBC	To-be-considered (criterion)

TABLE 2-6

FEDERAL CHEMICAL-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Safe Drinking Water Act (SDWA) Regulations, Maximum Contaminant Levels (MCLs)	40 Code of Federal Regulations (CFR) Part 141	Relevant and Appropriate	Establishes enforceable standards for potable water for specific contaminants that have been determined to adversely affect human health.	Will be used to establish protective levels for groundwater that are potential drinking water sources.
SDWA Regulations, National Secondary Drinking Water Standards (SMCLs)	40 CFR Part 143	To Be Considered (TBC)	Establishes welfare-based standards for public water systems for specific contaminants or water characteristics that may affect the aesthetic qualities of drinking water.	Will be considered to establish protective levels for groundwater that are potential drinking water sources.
United States Environmental Protection Agency (U.S. EPA) Office of Drinking Water, Health Advisories	NA	Potential TBC	Estimates of non-carcinogenic risk due to consumption of contaminated drinking water.	Were used to calculate human health risk associated with potential exposure to groundwater as part of the Preliminary Risk Assessment (PRE).
Cancer Slope Factors (CSFs)	NA	TBC	Guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Were considered for development of human health protection cleanup goals for soil and groundwater at these sites.
Reference Doses (RfDs)	NA	TBC	Guidance values used to evaluate the potential noncarcinogenic hazard caused by exposure to contaminants.	Were considered for development of human health protection cleanup goals for soil and groundwater at these sites.

NA Not applicable

TABLE 2-7

STATE CHEMICAL-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Groundwater Classes, Standards and Exemptions	Florida Administrative Code (FAC) Chapter 62-520.100	Applicable	This rule designates the groundwater of the State into five classes and establishes minimum "free from" criteria. This rule also specifies that Classes I and II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	This rule was used to establish cleanup goals for groundwater that is a potential source of drinking water.
Drinking Water Criteria	FAC Chapter 62-550	TBC	This rule provides primary and secondary drinking water quality criteria.	This rule was considered for the development of groundwater cleanup goals.
Contaminant Cleanup Target Levels Rule	FAC Chapter 62-777	TBC	This rule provides guidance for soil, groundwater, and surface water cleanup levels that can be developed on a site-by-site basis.	This rule was considered for the development of soil and groundwater cleanup goals.

TABLE 2-8

FEDERAL LOCATION-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken

There are no federal Location-Specific ARARs

TABLE 2-9

STATE LOCATION-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken

There are no State Location-Specific ARARs

TABLE 2-10

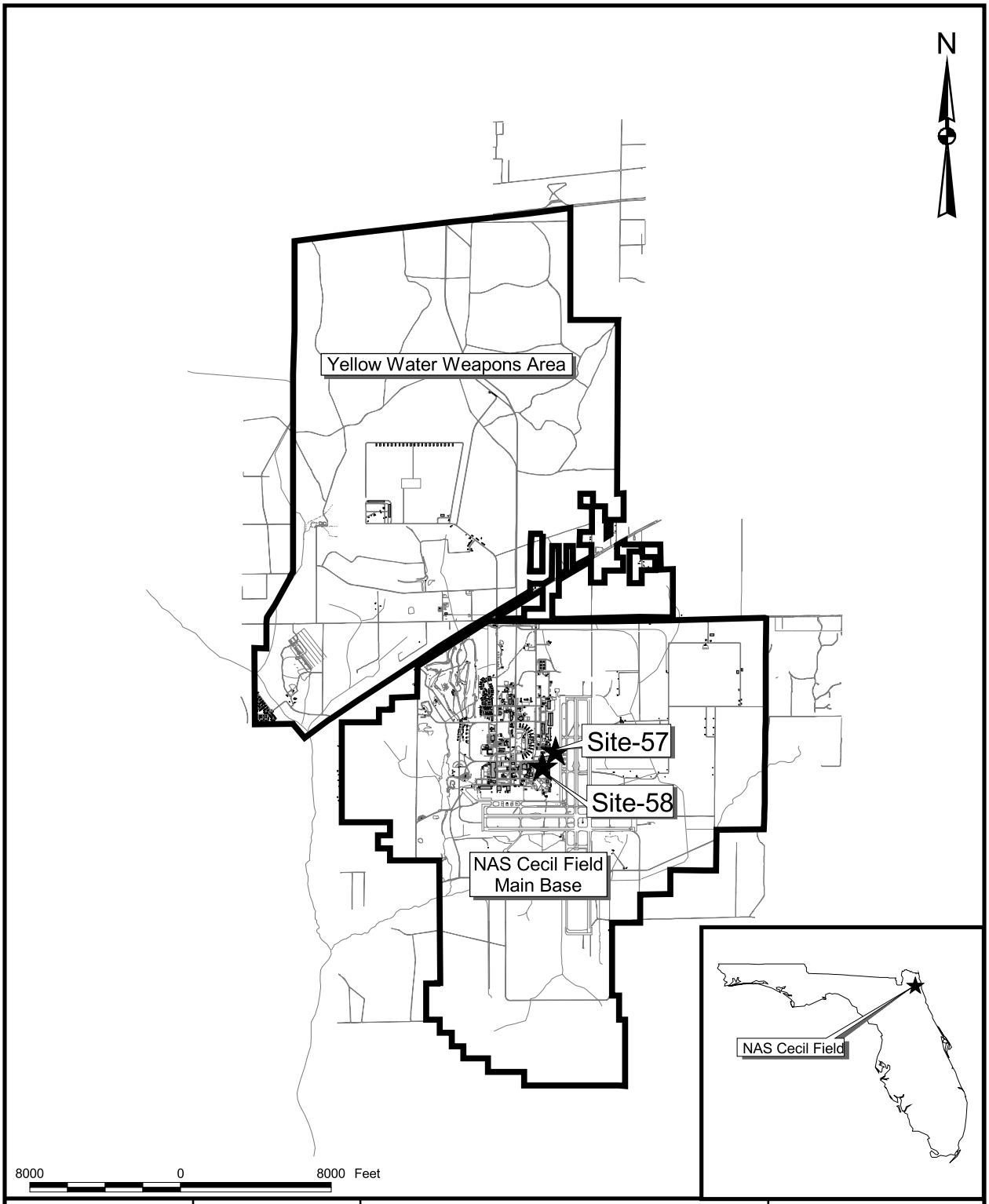
FEDERAL ACTION-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Occupational Safety and Health Act (OSHA) General Industry Standards	29 Code of Federal Regulations (CFR) Part 1910	Applicable	Requires establishment of programs to assure worker health and safety at hazardous waste sites, including employee-training requirements.	These regulations will apply to all soil and groundwater remedial activities.
OSHA, Occupational Health and Safety Regulations	29 CFR Part 1910, Subpart Z	Applicable	Establishes permissible exposure limits for workplace exposure to a specific listing of chemicals.	Will be applied to control worker exposure to OSHA hazardous chemicals during remedial activities.
OSHA Recordkeeping, Reporting, and Related Regulations	29 CFR Part 1904	Applicable	Provides recordkeeping and reporting requirements applicable to remedial activities.	These requirements will apply to all site contractors and subcontractors and will be followed during all site work.
OSHA Health and Safety Standards	29 CFR Part 1926	Applicable	Specifies the type of safety training, equipment, and procedures to be used during the remediation.	All phases of the remedial response project will be executed in compliance with these standards.
Resource Conservation and Recovery Act (RCRA) Contingency Plan and Emergency Procedures	40 CFR 264, Subpart D	Potentially Relevant and Appropriate	Outlines requirements for emergency procedures to be followed in case of an emergency.	The administrative requirements established in this rule will be met for remedial actions involving the management of hazardous waste.

TABLE 2-11

STATE ACTION-SPECIFIC ARARs
OU 9, SITES 57 AND 58 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Florida Water Well Permitting and Construction Requirements – March 1992	Florida Administrative Code (FAC) Chapter 62-532	Applicable	Establishes minimum standards for the location, construction, repair, and abandonment of water wells. Permitting requirements and procedures are established.	The substantive requirements for permitting will be met for the construction, repair, or abandonment of monitoring wells.
Florida Rules on Hazardous Waste Warning Signs – July 1991	FAC Chapter 62-736	Applicable	Requires warning signs at identified hazardous waste sites to inform the public of the presence of potentially harmful conditions.	This requirement will be met.



DRAWN BY MJJ	DATE 24Jan02	SITE LOCATION MAP, SITES 57 AND 58 OU 9, SITES 57 & 58 - ROD NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

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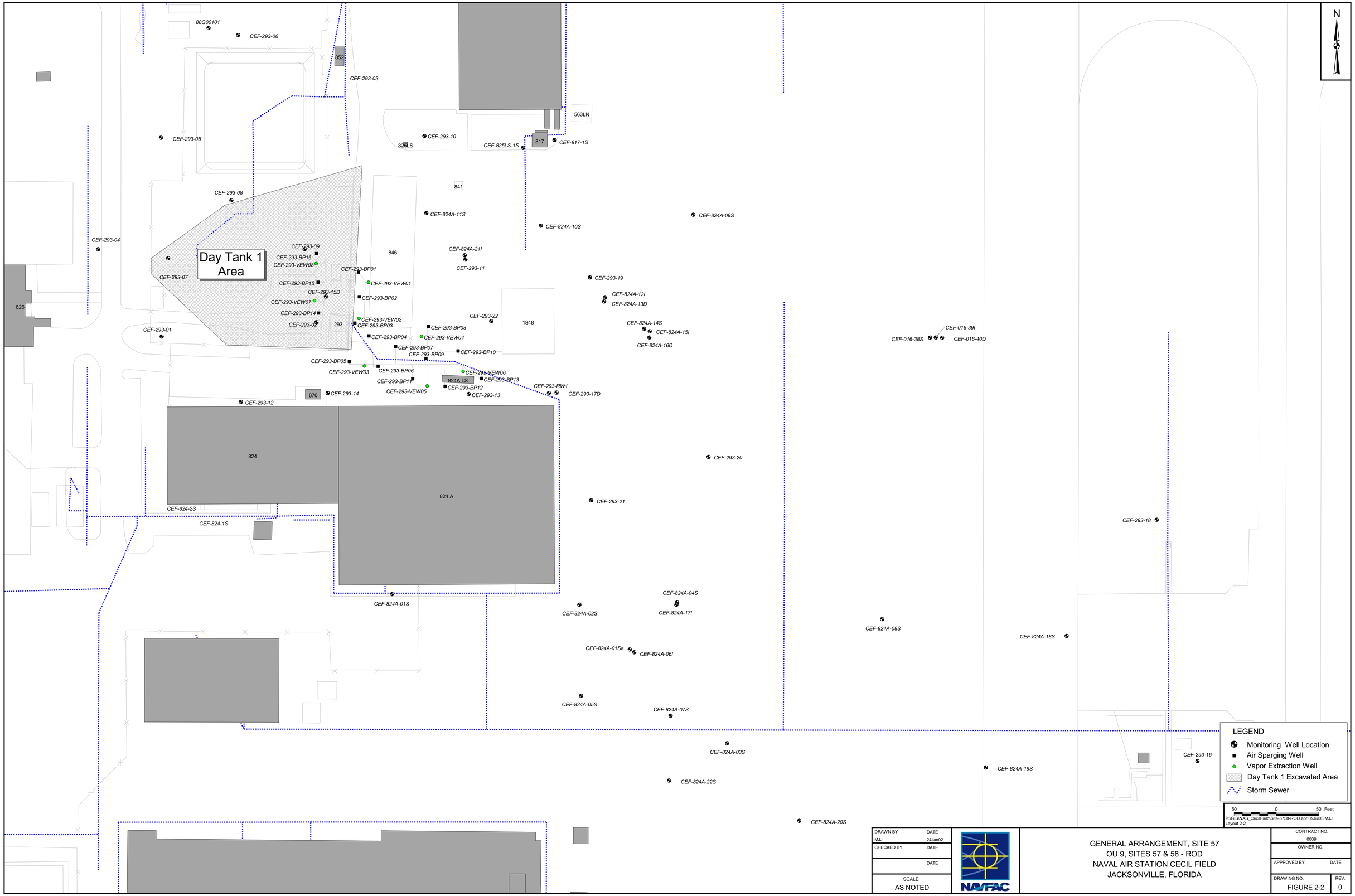
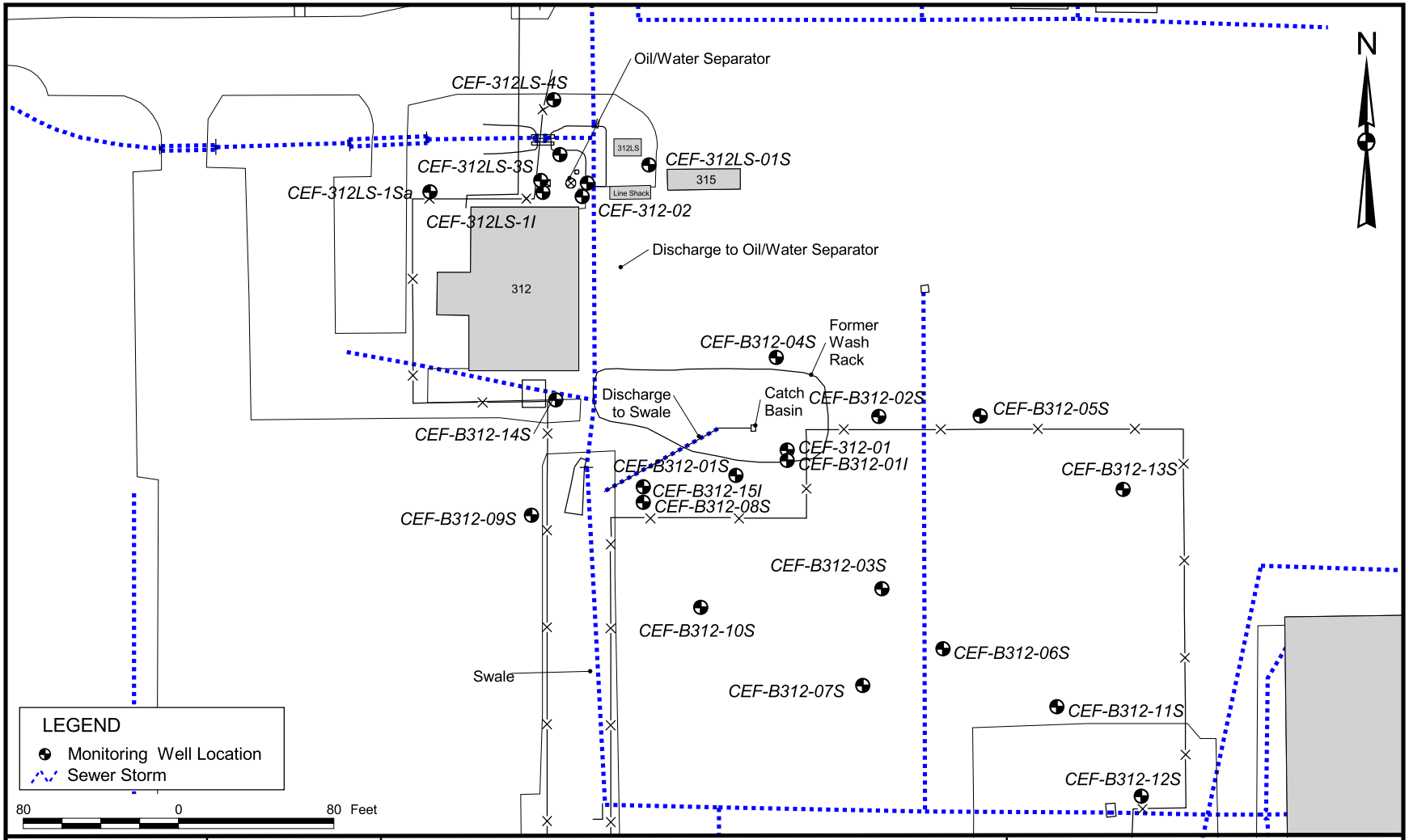


DRAWN BY MJJ	DATE 24Jan02	GENERAL ARRANGEMENT, SITE 57 OU 9, SITES 57 & 58 - ROD NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0039
CHECKED BY	DATE		OWNER NO.
	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 / REV. 0



DRAWN BY	DATE
MJJ	08Jun01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

NAVFAC

GENERAL ARRANGEMENT, SITE 58
OU 9, SITES 57 & 58 - ROD
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-3	REV 0

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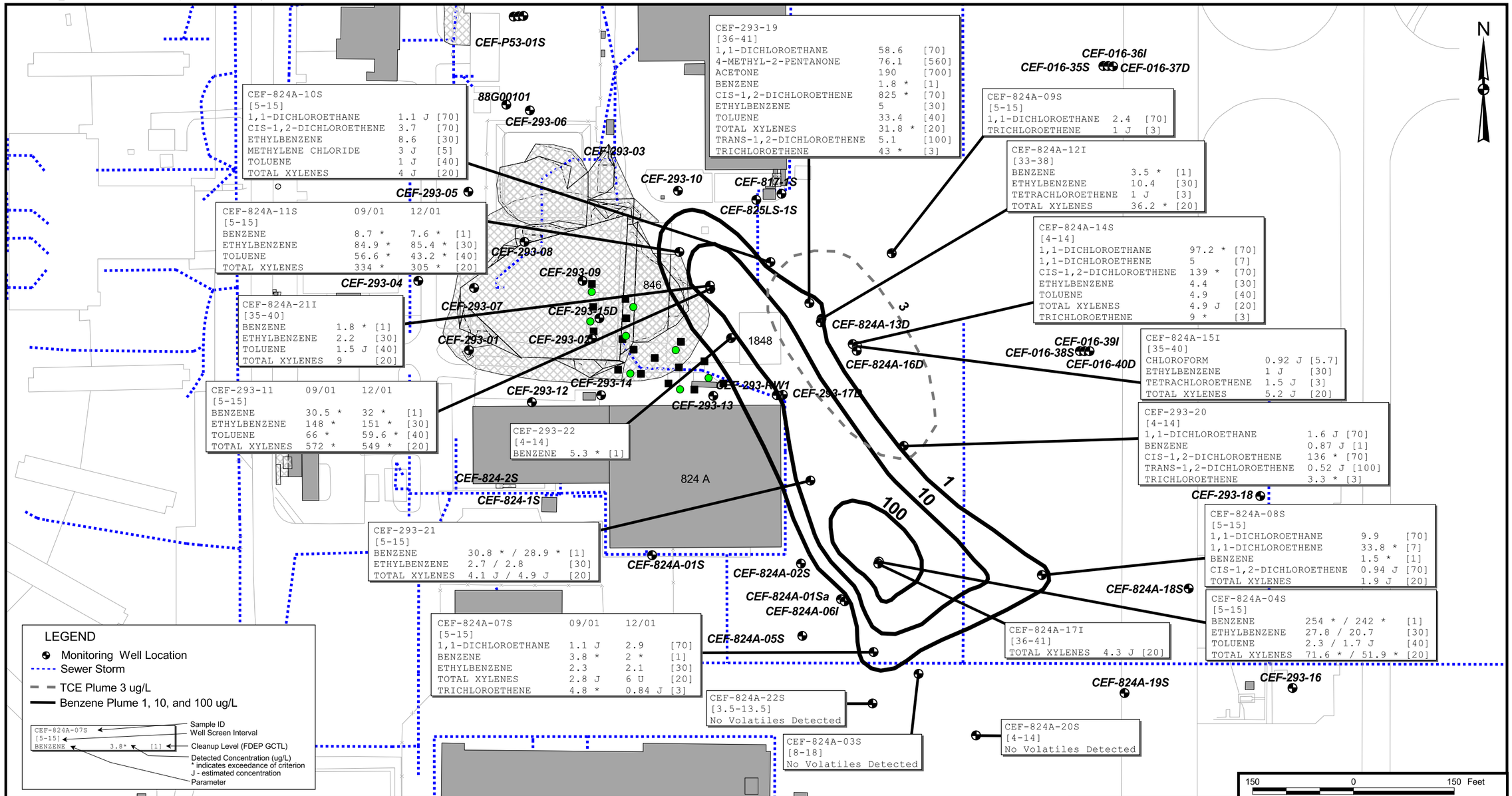

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ DATE 04Feb02
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

NAVFAC

SITE 57 GROUNDWATER VOCs
RI ANALYTICAL DATA
OU 9, SITES 57 & 58 - ROD
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2-4
REV. 0

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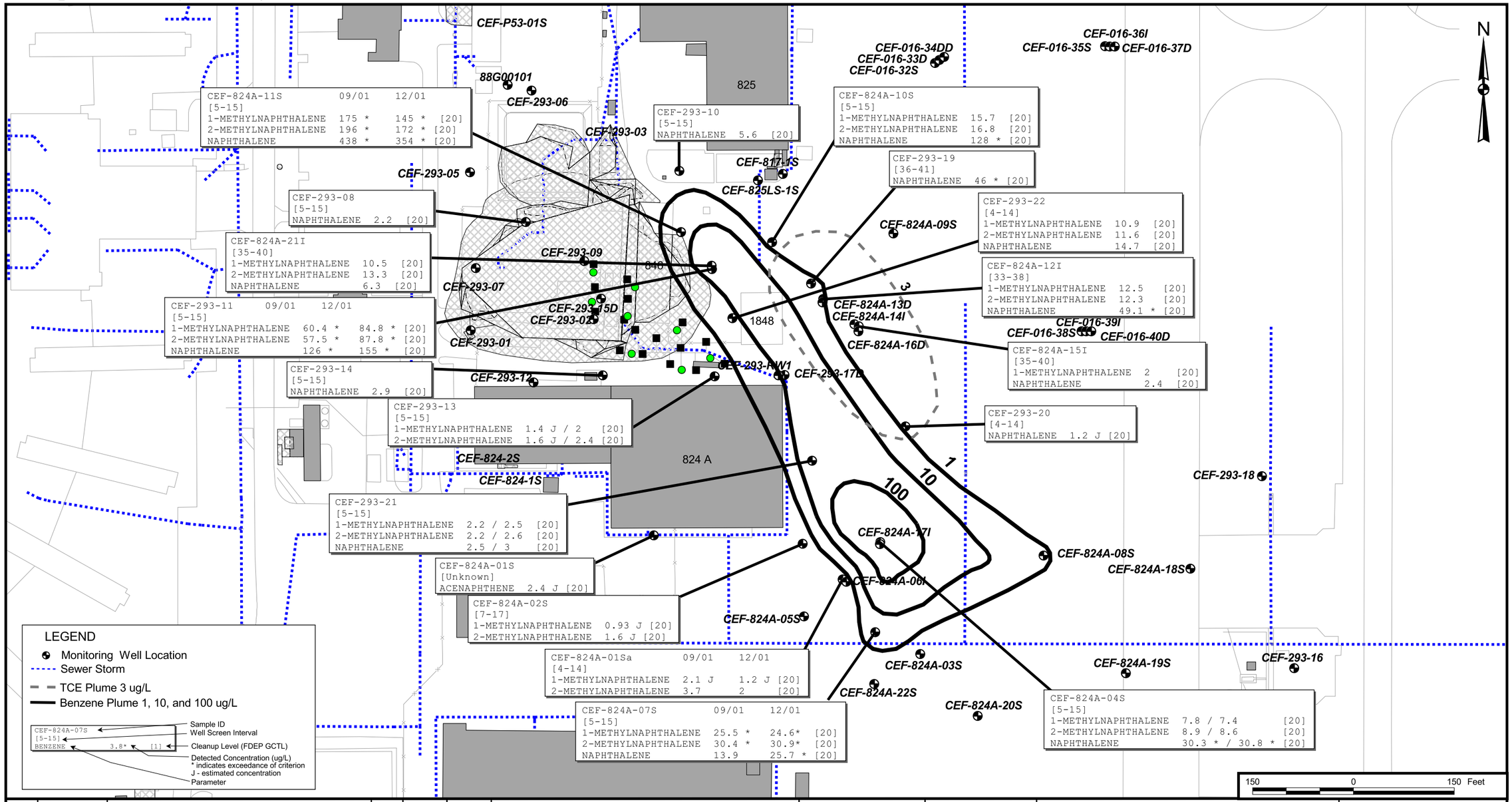

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 04Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

SITE 57 GROUNDWATER PAHs
RI ANALYTICAL DATA
OU 9, SITES 57 & 58 - ROD
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
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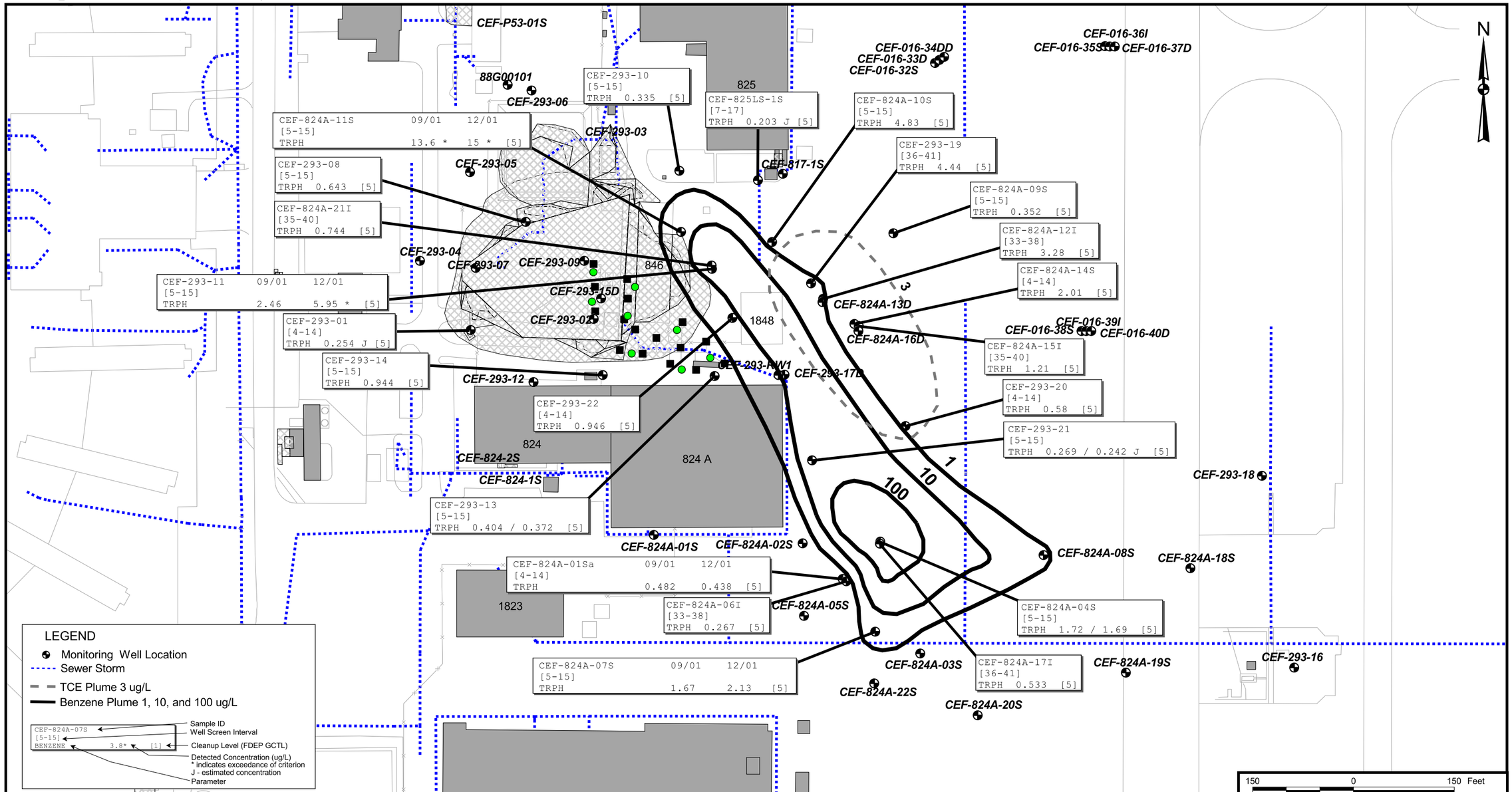
DRAWING NO. FIGURE 2-5	REV. 0

P:\GIS\NAS_CecilField\Site-5758-rod.apr 09Jul03 MJJ Layout 2-6



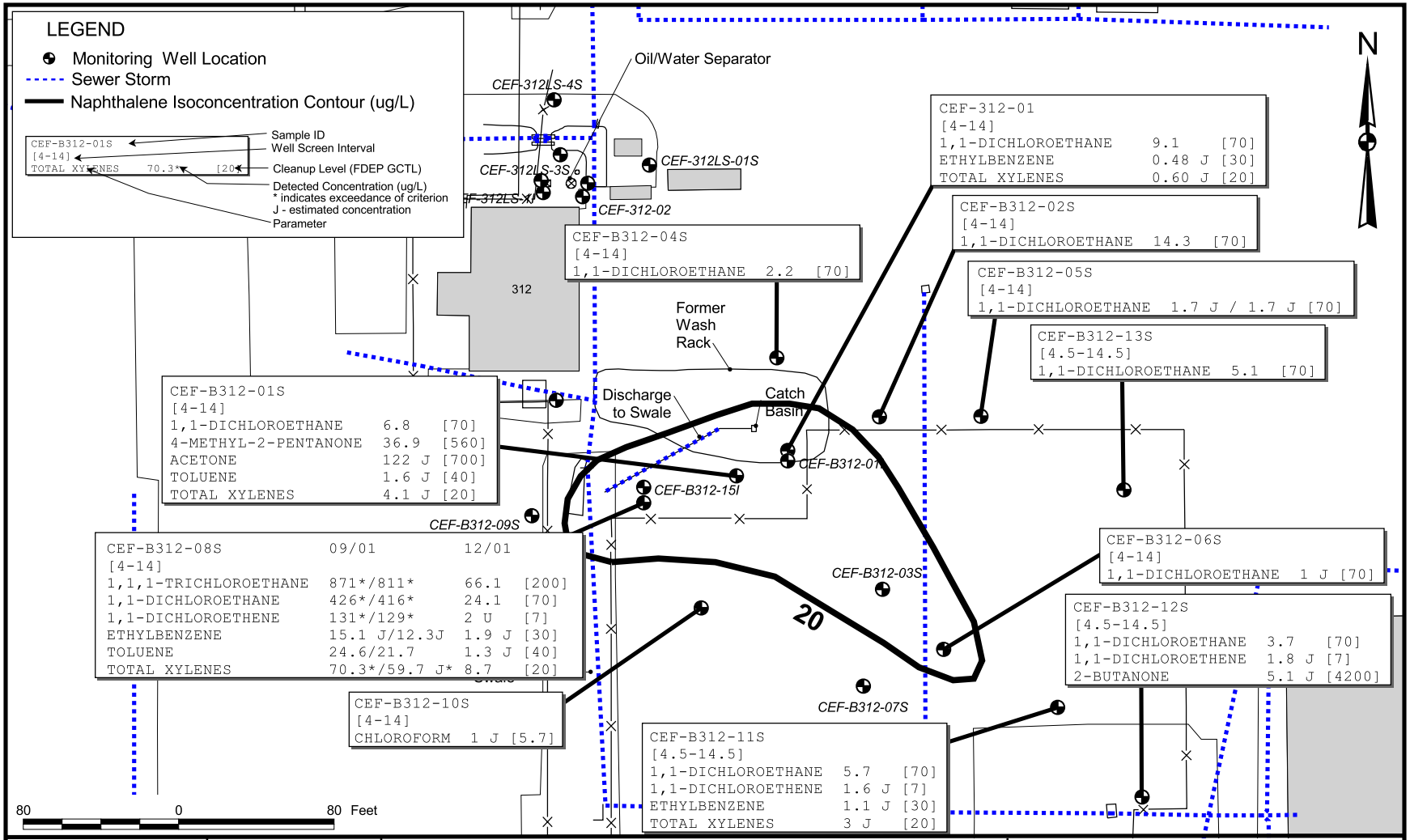
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 04Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

SITE 57 GROUNDWATER TRPH
RI ANALYTICAL DATA
OU 9, SITES 57 & 58 - ROD
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-6	REV. 0



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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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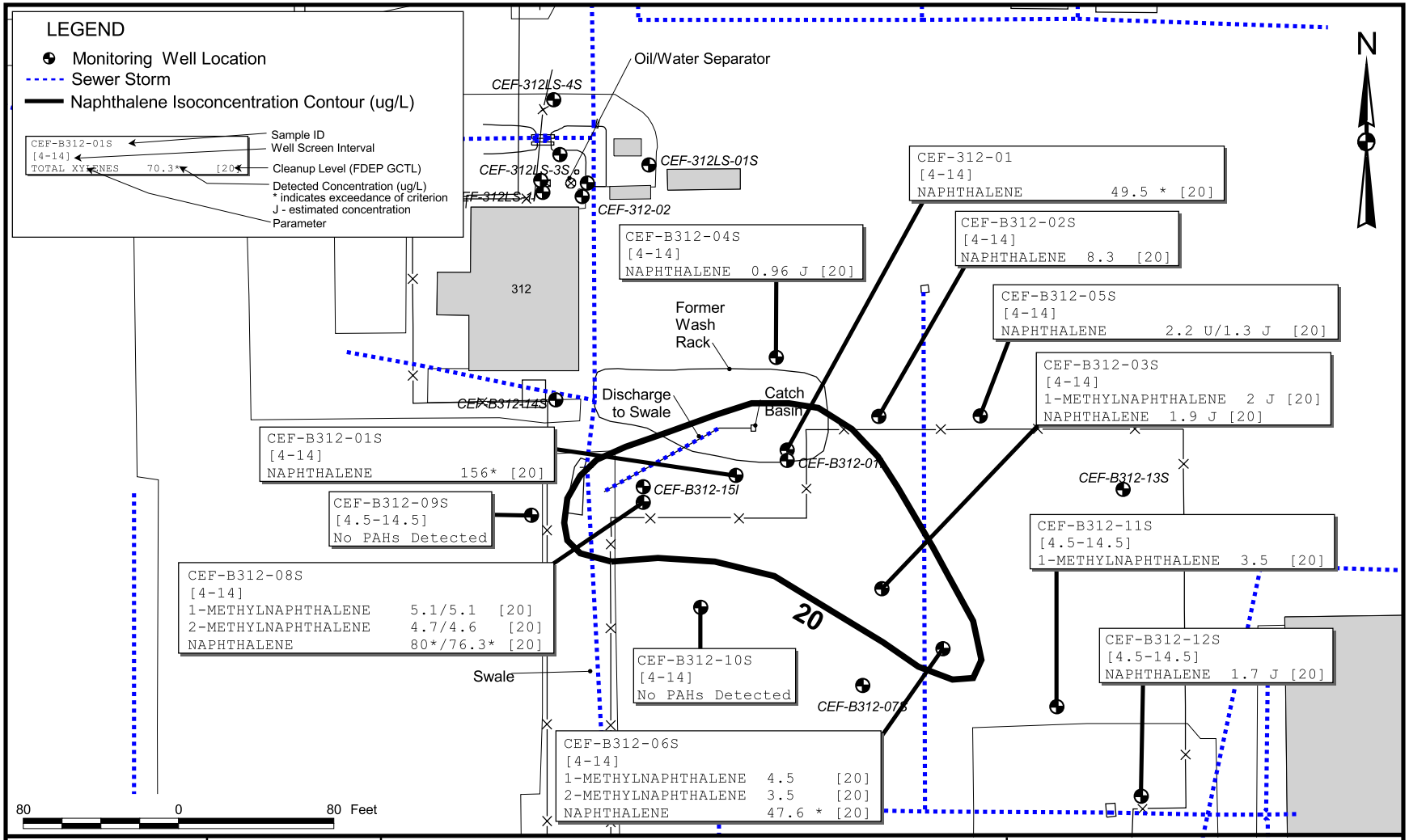

DRAWN BY MJJ	DATE 05Feb02	SITE 58 GROUNDWATER PAHs RI ANALYTIC DATA OU 9, SITES 57 & 58 - ROD NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-8 / REV 0

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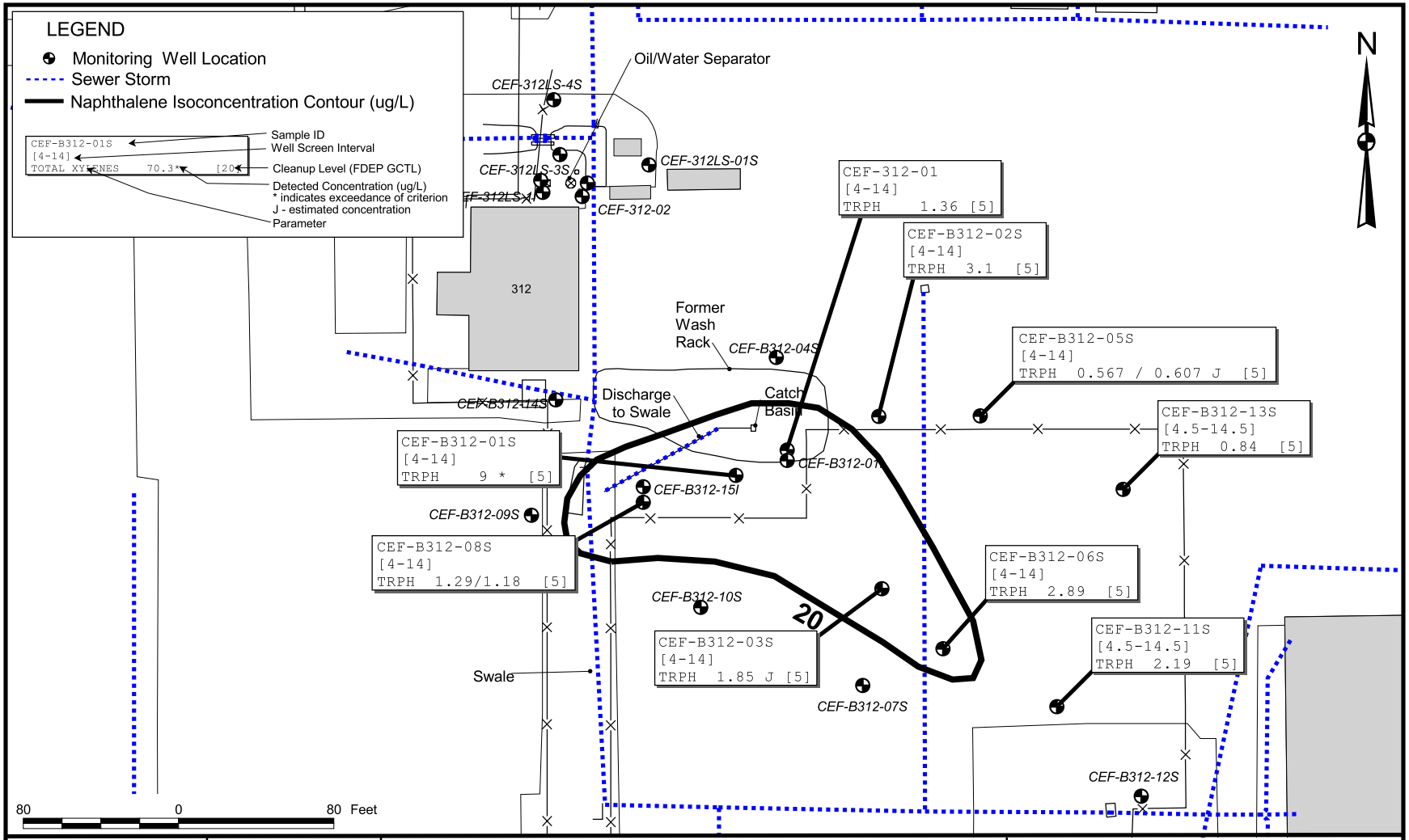

DRAWN BY MJJ	DATE 05Feb02	SITE 58 GROUNDWATER TRPH RI ANALYTICAL DATA OU 9, SITES 57 & 58 - ROD NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-9 / REV 0

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NATURAL ATTENUATION, LAND USE CONTROLS, AND LONG-TERM MONITORING

NATURAL ATTENUATION

- REDUCTION OF GROUNDWATER CONTAMINATION THROUGH NATURALLY OCCURRING PROCESSES (BIODEGRADATION, DISPERSION, DILUTION)

→

LAND USE CONTROLS

- PREVENT CONSUMPTION/USE OF SURFICIAL AQUIFER GROUNDWATER
- MAINTAIN INTEGRITY OF EXISTING AND/OR FUTURE REMEDIATION SYSTEM(S)
- PERFORM ANNUAL SITE INSPECTIONS TO VERIFY CONTINUED IMPLEMENTATION OF LUCs

→

LONG-TERM MONITORING

- COLLECT GROUNDWATER SAMPLES FROM EIGHT EXISTING WELLS AT SITE 57 AND THREE EXISTING WELLS AT SITE 58 AND ANALYZE FOR VOCs, PAHs, AND TRPH:
  - QUARTERLY FOR 1 YEAR
  - SEMI-ANNUALLY FOR 2 YEARS
  - ANNUALLY FOR 2 YEARS AT SITE 58 AND 17 YEARS AT SITE 57

PAHs = Polynuclear aromatic hydrocarbons.
TRPH = Total recoverable petroleum hydrocarbons.
LUCs = Land use controls.

DRAWN BY MJJ	DATE 13Jan04	BLOCK FLOW DIAGRAM SELECTED REMEDY OU 9, SITES 57 & 58 - ROD NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-10 / REV 0

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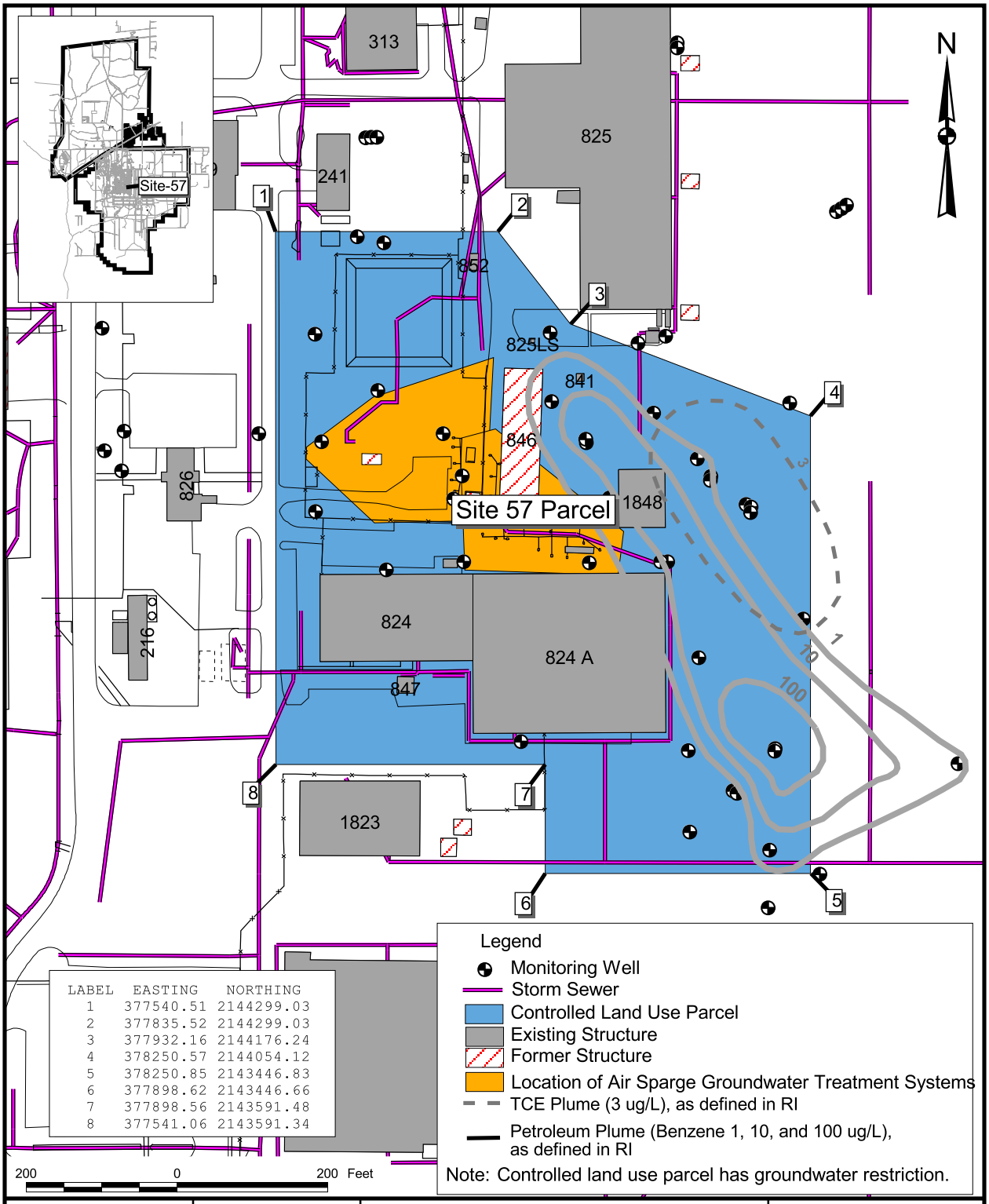

LABEL	EASTING	NORTHING
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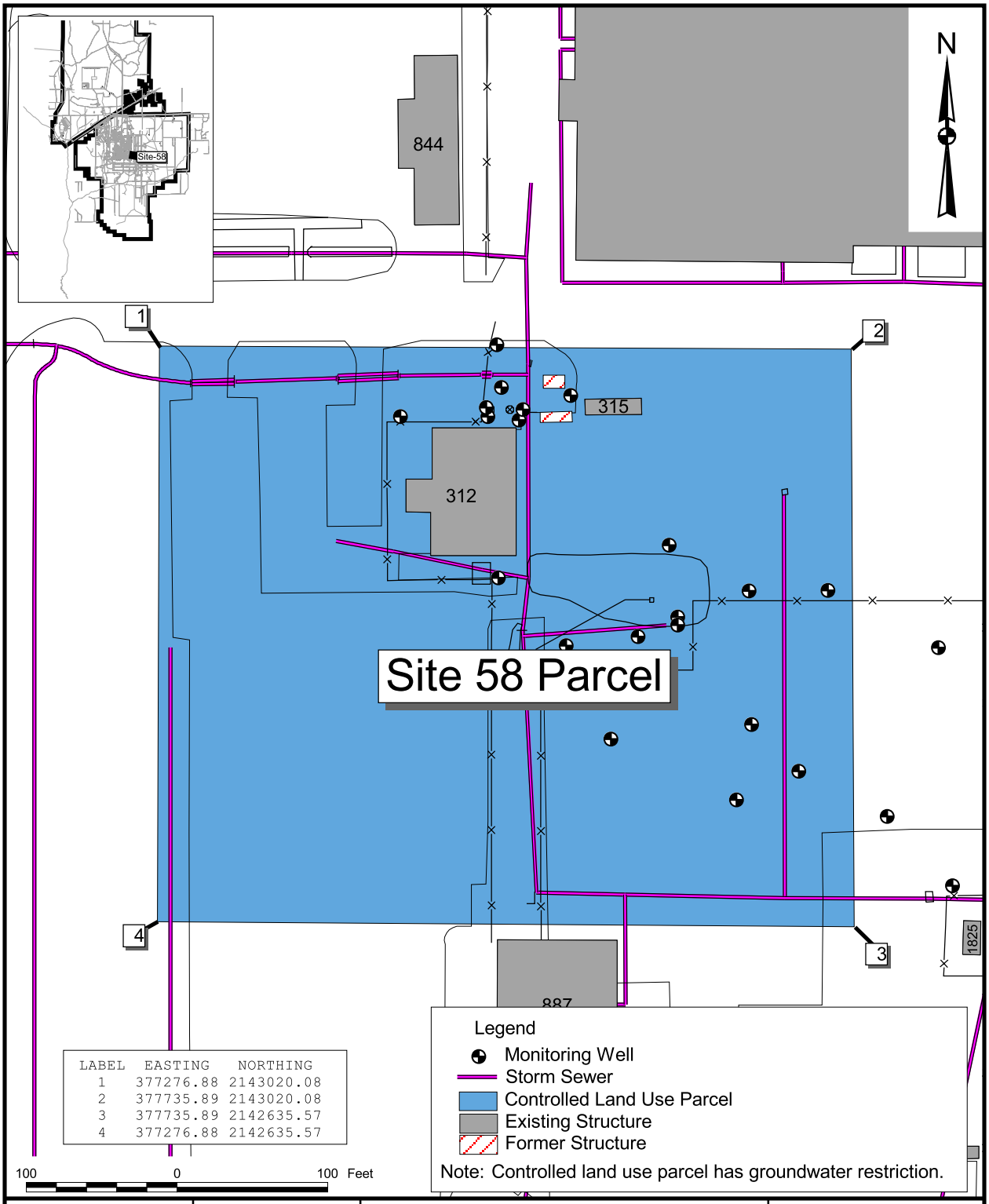
2	377835.52	2144299.03
3	377932.16	2144176.24
4	378250.57	2144054.12
5	378250.85	2143446.83
6	377898.62	2143446.66
7	377898.56	2143591.48
8	377541.06	2143591.34

DRAWN BY MJJ	DATE 04May04	LAND USE CONTROL PARCEL OU 9, SITE 57 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-11 / REV 0

P:\GIS\NAS_CecilField\Site-5758-LUCRD.apr MJJ 26Jan05 Layout09



LABEL	EASTING	NORTHING
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4	377276.88	2142635.57

DRAWN BY MJJ	DATE 04May04	LAND USE CONTROL PARCEL OU 9, SITE 58 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-12 / REV 0

P:\GIS\NAS_CecilField\Site-5758-LUCRD.apr MJJ 26Jan05 Layout10

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APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Public notice of the availability of the Proposed Plan was placed in the Metro edition of the *Florida-Times Union* on July 14, 2003. This local edition targets the communities closest to NAS Cecil field. A 30-day public comment period was held from July 14 to August 13, 2003. Provisions for the public to request a public meeting to discuss the Proposed Plan were also described in the public notice. No comments were received during the 30-day comment period.

APPENDIX B

ESTIMATED COSTS OF SELECTED REMEDY

NAVAL AIR STATION CECIL FIELD
Jacksonville, Florida
SITES 57 & 58
Groundwater Remedial Alternative 2: Natural Attenuation, Institutional Controls, and Monitoring
Capital Cost

4/17/2003 4:29 AM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 INSTITUTION CONTROLS											
1.1 Prepare Deed Restrictions & LUC	100	hr			$30.00		$0	$0	$3,000	$0	$3,000
Subtotal							$0	$0	$3,000	$0	$3,000
Local Area Adjustments							100.0%	120.5%	88.0%	88.0%	
							$0	$0	$2,640	$0	$2,640
Overhead on Labor Cost @ 30%									$792		$792
G & A on Labor Cost @ 10%									$264		$264
G & A on Material Cost @ 10%								$0			$0
G & A on Subcontract Cost @ 10%							$0				$0
Total Direct Cost							$0	$0	$3,696	$0	$3,696
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$370
Subtotal											$4,066
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$4,066
Contingency on Total Field Costs @ 20%											$813
Engineering on Total Field Cost @ 0%											$0
TOTAL CAPITAL COST											**$4,879**

NAVAL AIR STATION CECIL FIELD
Jacksonville, Florida
SITES 57 & 58
Groundwater Remedial Alternative 2: Natural Attenuation, Institutional Controls, and Monitoring
Annual Cost

4/17/2003 4:29 AM

Item	Item Cost year 1	Item Cost years 2 and 3	Item Cost years 4 to 5	Item Cost years 6 to 20	Item Cost every 5 years	Notes
LUC Inspection and Sampling	$44,000	$22,000	$11,000	$7,700		Labor, Field Supplies, Local Travel
Analysis/Water(1) (Performance)	$61,488	$30,744	$15,372	$4,352		Analyze twelve groundwater sample for TCL VOCs, TCL SVOCs, TRPH, natural attenuation, and including blanks and duplicates for years 1 through 5. Analyze eight groundwater sample for TCL VOCs, TCL SVOCs, TRPH, and including blanks and duplicates for years 6 through 20.
Analysis/Water(1) (Migration)	$23,936	$11,968	$5,984	$4,353		Analyze eleven groundwater sample for TCL VOCs, TCL SVOCs, and TRPH including blanks and duplicates for years 1 through 5. Analyze eight groundwater sample for TCL VOCs, TCL SVOCs, TRPH, and including blanks and duplicates for years 6 through 20.
Report	$32,000	$16,000	$8,000	$8,000		Document site inspections, sampling events and results.
Site Review					$7,500	Perform 5-Year review (10% of the total cost)
TOTALS	$161,424	$80,712	$40,356	$24,405	$7,500	

(1) Sampling frequency will occur quarterly the first year, semi-annual for years 2 & 3, and annually for years 4 through 20.

NAVAL AIR STATION CECIL FIELD
Jacksonville, Florida
SITES 57 & 58
Groundwater Remedial Alternative 2: Natural Attenuation, Institutional Controls, and Monitoring
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$4,879		$4,879	1.000	$4,879
1		$161,424	$161,424	0.935	$150,931
2		$80,712	$80,712	0.873	$70,462
3		$80,712	$80,712	0.816	$65,861
4		$40,356	$40,356	0.763	$30,792
5		$47,856	$47,856	0.713	$34,121
6		$24,405	$24,405	0.666	$16,254
7		$24,405	$24,405	0.623	$15,204
8		$24,405	$24,405	0.582	$14,204
9		$24,405	$24,405	0.544	$13,276
10		$31,905	$31,905	0.508	$16,208
11		$24,405	$24,405	0.475	$11,592
12		$24,405	$24,405	0.444	$10,836
13		$24,405	$24,405	0.415	$10,128
14		$24,405	$24,405	0.388	$9,469
15		$31,905	$31,905	0.362	$11,550
16		$24,405	$24,405	0.339	$8,273
17		$24,405	$24,405	0.317	$7,736
18		$24,405	$24,405	0.296	$7,224
19		$24,405	$24,405	0.277	$6,760
20		$31,905	$31,905	0.258	$8,231
				TOTAL PRESENT WORTH	**$523,992**