Five-Year Review

Naval Air Station Cecil Field

Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0066

August 2000

OU 1, Site 1, View from Perimeter Road Looking East. Access Road is on left.

OU 1, Site 1, Rubble Pile in Southwest Corner of Site

OU 1, Site 2, View from North Side of Site Looking South. Monitoring Well CEF-2-4S on the Right.

OU 1, Site 2, View of Rowell Creek Looking Northeast (Upstream) from Site

OU 1, Site 2, Orange Flocculent at Monitoring Point RR3

OU 1, Site 2, Spring Area near Monitoring Point RR1

OU 2, Site 5, View from Perimeter Road from Northwestern Corner of the Site Looking Southeast. Monitoring Well CEF-5-LTM-01 is on the Left

OU 2, Site 5, View of Drainage Ditch Along Southern Edge of the Site Looking East

OU 2, Site 17, View from Perimeter Road at South End of the Site Looking East

OU 2, Site 17, View of the Site from the East Side Looking West. Monitoring Well CEF-17-LTM-03S is in the Foreground

OU 3, Site 7, View of the Site Looking West

OU 4, Site 10, View from Perimeter Road and Access Road Intersection Looking North

OU 4, Site 10, View from Access Road Looking West

OU 6, Site 11, View of the Site Looking East

OU 6, Site 11, Area of Anomaly #2

OU 7, Site 16, View of the Source Area and AS/SVE System Looking East. Steel Stand is a Weight Over the Monitoring Well Cover for CEF-16-MW-45I and the Square Covers are for the Injection Wells (IW-01 and IW-02) and Extraction Well EW-14

OU 7, Site 16, View of the AS/SVE System Equipment

OU 7, Site 16, View of the AS/SVE System Equipment, Carbon Units in Background

OU 7, Site 16, View of the AS/SVE Well System Components

OU 7, Site 16, View of the Source Area Looking West. Square Covers are for the Extraction Wells.

OU 7, Site 16, View of the Surface Area Above the Plume Area Looking South

OU 7, Site 16, View of the Surface Area Above the Storm Sewer Repair Area Looking Southeast from the North End of the Repair

OU 8, Site 3, View of the AS System from the Lake Fretwell Access Road Looking North

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OU 3, Site 7, Panoramic View from the North End of the Site Looking South, Building 865 is on the Right.

OU 3, Site 8, Panoramic View of the Boresite Overhang

OU 3, Site 8, Panoramic View of the Site Looking South/ Southeast. Monitoring Well CEF-8-10S is on the Left.

OU 3, Site 8, Panoramic View of the Firefighting Training Pits. Monitoring Well CEF-8-16S is in the Foreground.

OU 3, Site 8, Panoramic View of the Site Looking West

OU 8, Site 3, Panoramic View of the Site Looking South. Monitoring Wells DCEF-3-13S,-14I,-15D, and-33DD are on the Right. The truck is on the Lake Fretwell Access Road.

OU 8, Site 3, Panoramic View of the Site from the intersection of Perimeter and Lake Fretwell Access Roads Looking East

OU 8, Site 3, Panoramic View of the Helicopter Crash Site Area Looking South

089919/P

FIVE-YEAR REVIEW

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

Submitted by:
Tetra Tech NUS, Inc.
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Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0066

AUGUST 2000

PREPARED UNDER THE SUPERVISION OF:

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EPA Five-Year Review Signature Cover

Key Review Information

Site Identification			
Site Name: Naval Air Station Cecil Field			EPA ID: *FL5170022474*
Region: 4	State: FL	City/County: Jacksonville/Duval and Clay	
Site Status			
NPL Status: Final			
Remediation Status (under construction, operating, complete): Under Construction and Operating			
Multiple OU's* (highlight): Y N		Number of OU's: 9	
Construction Completion Date: To be determined			
Fund/PRP/Federal Facility Lead: Federal Facility		Lead Agency: Department of the Navy, Southern Division Naval Facilities Engineering Command	
Has site been put into reuse? (highlight): Y N			
Review Status			
Who conducted the review (EPA Region, State, Federal Agency): Southern Division Naval Facilities Engineering Command			
Author Name: Mark Davidson		Author Title: Remedial Project Manager	
Author Affiliation: Department of the Navy, Southern Division Naval Facilities Engineering Command			
Review Period: April 1999 to June 1999		Date(s) of Site Inspection: April 1999	
Highlight: Statutory Policy	Policy Type (name): 1. Pre-SARA 2. Ongoing 3. Removal Only 4. Regional Discretion	Review Number (1, 2, etc) 1	
Triggering Action Event: Interim ROD Signature for OU 7, Site 16			
Trigger Action Date: *June 2, 1994*			
Due Date: *June 2, 1999*			

* OU refers to Operable Unit

Deficiencies:

No deficiencies were discovered during the five-year review. The Navy still owns the property that is contaminated above action levels. Many of the remedial actions were implemented recently or are currently under construction.

Recommendations and Required Actions:

Implement institutional controls prior to the Navy transferring any contaminated property to the City of Jacksonville, Jacksonville Economic Development Commission, and the Jacksonville Port Authority. The institutional controls are currently being prepared and will be implemented as Land Use Implementation Control Plans (LUCIPs). The restrictions identified in the LUCIPs are designed to ensure continued protection of human health and the environment. When the Navy transfers the property to the Jacksonville Economic Development Commission, Jacksonville Port Authority, or the City of Jacksonville, these LUCIPs must be adopted by the new property owner by way of deed restrictions, notices, or other agreements. The LUCIPs and institutional controls will be implemented unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure.

Protectiveness Statement(s):

The remedial actions at the OUs at NAS Cecil Field will be protective of human health and the environment upon completion of the remedial actions (long-term groundwater monitoring and operation of the AS and AS/SVE system). Remedial actions for immediate threats of exposure have been (OU 2, Sites 5 and 17 and OU 7, Site 16) or will be (OU 3, Sites 7 and 8; OU 4, Site 10; and OU 6, Site 11) implemented by the year 2000. However, many of the remedial actions currently being implemented will require more than 5 years to complete.

This five-year review shows that the Navy is meeting or exceeding the requirements of the RODs for the OUs at NAS Cecil Field. The Navy is constantly reevaluating to utilize permanent remedies and alternative treatment technologies to the maximum extent practical for each OU.

Other Comments:

The majority of the flightline was transferred to the Jacksonsville Port Authority in the fall of 1999. The Navy retained ownership of the property on the flightline associated with the operable units that do not have an unrestricted reuse. The Navy will also retain the property associated with the operable units within the Economic Development Conveyance (EDC) parcel that do not have unrestricted reuse. The majority of the EDC is scheduled to be transferred to the Jacksonville Economic Development Commission in the fall of 2000. The operable units will be transferred to Jacksonville Economic Development Commission, Jacksonville Port Authority, or the City of Jacksonville when it has been determined that the remediation systems are operating properly and successfully or when the cleanup levels are achieved, resulting in unlimited use.

Signature of U.S. Department of the Navy and Date

for

R.E. CELLON, CAPT, CEC, USN
Commander
Southern Division
Naval Facilities Engineering Command

9/7/00
Date

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, Tetra Tech NUS, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-94-D-0888 are complete and accurate and comply with all requirements of this contract.

DATE: August 18, 2000

NAME AND TITLE OF CERTIFYING OFFICIAL: Mark Speranza, P.E.
Task Order Manager

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
AIMD	Aircraft Intermediate Maintenance Department
ARAR	Applicable or Relevant and Appropriate Requirements
AS	Air Sparging
AS/SVE	Air Sparging/Soil Vapor Extraction
bgs	Below Ground Surface
BCT	BRAC Cleanup Team
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of Concern
CTO	Contract Task Order
DCBP	1,2-dibromo-3-chloropropane
DCE	Dichloroethene
EOD	Explosive Ordnance Disposal
ESD	Explanation of Significant Differences
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FS	Feasibility Study
HASP	Health and Safety Plan
HLA	Harding Lawson and Associates
IAS	Initial Assessment Study
LUCIP	Land Use Control Implementation Plans
MCL	Maximum Contaminant Level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
QA/QC	Quality Assurance/Quality Control
RAO	Remedial Action Objective

RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SVOC	Semivolatile Organic Compound
TCE	Trichloroethene
TRPH	Total Recoverable Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
U.S. EPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
yd^3	Cubic Yards

1.0 INTRODUCTION

This five-year review has been prepared under Contract Task Order (CTO) 0066 as part of the Comprehensive Long-Term Environmental Action Navy III (CLEAN) Contract No. N62467-94-D-0888 for the Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). Tetra Tech NUS, Inc. (TtNUS) conducted the five-year review of the pending, completed, and ongoing remedial actions implemented at seven of the nine operable units (OU) at Naval Air Station (NAS) Cecil Field, located in southwestern Duval County within the city limits of Jacksonville, Florida. A general site location map of NAS Cecil Field is shown on Figure 1-1, and the locations of the OUs are shown on Figure 1-2. This five-year review was prepared based on remedial actions that were conducted up to June 30, 1999.

The purpose of the five-year review is to determine whether the remedies at the OUs are protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in this report. In addition, this report identifies deficiencies found during the review, if any, and recommendations to address them.

This is the first five-year review for the NAS Cecil Field operable units. The triggering action for the statutory and policy review is the date of the OU 7, Site 16 Interim ROD and Interim Removal Action, as shown in U.S. EPA's WasteLAN database: March 1994. The five-year review is being conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices remain at most of the operable units at NAS Cecil Field.

This five-year review is required by statute for OU 1, Sites 1 and 2 because hazardous substances, pollutants, and contaminants remain at these sites. The U.S. Environmental Protection Agency (U.S. EPA) is responsible for implementing statutory five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). However, by Executive Order 12580, federal facility sites under the jurisdiction, custody, or control of the Department of Defense relieves the U.S. EPA of this responsibility and delegates the responsibility to the Department of Defense. The Navy is the lead agency responsible for this Five-Year Review at NAS Cecil Field, working with the U.S. EPA and the Florida Department of Environmental Protection (FDEP) through the Federal Facilities Agreement (FFA).

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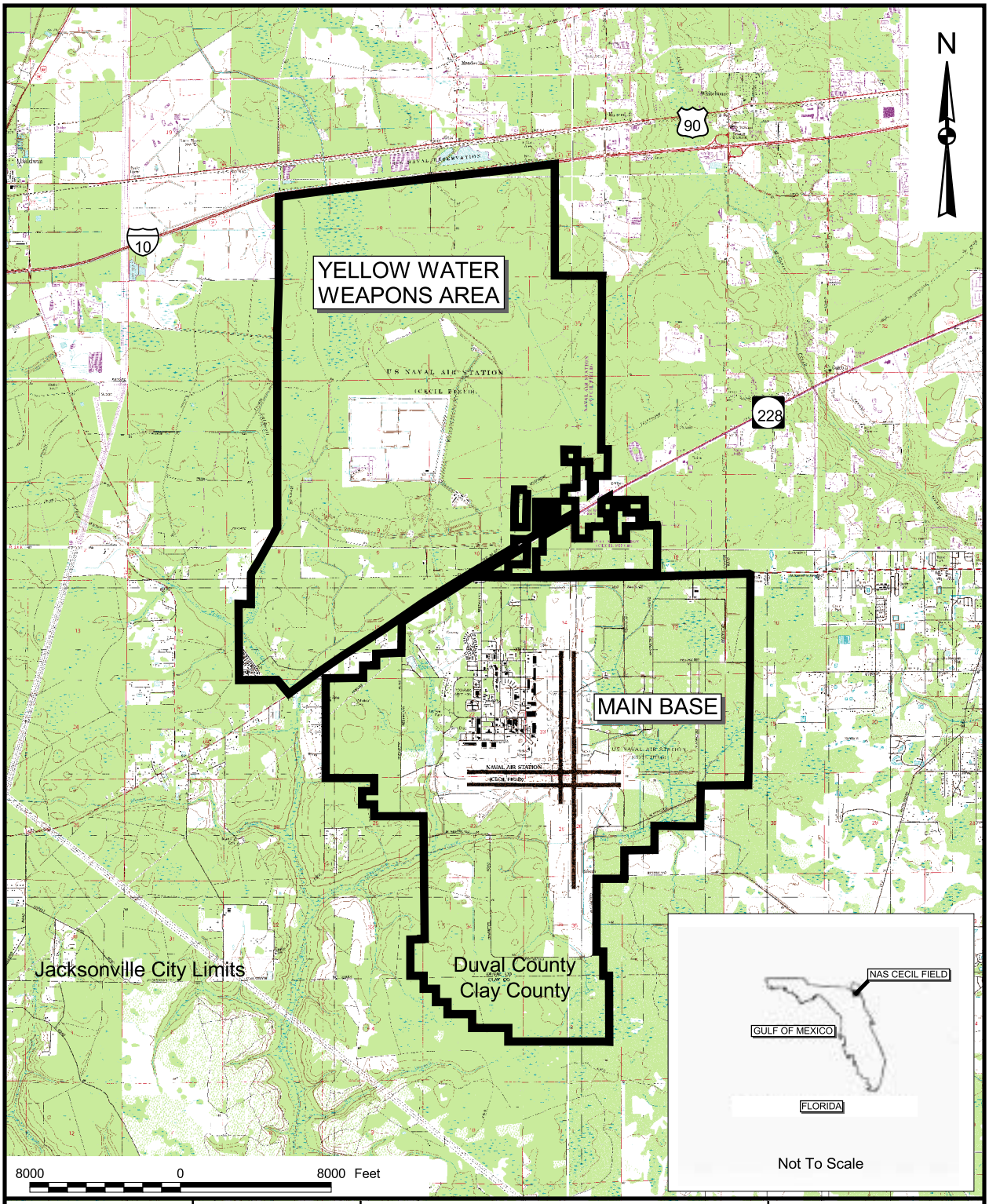
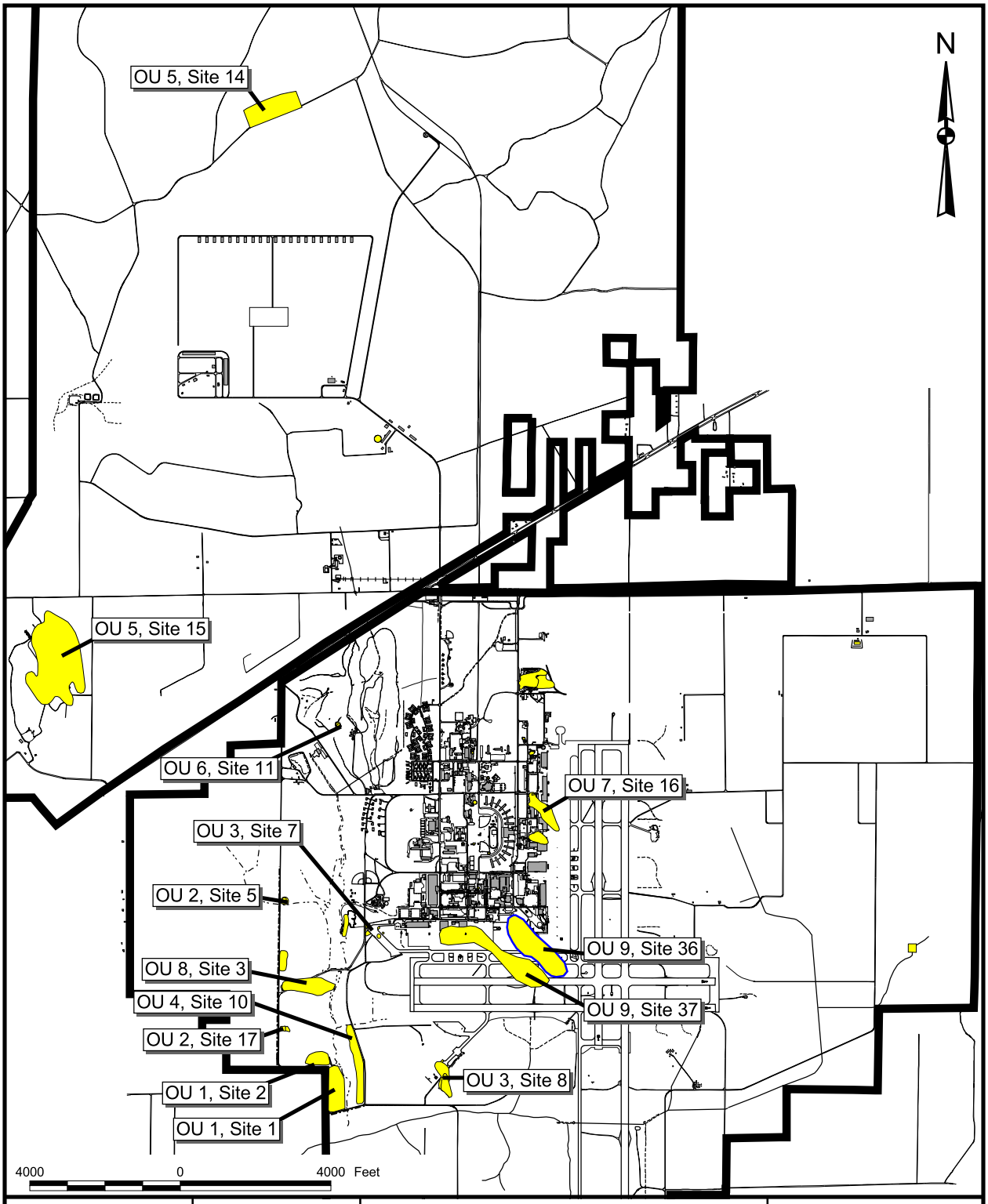


DRAWN BY MJJ	DATE 09August99	GENERAL LOCATION MAP FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY RD	DATE —		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV 0

P:\GIS\CECIL\5yr_review.apr 18August99 MJJ Figure 1-1



DRAWN BY MJJ	DATE 09August99	LOCATION OF OPERABLE UNITS FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY RD	DATE —		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1-2 / REV 0

P:\GIS\CECIL\5yr_review.apr 18August99 MJJ Figure 1-2

This five-year review is also being conducted in accordance with U.S. EPA policy for most of the other OUs at the facility (OU 2, Sites 5 and 17; OU 3, Sites 7 and 8; OU 4, Site 10; OU 6, Site 11; OU 7, Site 16; and OU 8, Site 3). The U.S. EPA conducts five-year reviews as a matter of policy at

(1) Sites where no hazardous substances will remain above levels that allow unlimited use and unrestricted exposure after completion of remedial actions, but where the cleanup levels specified in the Record of Decision (ROD) will require 5 or more years to attain. OU 2, Sites 5 and 17; OU 3, Sites 7 and 8; OU 6, Site 11; OU 7, Site 16; and OU 8, Site 3 were reviewed because the remedial action will require more than 5 years of operation to attain the cleanup levels required by the ROD.

(2) Sites addressed before SARA where the remedy, upon attainment of cleanup level, does not or will not allow unlimited use and unrestricted exposure.

(3) Removal-only sites where hazardous substances remain on site at levels that will not allow unlimited use and unrestricted exposure.

This five-year review did not include OU 5, Sites 14 and 15; and OU 9, Sites 36 and 37. OU 5, Site 14 was not included because five-year reviews are not required when the selected remedial action in the ROD is No Further Action and there have been no changes in the site conditions and the factors contributing to the assumptions underlying the No Further Action decision. OU 5, Site 15 and OU 9, Sites 36 and 37 were not included because these sites are being investigated, no ROD has been prepared that identifies the selected remedial action, and no remedial actions have been conducted at these sites.

This report consists of nine sections and one appendix, as listed below:

- Section 1.0 discusses the purpose of the report, provides a summary of the history and site chronology of NAS Cecil Field, and evaluates the changes that have occurred in the Applicable or Relevant and Appropriate Requirements (ARARs).

- Sections 2.0 through 8.0 are the five-year reviews for OU 1, OU 2, OU 3, OU 4, OU 6, OU 7, and OU 8, respectively, at NAS Cecil Field. Each section includes the OU chronology, background, summary of the remedial actions performed, and the five-year review findings, assessment, deficiency list, recommendations, and protectiveness statements.

- Section 9.0 provides a general summary, conclusions, and protectiveness statement for the NAS Cecil Field facility. This section also identifies when the next five-year review is required and the other tasks that should be performed as part of that five-year review.

- Appendix A contains photographs of each of the operable units.

The five-year review was conducted by the Cecil Field BRAC Cleanup Team (BCT), which includes

- Deborah Vaughn-Wright, U.S. EPA Region 4 Remedial Project Manager
- Michael Deliz, FDEP Remedial Project Manager
- Mark Davidson, Department of the Navy, Southern Division Remedial Project Manager
- Scott Glass, Department of the Navy, Southern Division, BRAC Environmental Coordinator
- Dave Kruzicki, NAS Cecil Field Environmental Director
- Norm Hatch , CH2M Hill Project Manager
- Mark Speranza, TtNUS Task Order Manager

This five-year review consisted of a review of relevant documents, interviews, and a site inspection. In addition, an announcement about the review was provided to the Restoration Advisory Board, which is composed of concerned citizens and is supported by the Partnering Team. The completed report is available in the information repository located at NAS Cecil Field, Building 907 in Jacksonville, Florida. Notice of its preparation was provided to the Restoration Advisory Board.

1.1 OVERVIEW OF NAS CECIL FIELD

The official mission of NAS Cecil Field was to provide facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operating forces. Some of the tasks required to accomplish this mission included operation of fuel storage facilities, provision of facilities and performance of aircraft maintenance, and maintenance and operation of an engine repair facility and test cells for designated turbojet engines. NAS Cecil Field is scheduled to close on September 30, 1999. The following sections provide a history and chronology, as well as the physical and geologic conditions at NAS Cecil Field.

1.1.1 History and Site Chronology

A list of important NAS Cecil Field historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Purchase of 2,600 acres for development of a base	1941
Base officially commissioned with a landing mat and 2 maintenance hangars	December 1941
Four 5,000-foot extensions to landing mat added for training demands	World War II
Became homeport for 2 carrier air groups consisting of 200 aircraft (the first jet squadron)	1949
Purchased 2,000 acres, constructed four 8,000-foot runways to achieve status of master jet base	1951
Expansion and commission of the Naval Magazine Yellow Water as a separate command	1960
Construction of Hangar 824 to increase the capabilities of the Aircraft Intermediate Maintenance Department and jet engine repair	1967
First environmental study for investigation of waste handling and disposal sites	1983 to 1985
Initial Assessment Study completed	1985
RCRA Facility Investigation (RFI) completed	1988
Placed on the National Priorities List (NPL)	1989
Federal Facility Agreement signed	1990
Slated for closure by the Base Realignment and Closure Act (BRAC) Commission and start of the Environmental Baseline Survey	1993
Ceased operations and closed as a result of the BRAC Commission recommendations	1999

The Navy initiated investigation at NAS Cecil Field through Geraghty and Miller in 1983 at the request of the state of Florida. Monitoring wells were installed at several sites. Envirodyne Engineers, Inc. completed an Initial Assessment Study (IAS) in 1985, as part of the Naval Assessment and Control of Installation Pollutants program. This IAS recommended that several of the sites be further characterized. A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed in 1988 by Harding Lawson Associates (HLA). Additional monitoring well installation and analysis of groundwater, surface water, and sediment were completed.

Investigations continued through approval of final RODs for

- OU 1, Sites 1 and 2
- OU 2, Site 17
- OU 3, Sites 7 and 8
- OU 4, Site 10
- OU 5, Site 14

- OU 6, Site 11
- OU 8, Site 3

A final amended ROD has been approved for OU 7, Site 16. An amended ROD is being prepared for OU 2, Site 5 due to changes in conditions at the site and cleanup objectives. A remedial investigation (RI), baseline risk assessment (BRA), and feasibility study (FS) have been completed for OU 5, Site 15; however, the FS is being re-evaluated due to changed site conditions (size of the site has increased), and the Proposed Plan and subsequent ROD are pending. A RI and FS are currently being conducted for OU 9, Sites 36 and 37.

1.1.2 Land Use

NAS Cecil Field occupies approximately 17,200 acres consisting of three distinct areas. This review was conducted for the OUs located at one of the three distinct areas that include

- The main facility, occupying approximately 8,500 acres
- The Yellow Water Weapons Department, occupying approximately 7,900 acres
- Jacksonville Heights, occupying approximately 800 acres

The adjacent land use west and north of NAS Cecil Field is characterized as rural and is predominantly forested. Small communities and scattered dwellings are located in the vicinity, with a small residential area abutting NAS Cecil Field property to the west. The rural surroundings east of NAS Cecil Field grade into a suburban fringe bordering major east-west roadways located to the east. This suburban fringe consists of low-intensity commercial use, an airport, a golf course, and low-density residential areas. The greatest population density is approximately 14 miles to the northeast, in Jacksonville, Florida.

The climatology, topography, geological, hydrogeological, soil, and surface water hydrology characteristics of the site are described in the General Information Report (ABB-ES, 1996).

1.2 ARAR AND SITE-SPECIFIC ACTION LEVELS CHANGES

The five-year review is being conducted for two purposes:

- To determine if the remedial actions are being implemented as specified in the ROD to protect human health and the environment.

- To determine if there have been changes in the ARARs or site-specific action levels that call into question the protectiveness of the remedy.

The ARARs identified in each of the RODs were reviewed, as were new federal and state regulations that have been promulgated. This section describes the new or changed ARARs that address the risk posed to human health or the environment.

The most significant change in the ARARs that has occurred in the past 5 years is related to changes in the state of Florida regulations and guidance. Florida promulgated Chapter 62-785 (Brownfields Criteria Rule) in the Florida Administrative Code (FAC) in July 1998 and promulgated Chapter 62-777 (Contaminant Target Levels Rule) in the FAC in August 1999. These regulations developed risk-based cleanup target levels for chemicals of concern in soil, groundwater, freshwater surface water, and marine surface water.

The state of Florida published the Groundwater Guidance Concentration manual through the Bureau of Groundwater Protection in June 1994. Some of the concentrations in the Groundwater Guidance Concentration manual have not been promulgated; however, these values should be considered when determining cleanup levels for groundwater.

The Base Realignment and Closure (BRAC) and Installation Restoration Programs for NAS Cecil Field developed site-specific action levels, called the Inorganic Background Data Set ("hi-cut values"), that provide sentinel values (upper end background concentrations) for inorganic parameters in soil, groundwater, sediment, and surface water in 1998. The concentrations in the data set have not been promulgated; however, these values should be considered when determining cleanup levels.

The general result of the new regulations, guidance, and the development of the Inorganic Background Data Set is an increase in the allowed contaminant concentrations. In general, these ARAR changes do not currently affect protectiveness, since the cleanup concentrations used for the RODs are conservative and generally represent concentrations lower than the new standards for the contaminants of concern. However, cleanup concentrations for few chemical parameters (2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, 1,1-dichloroethane, lead, total recoverable petroleum hydrocarbons, 2,4-dichlorophenol and 2-methylnaphthalene) are more stringent. Specific information is provided in Sections 2 through 8.

The federal ARARs and other state ARARs have not significantly changed since the signing of the OU 7, Site 16 Interim ROD in 1994. Examples of some of the changes that have occurred are as follows:

- Nickel was withdrawn as a standard in the Safe Drinking Water Act (40 CFR Parts 141 to 146).

- Promulgation of Chapter 62-785 and Chapter 62-777 of the FAC provide criteria for soil and groundwater for many chemical parameters based on risk assessments. The specific chemicals of concern for each OU were reviewed and compared to these criteria in the following sections.

The U.S. EPA and the state of Florida have developed ecological risk toxicity values for surface water and sediment over the last 5 years. The following regulations and guidance documents were reviewed that could affect protectiveness:

- U.S. EPA Region IV Ecological Screening Values, published in November 1995 and updated in December 1998.

- FDEP, Approach to the Assessment of Sediment Quality in Florida Coastal Waters, November 1994.

- Chapter 62-302 FAC, Florida Surface Water Quality Standards promulgated in April 1995 and updated in December 1996.

The criteria in the U.S. EPA Region IV Ecological Screening Values and FDEP Approach to Sediment Quality in Florida Coastal Waters are guidelines that have not been promulgated; however, the criteria should be considered for protection of the ecological environment. These new regulations and guidance documents do not affect the protectiveness.

2.0 OPERABLE UNIT 1, SITES 1 AND 2

Implementation of the remedial actions at OU 1 began in approximately 1997. This five-year review consists of an approximate 2-year period of data and provides a current status update for OU 1. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions. A more detailed review of the remedial actions will be conducted during the next review.

This review is required by statute because landfill wastes are still contained on site that do not allow for unlimited use and unrestricted exposure. OU 1 consists of Site 1, the Old Landfill, and Site 2, the Recent Landfill. These sites are grouped as OU 1 because of their close proximity to each other and the similarity of wastes and disposal practices.

2.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 1, Sites 1 and 2 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 1 landfill operation	mid-1950s to 1965
Site 2 landfill operation	1965 to 1975
Initial investigation of OU 1 at the request of the State of Florida	1983
RI/FS complete	1994
ROD signature	9/95
Remedial Design complete	4/96
Unexploded Ordnance Survey	Late 1996 and 4/97
Long-Term Monitoring Program start	5/97
Radiological Survey start	10/97
Non-Significant Post-Record of Decision Change	11/97
Rusted drum removal	10/98
Groundwater monitoring/surface water, sediment, and macroinvertebrate sampling/toxicity testing	Ongoing annually

2.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 1 in the southwestern portion of the facility. A sketch of OU 1 showing the relative locations of Sites 1 and 2, the surface water drainage between the two sites (the spring, the drainage structure, and the Site 2 tributary), and Rowell

Creek is provided on Figure 2-1. Site 1 occupies approximately 9 acres and Site 2 occupies approximately 5 acres of OU 1.

Site 1, the Old Landfill, operated as a trench-and-fill landfill from the mid-1950s until 1965, during which time it served as the only landfill for NAS Cecil Field. Trenches were excavated in a north-south direction to a depth at or below the water table. After a trench was filled, it was covered with the excavated soil. Detailed records of wastes placed in the landfill were not maintained. The majority of material placed in the landfill is believed to have been solid waste from facility operations and the billeting of troops. Wastes were routinely burned at Site 1, according to historical reports. Site 1 was not lined and has a native soil cover.

Site 2, the Recent Landfill, operated as a trench-and-fill landfill from 1965 until 1975. Trenches at Site 2 were placed in an east-west direction to a depth at or below the water table. Waste types at Site 2 are believed to be similar to those landfilled at Site 1. A spring is located in the northeastern corner of Site 2 and is believed to have been caused by the landfilling activities (Figure 2-1). Site 2 was not lined and has a native soil cover.

2.3 REMEDIAL ACTIONS

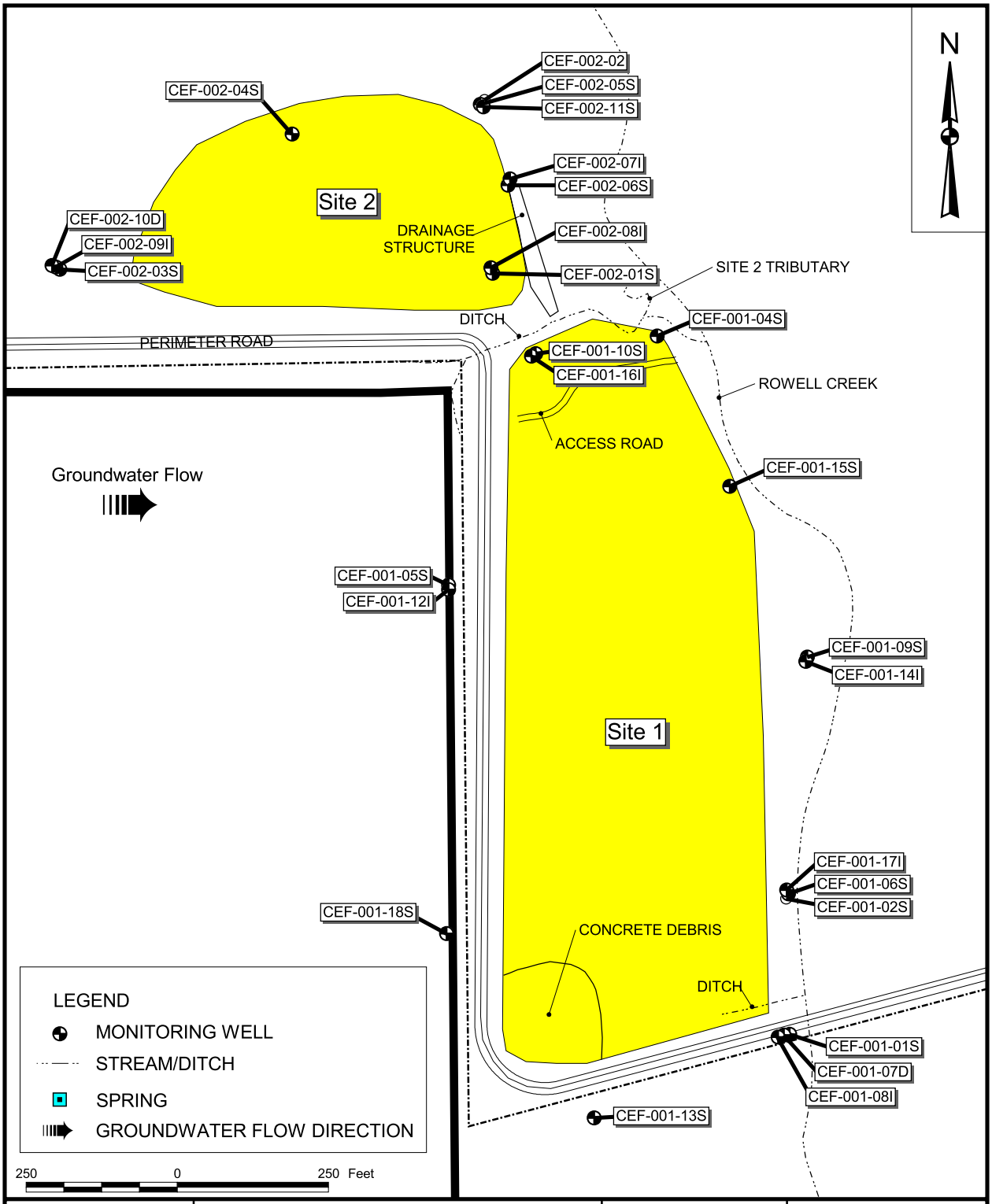
2.3.1 Remedy Selection

The purpose of remedial action at OU 1 is to close the landfills to comply with ARARs (source control) and to reduce the risk of possible adverse effects to ecological receptors posed by physical and chemical conditions in the Site 2 tributary to Rowell Creek (risk reduction). To meet these goals, four remedial action objectives (RAOs) were identified. These objectives were based on an evaluation of site conditions, risks, and legal requirements (ARARs).

One RAO was identified for source control:

- Complete closure of the landfills in accordance with state and federal ARARs for landfill closure.

The selected alternative for source control was site closure. Site closure provided an acceptable level of continued protection to human health and the environment. The remedial actions selected for site closure included preparation of closure and post-closure plans, institutional controls such as deed restrictions, installation of a fence, unexploded ordnance (UXO) survey, radiological survey, landfill gas survey, surface debris removal and disposal, and groundwater monitoring.



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J. BELLONE	15-SEP-99		7898	—
CHECKED BY	DATE	OPERABLE UNIT 1, SITES 1 AND 2	APPROVED BY	DATE
—	—	FIVE-YEAR REVIEW	—	—
COST/SCHEDULE-AREA		NAVAL AIR STATION CECIL FIELD	APPROVED BY	DATE
		JACKSONVILLE, FLORIDA	—	—
SCALE			DRAWING NO.	REV
AS NOTED			FIGURE 2-1	0

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Three RAOs were identified for risk reduction:

- Remove and prevent transport and accumulation of the orange-red flocculent material from the Site 2 tributary if biomonitoring shows the materials to be harmful to the benthic macroinvertebrate community of Rowell Creek.

- Reduce unacceptable exposure of ecological receptors to metals (cyanide, nickel, cadmium, mercury, selenium, silver, and vanadium) in sediments.

- Reduce unacceptable aquatic receptor responses to iron, lead, and aluminum in the Site 2 tributary surface water.

The selected alternative for risk reduction was biomonitoring. This selected alternative was considered to be protective of human health and would protect the environment of Rowell Creek. The biomonitoring remedial actions included selection of sampling locations, sampling and chemical analysis of surface water and sediment, sampling of benthic macroinvertebrates, and toxicity testing of sediment with two species.

The chemical-specific ARAR (Florida Surface Water Quality Standards) for surface water would not be met for iron, lead, and nickel for this alternative because the selected remedy did not impose a treatment component. An ARAR waiver was justified in this case because compliance with this requirement would result in greater risk to the environment. The selected remedy for risk reduction will attain the other chemical-, location-, and action-specific ARARs.

2.3.2 Remedy Implementation

The remedial design, which included the closure and post-closure plans for the OU, was started in late 1995 and was completed by ABB-ES for the Navy in April 1996. The remedial design included the specifications necessary to conduct the remedial actions listed in the ROD, with the following exceptions:

- Concrete debris will be left in place.
- The UXO survey will consist of a site walkover with 100 percent of the site surface being visually examined and a screening of the locations of the soil gas survey probes with a magnetometer.

Remedial action activities began in late 1996. Bechtel Environmental, Inc. performed the UXO Survey consisting of a site walkover (100 percent of the site surface was visually examined). The U.S. Navy Mayport Explosive Ordnance Disposal Unit conducted an UXO Survey consisting of visual observations. The Mayport Explosive Ordnance Disposal Unit used a magnetometer at the landfill gas survey locations

in April 1997 before the start of the long-term monitoring program. The long-term monitoring program, which includes landfill gas survey, groundwater monitoring, sampling and analysis of surface water and sediment, identification of bacteria, sampling of benthic macroinvertebrates, and toxicity testing of sediment, is being conducted by TtNUS and was started in May 1997. Bechtel Environmental, Inc. conducted the radiological survey in October 1997 and conducted the debris removal (rusted drums and other environmental debris of concern) in October 1998.

The NAS Cecil Field BCT reviewed the regulations related to the installation of a perimeter fence around the OU. The BCT decided in October 1997 not to install the fencing around the OU and documented this decision with a memorandum to file entitled "Non-Significant Post-ROD Change for OU 1," dated November 3, 1997. The Jacksonville Port Authority plans to install a fence in the area of OU 1 when the property is transferred to them as part of the reuse plan.

The institutional controls, such as deed restrictions, are currently being developed through Land Use Control Implementation Plans (LUCIP). These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

2.3.3 System Operations/Operation and Maintenance

The Navy has contracted with TtNUS to perform the long-term monitoring program. The work is being conducted in accordance with the ROD and the OU 1 Remedial Design and Closure Plan.

The completed activities for the long-term monitoring program include

- The first year of landfill gas surveys (quarterly), groundwater monitoring (semiannual), surface water and sediment sampling and analysis (quarterly), benthic macroinvertebrates sampling (quarterly), and sediment toxicity testing (quarterly).

- The second year annual monitoring of groundwater, surface water, sediment, and sediment toxicity.

The Navy's original cost estimate for implementation of closure of the landfills was approximately $261,500. The Navy's original cost estimate for implementation of the long-term monitoring program (risk reduction) was approximately $266,400. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

2.4 FIVE-YEAR REVIEW

2.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 1, Sites 1 and 2. The site inspections included visual observations of the landfill cover, surface water, sediment, and groundwater monitoring wells. The landfill cover was wooded/forested, typical of a 20-year-old forest with well-established tree and shrub growth. Visual observations of the area did not provide evidence of a landfill and there was no evidence of erosion problems. Water ponds in one low-lying area after heavy rain event. Concrete debris and at least two metal drums were observed on the cover. Signs of many wildlife species typical of the area were observed.

The surface water in the Site 2 Tributary is generally cloudy and contains an orange flocculent from its headwater to its outlet into Rowell Creek. Rowell Creek is generally clear near the outlet of the Site 2 Tributary. Signs of many aquatic species typical of the area were observed in the surface water. The sediment in the Site 2 Tributary contains the blanket of orange flocculent material observed during the previous investigations. The groundwater monitoring wells including the concrete base and the well casing were in good condition.

TtNUS conducted several site visits as part of the long-term monitoring program in 1998 and 1999. The site visits included a soil gas survey; groundwater, surface water, and sediment sampling; and a site walkover. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Jacksonville Port Authority intends to purchase the site and surrounding property and to continue the land's use as an airport. OU 1 is located within a natural and recreational corridor. There are plans for a new runway as part of the airport that would prevent locating any buildings at OU 1. These plans reflect an anticipated industrial undeveloped land use for OU 1.

2.4.2 Document and Analytical Data Review

Review of records and monitoring reports through June 30, 1999 indicates that four quarterly long-term monitoring sampling events were conducted in 1997 and 1998 and an annual sampling event was conducted in April 1999. The results of the surface water and sediment chemical analysis (exceedances only) are shown on Figures 2-2 and 2-3, respectively. Data from the first and second years of long-term monitoring program indicate that potential OU 1-related ecological impacts are limited to the Rowell Creek tributary stream that drains Site 2. The upstream portions of this tributary stream (locations RR-1 through RR-4) have consistently been the locations where concentrations of analytes in surface waster and

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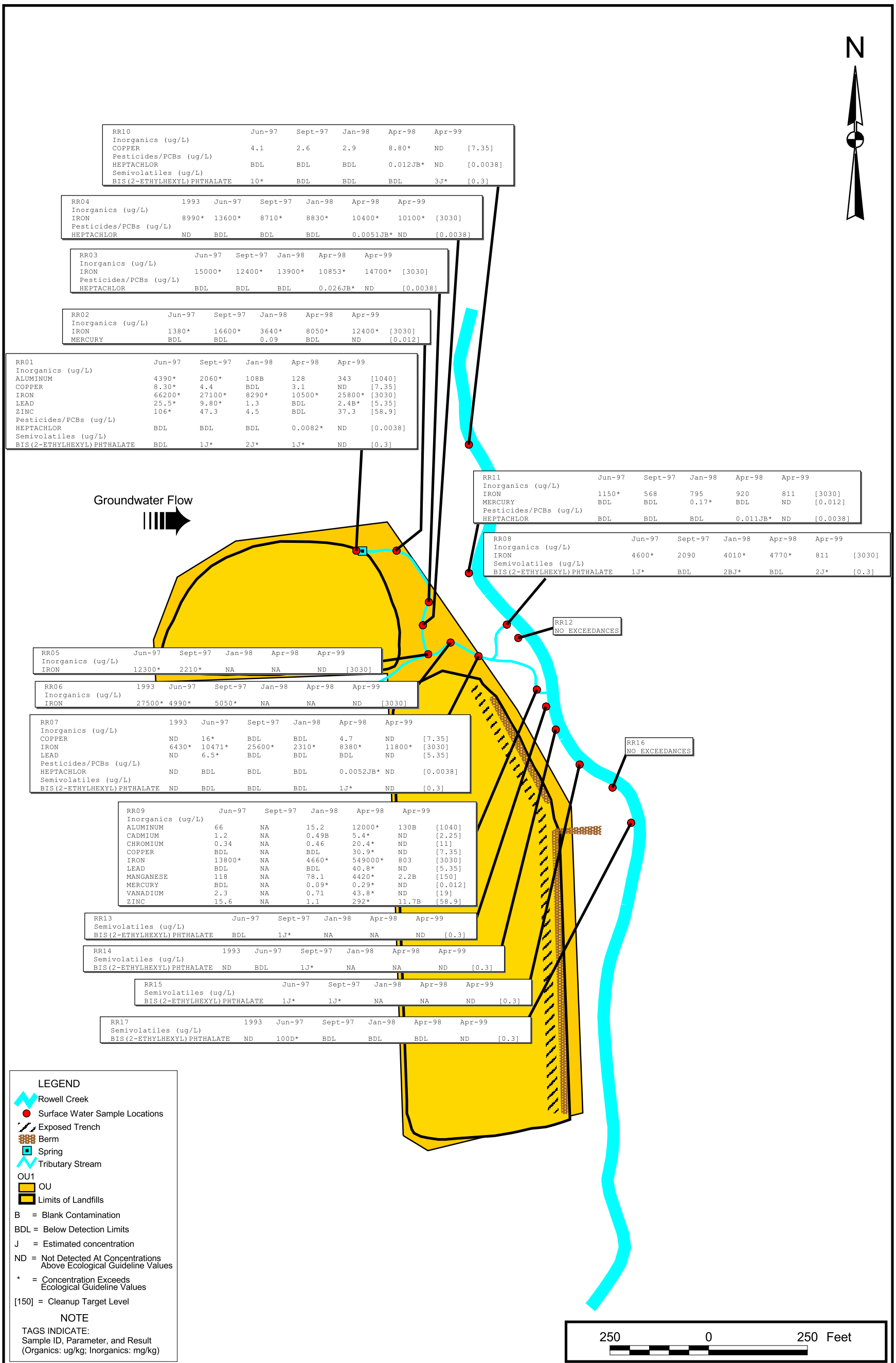

RR10	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
COPPER	4.1	2.6	2.9	8.80*	ND	[7.35]
Pesticides/PCBs (ug/L)						
HEPTACHLOR	BDL	BDL	BDL	0.012JB*	ND	[0.0038]
Semivolatiles (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	10*	BDL	BDL	BDL	3J*	[0.3]

RR04	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)							
IRON	8990*	13600*	8710*	8830*	10400*	10100*	[3030]
Pesticides/PCBs (ug/L)							
HEPTACHLOR	ND	BDL	BDL	BDL	0.0051JB*	ND	[0.0038]

RR03	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
IRON	15000*	12400*	13900*	10853*	14700*	[3030]
Pesticides/PCBs (ug/L)						
HEPTACHLOR	BDL	BDL	BDL	0.026JB*	ND	[0.0038]

RR02	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
IRON	1380*	16600*	3640*	8050*	12400*	[3030]
MERCURY	BDL	BDL	0.09	BDL	ND	[0.012]

RR01	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
ALUMINUM	4390*	2060*	108B	128	343	[1040]
COPPER	8.30*	4.4	BDL	3.1	ND	[7.35]
IRON	66200*	27100*	8290*	10500*	25800*	[3030]
LEAD	25.5*	9.80*	1.3	BDL	2.4B*	[5.35]
ZINC	106*	47.3	4.5	BDL	37.3	[58.9]
Pesticides/PCBs (ug/L)						
HEPTACHLOR	BDL	BDL	BDL	0.0082*	ND	[0.0038]
Semivolatiles (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	1J*	2J*	1J*	ND	[0.3]

RR11	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
IRON	1150*	568	795	920	811	[3030]
MERCURY	BDL	BDL	0.17*	BDL	ND	[0.012]
Pesticides/PCBs (ug/L)						
HEPTACHLOR	BDL	BDL	BDL	0.011JB*	ND	[0.0038]

RR08	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
IRON	4600*	2090	4010*	4770*	811	[3030]
Semivolatiles (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	1J*	BDL	2BJ*	BDL	2J*	[0.3]

RR05	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
IRON	12300*	2210*	NA	NA	ND	[3030]

RR06	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)							
IRON	27500*	4990*	5050*	NA	NA	ND	[3030]

RR07	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)							
COPPER	ND	16*	BDL	BDL	4.7	ND	[7.35]
IRON	6430*	10471*	25600*	2310*	8380*	11800*	[3030]
LEAD	ND	6.5*	BDL	BDL	BDL	ND	[5.35]
Pesticides/PCBs (ug/L)							
HEPTACHLOR	ND	BDL	BDL	BDL	0.0052JB*	ND	[0.0038]
Semivolatiles (ug/L)							
BIS(2-ETHYLHEXYL)PHTHALATE	ND	BDL	BDL	BDL	1J*	ND	[0.3]

RR09	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (ug/L)						
ALUMINUM	66	NA	15.2	12000*	130B	[1040]
CADMIUM	1.2	NA	0.49B	5.4*	ND	[2.25]
CHROMIUM	0.34	NA	0.46	20.4*	ND	[11]
COPPER	BDL	NA	BDL	30.9*	ND	[7.35]
IRON	13800*	NA	4660*	549000*	803	[3030]
LEAD	BDL	NA	BDL	40.8*	ND	[5.35]
MANGANESE	118	NA	78.1	4420*	2.2B	[150]
MERCURY	BDL	NA	0.09*	0.29*	ND	[0.012]
VANADIUM	2.3	NA	0.71	43.8*	ND	[19]
ZINC	15.6	NA	1.1	292*	11.7B	[58.9]

RR13	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semivolatiles (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	BDL	1J*	NA	NA	ND	[0.3]

RR14	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semivolatiles (ug/L)							
BIS(2-ETHYLHEXYL)PHTHALATE	ND	BDL	1J*	NA	NA	ND	[0.3]

RR15	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semivolatiles (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	1J*	1J*	NA	NA	ND	[0.3]

RR17	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semivolatiles (ug/L)							
BIS(2-ETHYLHEXYL)PHTHALATE	ND	100D*	BDL	BDL	BDL	ND	[0.3]

DRAWN BY J. BELLONE	DATE 26-AUG-99	SURFACE WATER CONSTITUENTS EXCEEDING ECOLOGICAL GUIDELINE VALUES LONG TERM MONITORING PROGRAM OPERABLE UNIT 1, SITES 1 AND 2 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 REV 0

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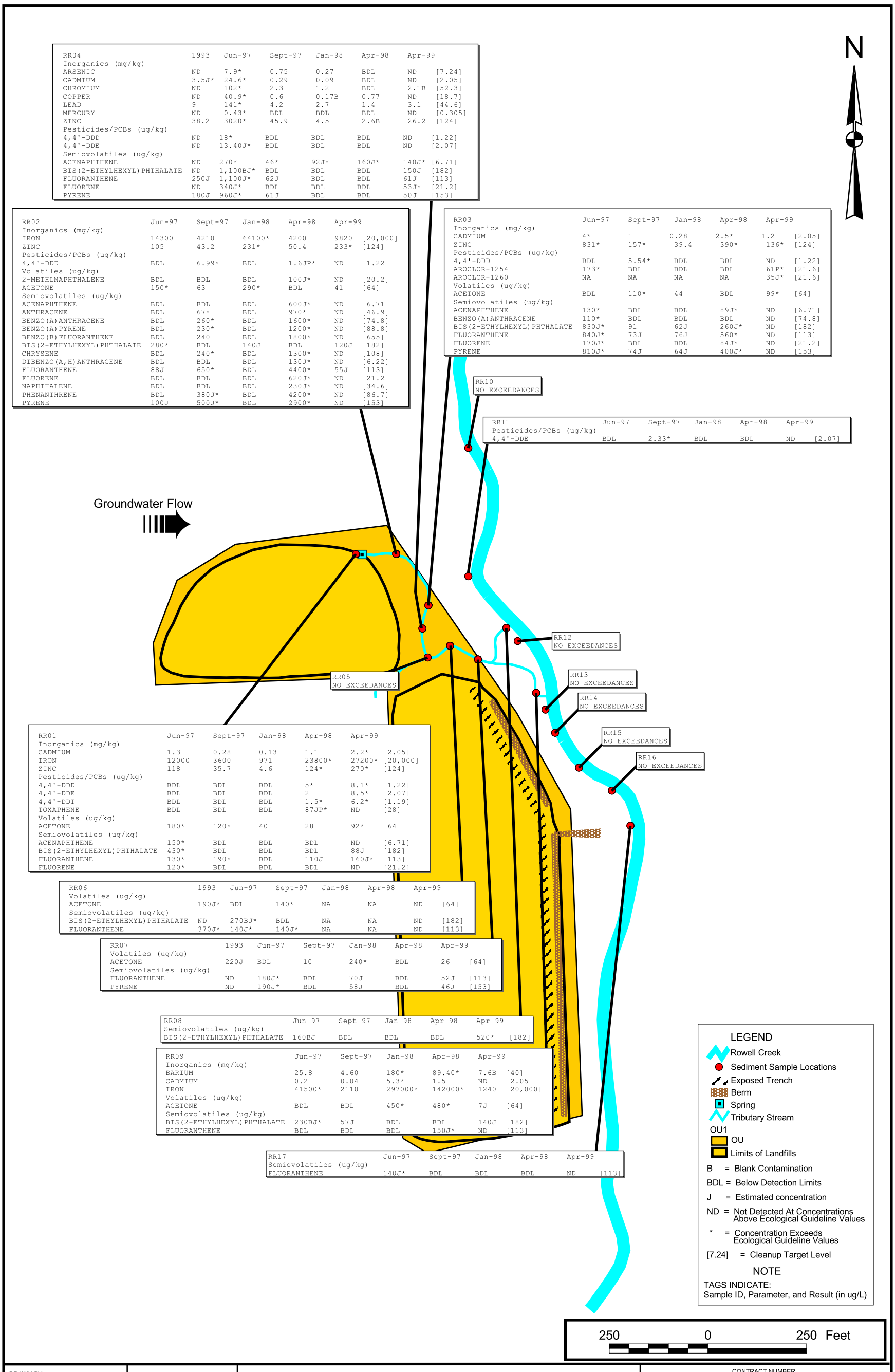

RR04	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (mg/kg)							
ARSENIC	ND	7.9*	0.75	0.27	BDL	ND	[7.24]
CADMIUM	3.5J*	24.6*	0.29	0.09	BDL	ND	[2.05]
CHROMIUM	ND	102*	2.3	1.2	BDL	2.1B	[52.3]
COPPER	ND	40.9*	0.6	0.17B	0.77	ND	[18.7]
LEAD	9	141*	4.2	2.7	1.4	3.1	[44.6]
MERCURY	ND	0.43*	BDL	BDL	BDL	ND	[0.305]
ZINC	38.2	3020*	45.9	4.5	2.6B	26.2	[124]
Pesticides/PCBs (ug/kg)							
4,4'-DDD	ND	18*	BDL	BDL	BDL	ND	[1.22]
4,4'-DDE	ND	13.40J*	BDL	BDL	BDL	ND	[2.07]
Semiovolatiles (ug/kg)							
ACENAPHTHENE	ND	270*	46*	92J*	160J*	140J*	[6.71]
BIS(2-ETHYLHEXYL)PHTHALATE	ND	1,100BJ*	BDL	BDL	BDL	150J	[182]
FLUORANTHENE	250J	1,100J*	62J	BDL	BDL	61J	[113]
FLUORENE	ND	340J*	BDL	BDL	BDL	53J*	[21.2]
PYRENE	180J	960J*	61J	BDL	BDL	50J	[153]

RR02	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (mg/kg)						
IRON	14300	4210	64100*	4200	9820	[20,000]
ZINC	105	43.2	231*	50.4	233*	[124]
Pesticides/PCBs (ug/kg)						
4,4'-DDD	BDL	6.99*	BDL	1.6JP*	ND	[1.22]
Volatiles (ug/kg)						
2-METHLNAPHTHALENE	BDL	BDL	BDL	100J*	ND	[20.2]
ACETONE	150*	63	290*	BDL	41	[64]
Semiovolatiles (ug/kg)						
ACENAPHTHENE	BDL	BDL	BDL	600J*	ND	[6.71]
ANTHRACENE	BDL	67*	BDL	970*	ND	[46.9]
BENZO(A)ANTHRACENE	BDL	260*	BDL	1600*	ND	[74.8]
BENZO(A)PYRENE	BDL	230*	BDL	1200*	ND	[88.8]
BENZO(B)FLUORANTHENE	BDL	240	BDL	1800*	ND	[655]
BIS(2-ETHYLHEXYL)PHTHALATE	280*	BDL	140J	BDL	120J	[182]
CHRYSENE	BDL	240*	BDL	1300*	ND	[108]
DIBENZO(A,H)ANTHRACENE	BDL	BDL	BDL	130J*	ND	[6.22]
FLUORANTHENE	88J	650*	BDL	4400*	55J	[113]
FLUORENE	BDL	BDL	BDL	620J*	ND	[21.2]
NAPHTHALENE	BDL	BDL	BDL	230J*	ND	[34.6]
PHENANTHRENE	BDL	380J*	BDL	4200*	ND	[86.7]
PYRENE	100J	500J*	BDL	2900*	ND	[153]

RR03	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (mg/kg)						
CADMIUM	4*	1	0.28	2.5*	1.2	[2.05]
ZINC	831*	157*	39.4	390*	136*	[124]
Pesticides/PCBs (ug/kg)						
4,4'-DDD	BDL	5.54*	BDL	BDL	ND	[1.22]
AROCLOR-1254	173*	BDL	BDL	BDL	61P*	[21.6]
AROCLOR-1260	NA	NA	NA	NA	35J*	[21.6]
Volatiles (ug/kg)						
ACETONE	BDL	110*	44	BDL	99*	[64]
Semiovolatiles (ug/kg)						
ACENAPHTHENE	130*	BDL	BDL	89J*	ND	[6.71]
BENZO(A)ANTHRACENE	110*	BDL	BDL	BDL	ND	[74.8]
BIS(2-ETHYLHEXYL)PHTHALATE	830J*	91	62J	260J*	ND	[182]
FLUORANTHENE	840J*	73J	76J	560*	ND	[113]
FLUORENE	170J*	BDL	BDL	84J*	ND	[21.2]
PYRENE	810J*	74J	64J	400J*	ND	[153]

RR11	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Pesticides/PCBs (ug/kg)						
4,4'-DDE	BDL	2.33*	BDL	BDL	ND	[2.07]

RR01	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (mg/kg)						
CADMIUM	1.3	0.28	0.13	1.1	2.2*	[2.05]
IRON	12000	3600	971	23800*	27200*	[20,000]
ZINC	118	35.7	4.6	124*	270*	[124]
Pesticides/PCBs (ug/kg)						
4,4'-DDD	BDL	BDL	BDL	5*	8.1*	[1.22]
4,4'-DDE	BDL	BDL	BDL	2	8.5*	[2.07]
4,4'-DDT	BDL	BDL	BDL	1.5*	6.2*	[1.19]
TOXAPHENE	BDL	BDL	BDL	87JP*	ND	[28]
Volatiles (ug/kg)						
ACETONE	180*	120*	40	28	92*	[64]
Semiovolatiles (ug/kg)						
ACENAPHTHENE	150*	BDL	BDL	BDL	ND	[6.71]
BIS(2-ETHYLHEXYL)PHTHALATE	430*	BDL	BDL	BDL	88J	[182]
FLUORANTHENE	130*	190*	BDL	110J	160J*	[113]
FLUORENE	120*	BDL	BDL	BDL	ND	[21.2]

RR06	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Volatiles (ug/kg)							
ACETONE	190J*	BDL	140*	NA	NA	ND	[64]
Semiovolatiles (ug/kg)							
BIS(2-ETHYLHEXYL)PHTHALATE	ND	270BJ*	BDL	NA	NA	ND	[182]
FLUORANTHENE	370J*	140J*	140J*	NA	NA	ND	[113]

RR07	1993	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Volatiles (ug/kg)							
ACETONE	220J	BDL	10	240*	BDL	26	[64]
Semiovolatiles (ug/kg)							
FLUORANTHENE	ND	180J*	BDL	70J	BDL	52J	[113]
PYRENE	ND	190J*	BDL	58J	BDL	46J	[153]

RR08	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semiovolatiles (ug/kg)						
BIS(2-ETHYLHEXYL)PHTHALATE	160BJ	BDL	BDL	BDL	520*	[182]

RR09	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Inorganics (mg/kg)						
BARIUM	25.8	4.60	180*	89.40*	7.6B	[40]
CADMIUM	0.2	0.04	5.3*	1.5	ND	[2.05]
IRON	41500*	2110	297000*	142000*	1240	[20,000]
Volatiles (ug/kg)						
ACETONE	BDL	BDL	450*	480*	7J	[64]
Semiovolatiles (ug/kg)						
BIS(2-ETHYLHEXYL)PHTHALATE	230BJ*	57J	BDL	BDL	140J	[182]
FLUORANTHENE	BDL	BDL	BDL	150J*	ND	[113]

RR17	Jun-97	Sept-97	Jan-98	Apr-98	Apr-99	
Semiovolatiles (ug/kg)						
FLUORANTHENE	140J*	BDL	BDL	BDL	ND	[113]

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SCALE	AS NOTED

SEDIMENT CONSTITUENTS EXCEEDING
ECOLOGICAL GUIDELINE VALUES
LONG TERM MONITORING PROGRAM
OPERABLE UNIT 1, SITES 1 AND 2
FIVE - YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
7898	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-3	REV 0

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sediment have exceeded ecological guidelines. During the first year of the long-term monitoring program, these analytes consisted primarily of metals in surface water and metals and PAHs in sediment. During the second year of the long-term monitoring program, these analytes consisted primarily of metals in surface water and a few organic compounds in sediment. The results of toxicity tests indicate that OU 1-related ecological impacts are limited to the upstream portions of the same tributary stream.

Although most of the tributary steam is outside the boundaries of Sites 1 and 2, the most upstream sampling location (RR-1) is located within Site 2. Some maps also show sampling location RR-2 within Site 2. Sampling locations RR-3 and RR-4 are immediately downstream of these two locations. Thus, elevated concentrations of contaminants in the upstream portion of the tributary stream (locations RR-1 through RR-4) are site related. As mentioned in Section 2.2, the spring in the northeastern portion of Site 2 (sampling location RR-1) is believed to have been caused by previous landfilling activities at the site. Apparently, the excavation of surface soil from this low-lying area during landfill operations was sufficient to expose what had been shallow groundwater. This conclusion is based on historical aerial photographs that do not show the spring until after landfill activities began.

Overall, chemical concentrations in sample collection during the second year of the long-term monitoring program were consistent with those in the first year. However, concentrations of several sediment analytes in the sample farthest upstream (RR-1) in the tributary that drains Site 2 were greater during the second year of the long-term monitoring program than in the first year at the same location. The survival of organisms in toxicity tests were similar between the first and second years of the long-term monitoring program. The growth of test organisms was adversely impacted in fewer sample during the second year than the first year.

Most locations from which surface water and sediment samples were collected in 1993 for the RI do not correspond to those used in the long-term monitoring program. Thus, a comparison of data from the long-term monitoring program to data reported and discussed in the RI is somewhat restricted. However, the following conclusions can be inferred from the data. Results of sediment toxicity tests in 1993 showed greater toxicity than in samples collected in the second year of the long-term monitoring program. Furthermore, concentrations of surface water and sediment analytes were generally greater in 1993 than in the second year of the long-term monitoring program.

The benthic macroinvertebrate data comprise numerous metrics of diversity and abundance for each quarterly sampling event during the first year of the long-term monitoring program. The macroinvertebrate data displayed a wide range of variability among sample locations during each quarter. Because data were too variable to be useful, the NAS Cecil BCT approved recommendation to cease further collections of benthic macroinvertebrates. Furthermore, several bacterial specied identified in

sample of the orange flocculent mentioned in the RAO will create a flocculent material, and some identified species are know iron precipitators. According to the testing laboratory, the orange flocculent material is iron oxide (i.e., “rust”) produced by the bacteria. This condition is common in freshwater systems where free iron and manganese occur. High concentrations of these two metals (especially iron) were present in surface water samples collected from the tributary stream.

The results of the soil gas survey fluctuated from quarter to quarter but concentrations generally declined during the four quarterly sampling events in 1997 and 1998. The 1998 annual report recommended that the soil gas survey should be performed in the vicinity of the two sample locations with the highest measured percent of the lower explosion level.

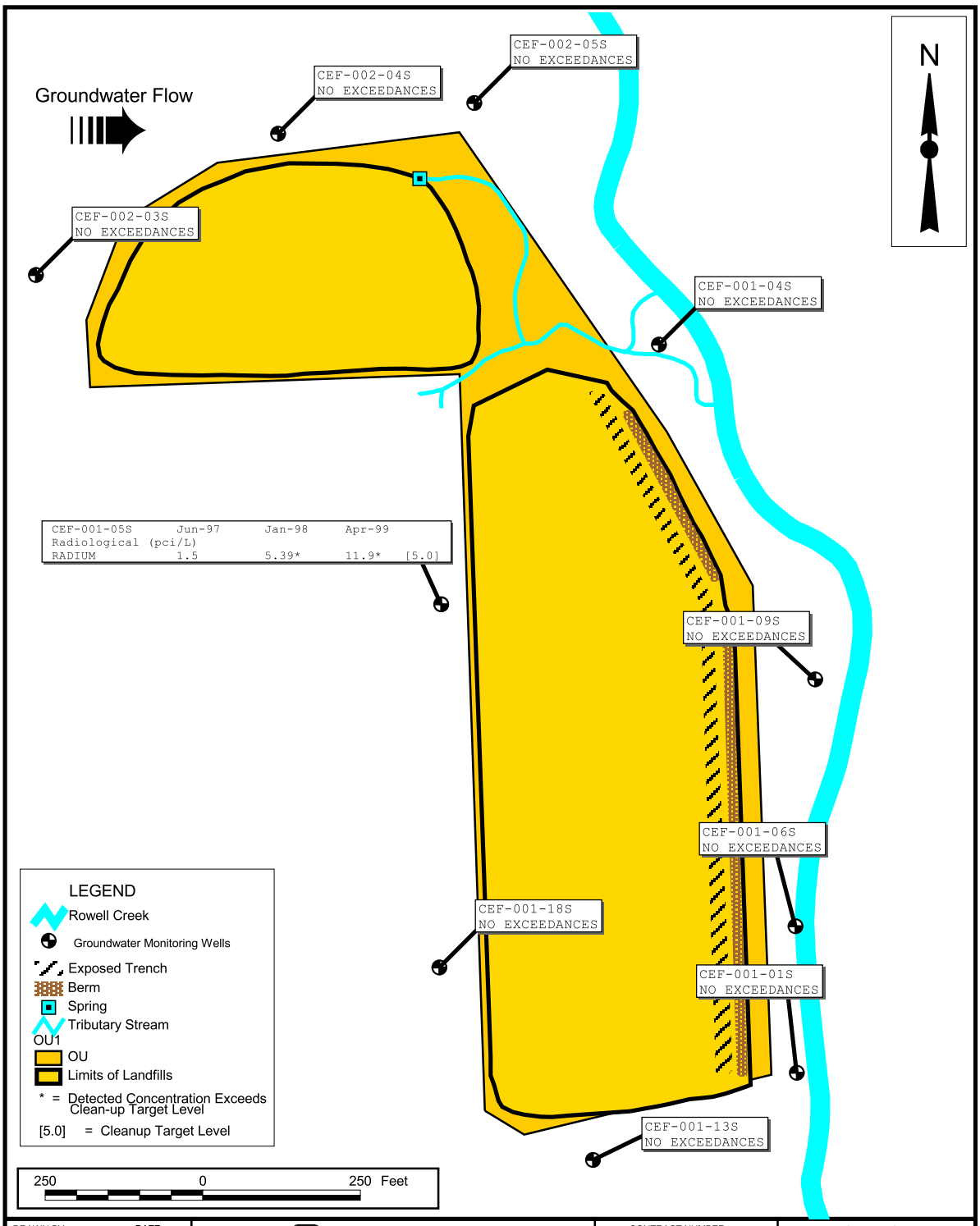
Groundwater analytes exceeding regulatory guidelines were limited to radium-228 in monitoring well CEF-1-5S. The exceedances for the Long-Term Monitoring Program are shown in Figure 2-4. The results from 1997 to 1999 indicate there is an increasing trend in the radium-228 detections. The report recommends groundwater monitoring should be continued at this one well for radium-228.

Bechtel Environmental conducted an UXO Survey in late 1996 and discovered four or five potential UXO items. The U.S. Navy Explosive Ordnance Disposal (EOD) Unit Six Detachment conducted a follow-up UXO survey that consisted of a site walkover, where 100 percent of the area was visually inspected for signs of UXO, and screening for buried UXO at the 35 proposed soil gas survey locations with a Vallon MW 1630 magnetometer. The EOD found one cement-filled inert bomb during the site walkover. This was removed. No other signs of UXO were noted during the site walkover.

The review of these documents indicates that the Navy is meeting the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU. The once per year frequency of the monitoring specified in the long-term monitoring program for years 3 through 5 appears to be adequate.

2.4.3 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs and site-specific action levels that have changed since the ROD was signed are shown in the table below. The ARAR changes are from the promulgation of the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC). The site-specific action level changes are from the development of an Inorganic Background Data Set at NAS Cecil Field.



DRAWN BY J. BELLONE	DATE 31-AUG-99	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7898 / OWNER NO.
CHECKED BY	DATE	GROUNDWATER CONSTITUENTS EXCEEDING REGULATORY CRITERIA OPERABLE UNIT 1, SITES 1 AND 2 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 / REV 0

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Contaminant	ARAR/Site-Specific Level		Source
GROUNDWATER			
Aluminum	Previous	200 µg/L	Secondary Drinking Water Standard
	New	13101 µg/L	NAS Cecil Field Inorganic Background Data Set
Cadmium	Previous	5 µg/L	Primary Drinking Water Standard
	New	6 µg/L	NAS Cecil Field Inorganic Background Data Set
Iron	Previous	300 µg/L	Secondary Drinking Water Standard
	New	7760 µg/L	NAS Cecil Field Inorganic Background Data Set
Manganese	Previous	50 µg/L	Secondary Drinking Water Standard
	New	150 µg/L	NAS Cecil Field BCT Minutes of Meeting, Minutes No. 1032
Thallium	Previous	Not Listed	
	New	13.25 µg/L	NAS Cecil Field Inorganic Background Data Set
SURFACE WATER			
Arsenic	Previous	36 µg/L	FAC 17-302, FL Surface Water Quality Standards
	New	50 µg/L	FAC 62-302, FL Surface Water Quality Standards
Barium	Previous	Not Listed	
	New	50 µg/L	NAS Cecil Field Inorganic Background Data Set
	New	10000 µg/L	U.S. EPA Region III Screening Level
Iron	Previous	1000 µg/L	FAC 17-302, FL Surface Water Quality Standards
	New	3030 µg/L	NAS Cecil Field Inorganic Background Data Set
Manganese	Previous	Not Listed	
	New	80 µg/L	U.S. EPA Tier II value
Nickel	Previous	8.3 µg/L	FAC 17-302, FL Surface Water Quality Standards
	New	87.71 µg/L	U.S. EPA Tier II value
Selenium	Previous	5.71 µg/L	FAC 17-302, FL Surface Water Quality Standards
	New	7.6 µg/L	NAS Cecil Field Inorganic Background Data Set
	New	5 µg/L	U.S. EPA Region IV Surface Water Screening value and FAC 62-302, FL Surface Water Quality Standards
Vanadium	Previous	Not Listed	
	New	19 µg/L	U.S. EPA Tier II value
Zinc	Previous	1.86 µg/L	FAC 17-302, FL Surface Water Quality Standards
	New	58.91 µg/L	U.S. EPA Region IV Surface Water Screening value
Heptachlor	Previous	Not Listed	
	New	0.0038 µg/L	U.S. EPA Region IV Surface Water Screening value

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. Since the risk assessment in the RI/FS did not identify any unacceptable human health risks for media at OU 1, these regulations do not affect the protectiveness. These new contaminant cleanup target levels rely upon health-based risk assessments, and the cleanup target levels

should remain within the risk range calculated in the risk assessment. Since the new regulations and the Inorganic Background Data Set are generally less stringent, several metals (aluminum, iron, and manganese) that were previously identified as exceeding target cleanup levels are less than the new cleanup levels.

New chemical-specific ARARs have been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC), FDEP Approach to the Assessment of Sediment Quality in Florida Coastal Waters, and the U.S. EPA Region IV Ecological Screening Values. The ecological risk toxicity values for sediments developed in the new regulations and guidance manuals do not affect the protectiveness of the remedial action because the sediment toxicity testing results indicate the ecological impacts were limited to the upstream portions of the Site 2 Tributary.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the ROD.

2.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when OU 1, Sites 1 and 2 is transferred to the Jacksonville Port Authority, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements must be adopted. The current and future land use at these sites suggests that these controls should be effective.

Several discrepancies were identified between the selected remedial action described in the FS, ROD, and remedial design and what was implemented in the remedial action. These discrepancies are not sufficient to warrant a finding of not protective. These discrepancies include the requirement of conducting an UXO survey at depth and removal of surface debris. The remedial actions that have been completed as they relate to the UXO survey at depth and the removal of surface debris have been approved by the BCT. The two UXO surveys conducted, one by the Remedial Action Contractor and one by the U.S. Navy Explosive Ordnance Disposal Unit Six Detachment, were considered sufficient by the BCT. The BCT required the removal of surface debris of environmental concern, such as drums, but not the removal of construction debris, such as concrete.

Closure reports or forms are needed to document the surface debris removal. Two additional drums were observed during the 1999 Long-Term Monitoring Program that should be removed, and appropriate documentation should be completed.

2.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Port Authority are shown in the table below.

Recommendations/Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Program.	Navy	U.S. EPA and FDEP	Annually in April
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property
Remove and Dispose of Drums.	Navy	U.S. EPA and FDEP	Early 2000
Issue Explanation of Significant Differences	Navy	U.S. EPA and FDEP	Before next five-year review

2.7 PROTECTIVENESS STATEMENT

The remedy at OU 1 is expected to be protective of human health and the environment upon completion. The implementation of the long-term monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The remedial actions for the source control alternative are being implemented as designed, they provide effective containment of the wastes in the landfills, and they are measures that will prevent exposure. The institutional controls will be implemented before the transfer of the property to the Jacksonville Port Authority. The area surrounding OU 1, Sites 1 and 2 will be transferred to the Jacksonville Port Authority in 1999. The Navy will temporarily retain control of OU 1, Sites 1 and 2 after the surrounding property has been transferred to the Jacksonville Port Authority in 1999. OU 1, Sites 1 and 2 will be transferred when it has been determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and exposure.

The long-term monitoring program has been implemented as designed for the risk-reduction alternative. The results of this program indicate that potential OU 1-related ecological impacts are limited to the

upstream portions of the Site 2 Tributary. The toxicity testing of sediment in Rowell Creek showed no adverse biological and toxicological effects in the samples near the Site 2 Tributary Outlet.

Based on the completed activities and the activities that are underway or planned, the intent and goals of the ROD for OU 1 have or will be met.

3.0 OPERABLE UNIT 2, SITES 5 AND 17

Implementation of the remedial actions at OU 2 began in 1995. This five-year review consists of a 5-year period of data for the remedial action for soil and a 1-year period of data for the remedial action for groundwater. This five-year review provides a detailed review of the soil remedial action and provides a current status update for the groundwater remedial action. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions on the groundwater remedial action. A more detailed review of the groundwater remedial action will be conducted during the next review.

This five-year review is being conducted for OU 2, Site 5 because contaminated subsurface soil are still contained on site that does not allow for unlimited use and unrestricted exposure. This review is being conducted for OU 2, Site 17 as a matter of policy until the cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. OU 2 consists of Site 5, the Oil Disposal Area Northwest, and Site 17, the Oil and Sludge Disposal Pit Southwest. These sites are grouped as OU 2 because of their proximity and similarity as waste oil and fuel disposal sites.

3.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 2, Sites 5 and 17 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 5 Oil Disposal Area Northwest operation	1950s to early 1970s
Site 17 Oil and Sludge Disposal Pit Southwest operation	Late 1960s to early 1970s
Initial investigation of OU 1 at the request of the State of Florida – OU 2, Site 17 proposed as an upgradient location to OU 1	1983
Remedial Investigation for Soil	1991
Focused FS for Soil	1994
Interim ROD Signature for Soil	9/94
RI/FS for Groundwater and Sediment	1995
Interim Removal Action for Soil – Site 17	1/95 to 10/95
Interim Removal Action for Soil – Site 5	9/95 to 8/98
ROD Signature for Groundwater and Sediment	9/95
Site 17 Remedial Design Work Plan	1/97
Site 5 Sediment Design	5/97
Site 5 Air Sparging Pilot Test	11/97
Site 5 Groundwater Design	12/97
Revised Proposed Plan for Groundwater – Site 5	9/99

Event	Date
Amend ROD Site 5	2000
Site 5 and 17 Groundwater Monitoring	Ongoing semiannually

3.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 2, Sites 5 and 17 in the western and southwestern portions of the facility. A sketch of OU 2, Site 5 showing the former pit area, Perimeter Road, and the drainage ditch south of the site is provided on Figure 3-1. Site 5 occupies approximately 0.5 acre, and the disposal pit itself occupies 0.2 acre. A sketch of OU 2, Site 17 showing the former pit area, and Perimeter Road is provided on Figure 3-2. The Site 17 disposal pit occupies about 0.4 acre. The entire area of investigation is approximately 3 acres.

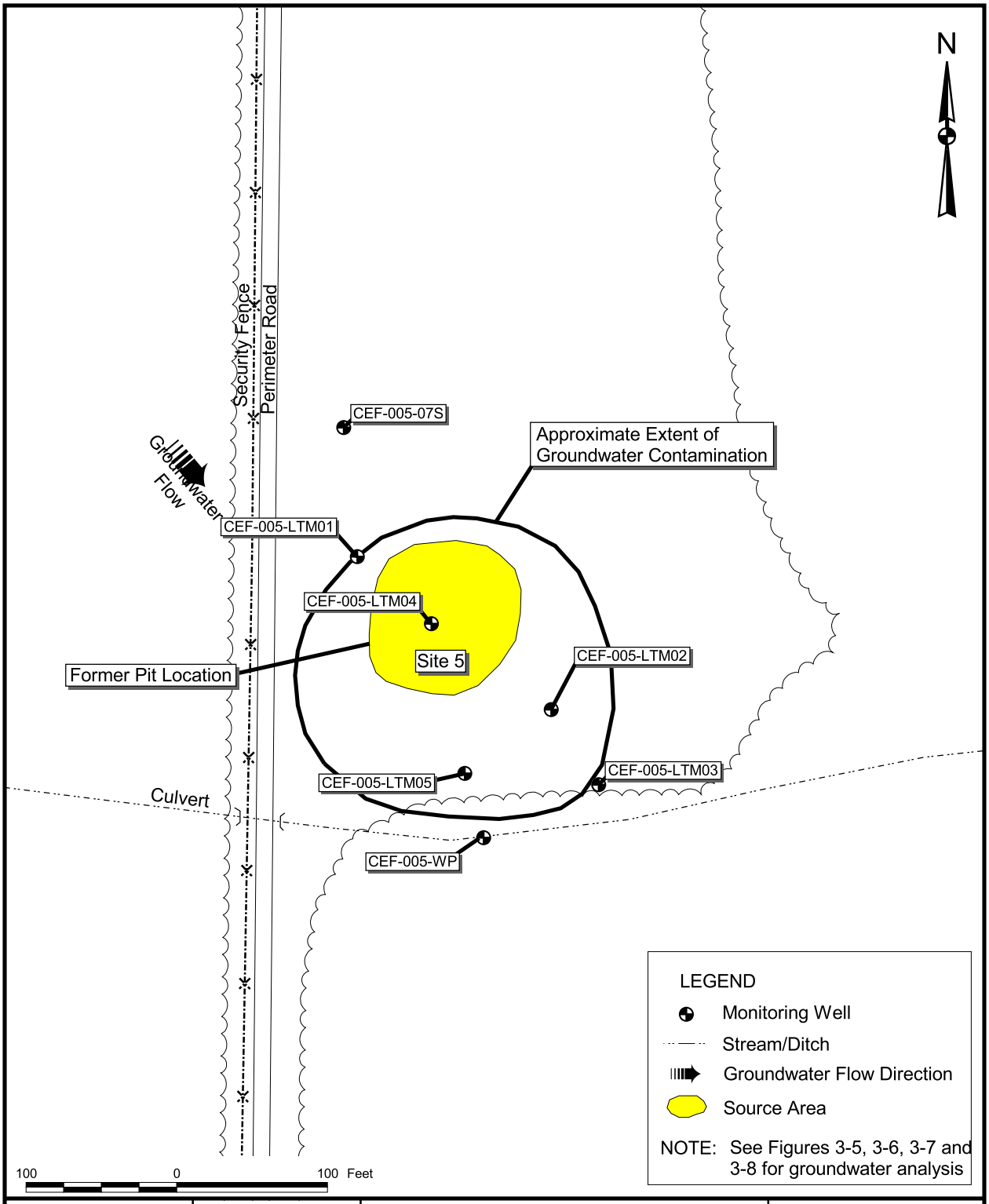
Site 5 operated as an oil disposal area for approximately two decades from the 1950s until the 1970s. The specific sources of the oil disposed at the site and the quantities remain unknown. However, waste solvents, paints, and strippers may have been mixed with the oil prior to disposal since this was common practice at the time. Petroleum odors and oil-stained soils, some of them void of vegetation, were noticed during early investigations of the site. The IAS indicated that these stains and odors suggest that dumping at the site may have occurred some time after the site was reportedly closed.

Site 17, the Oil and Sludge Disposal Pit Southwest, was operated as a disposal pit for waste liquids from the 1960s to the 1970s. The liquids, reportedly waste fuels and oils that may have been mixed with solvents, paints, and/or thinners, were emptied into the pit from 55-gallon drums and allowed to evaporate or soak into the ground. As was the case at Site 5, stains and odors were noticed at Site 17 during previous investigations. Although the quantities of wastes disposed at the site are not available, the sources of the wastes are identified as the fuel farm, Aircraft Intermediate Maintenance Department (AIMD), squadrons, and the public works. When disposal activities ceased at the site, the pit was backfilled and covered with native soils.

3.3 REMEDIAL ACTIONS

3.3.1 Remedy Selection

The purpose of remedial actions at OU 2 is to provide source control at both Site 5 and Site 17 to comply with the ARARs and to reduce the risk from sediment contamination at Site 5 and groundwater contamination at Site 5 and Site 17. The Site 5 remedial action for source control was defined in the Interim ROD, and the remedial actions to reduce the risk from the sediment and groundwater contamination were defined in the ROD for OU 2. The Site 17 remedial action for source control was



DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 2, SITE 5 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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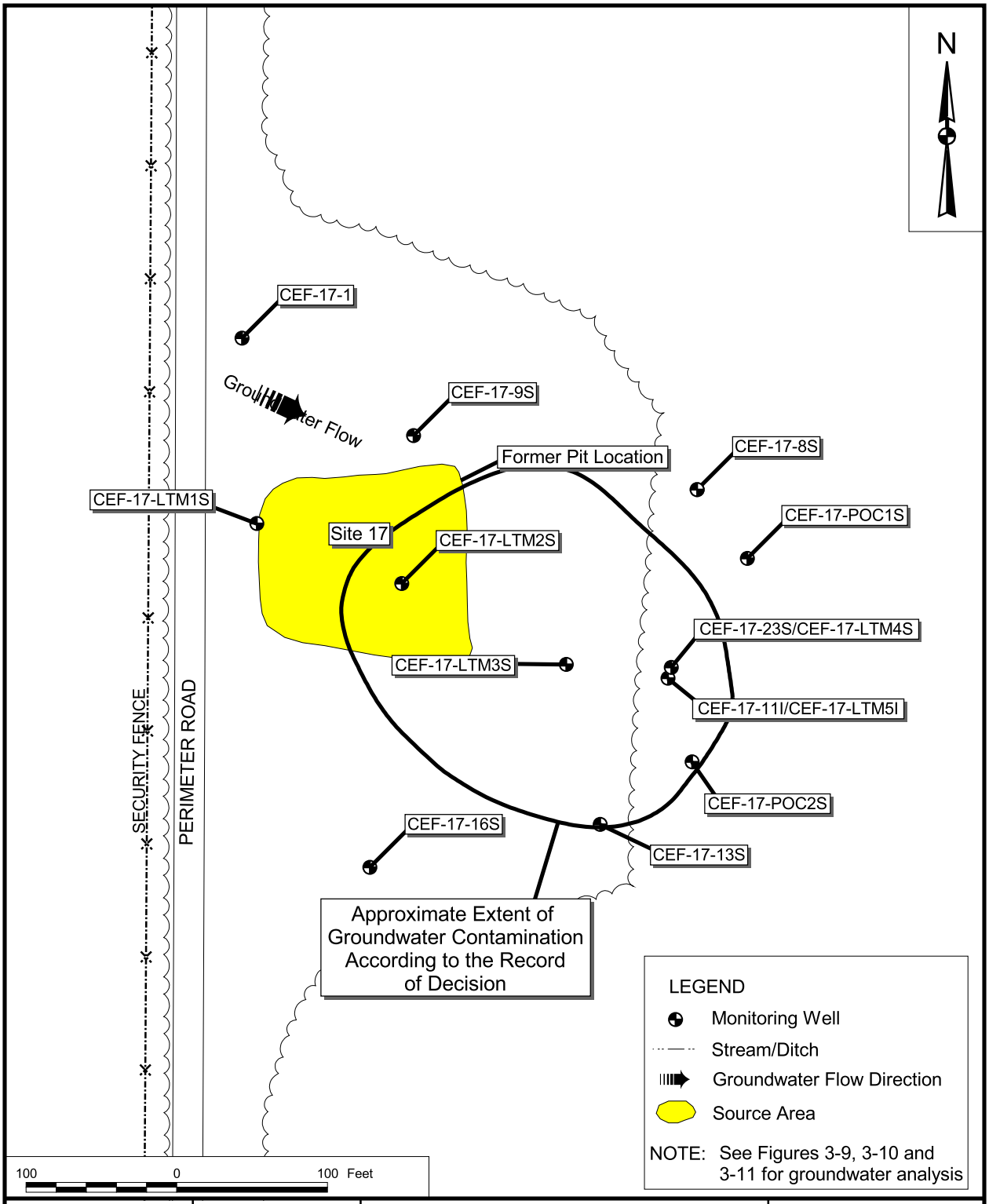

DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 2, SITE 17 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-2 / REV 0

P:\GIS\CECIL\5yr_review.apr 07Apr00 MJJ Figure 3-2 Layout

defined in the Interim ROD, and the remedial actions to reduce the risk from groundwater contamination were defined in the ROD for OU 2.

3.3.1.1 OU 2, Site 5

The Interim ROD identified three RAOs for source control:

- Clean up contamination in the unsaturated soil above the water table to reduce the source of contaminants to groundwater.
- Remove free product to reduce the source of contamination to groundwater.
- Clean up contaminated surface soil to reduce health risks from direct contact exposure.

The selected alternative for source control was excavation and treatment of the contaminated soil on a constructed biological treatment pad, off site disposal of free product and highly contaminated (saturated with free product) soil, and backfilling with the treated soil.

The ROD for OU 2 identified two RAOs to reduce the risk to human health and the environment from the contaminated sediment and groundwater at Site 5:

- Protect human health from potable water use of groundwater that contains concentrations of VOCs, SVOCs, pesticides, and inorganics above drinking water-based ARARs or risk assessment RAOs.

- Protect ecological receptors from exposure to sediment that contains concentrations of PCBs above guidance concentrations and TRPH that are demonstrated to pose a toxic effect at Site 5.

The selected alternative for the contaminated sediment was excavation and biological treatment. The remedial actions originally selected for the contaminated groundwater included an evaluation of two treatment technologies using pilot-scale testing. During the evaluation, the groundwater analysis showed significantly lower concentrations of VOCs (1,320 µg/L VOCs in the RI vs. 159 µg/L VOCs in the pilot-scale test). The BCT decided to evaluate whether natural attenuation was a feasible remedial alternative for Site 5. The BCT has decided to revise the Site 5 groundwater remedial action and is currently preparing a Revised Proposed Plan and Amended ROD. The Amended ROD being developed will identify natural attenuation as the selected remedial action for the Site 5 groundwater.

The Amended ROD being prepared will identify one RAO to reduce the risk to human health and the environment from the contaminated groundwater:

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

The interim remedial action for the contaminated soil is protective of human health and the environment, although it did not constitute the final remedy for all media. The interim remedial action combined with the remedial action for sediment and groundwater constitutes the final remedy. The remedial action for the sediment is protective of human health and the environment and complies with the federal and state ARARs. The alternative for groundwater that will be identified in the Amended ROD will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and monitoring will verify compliance. The selected groundwater remedy will attain the other chemical-, location-, and action-specific ARARs.

3.3.1.1 OU 2, Site 17

The Interim ROD identified two RAOs for source control:

- Remediate contaminated soil in the vadose zone to reduce the source of contaminants to groundwater.
- Remediate contaminated surface soil to reduce health risks from direct contact exposure.

The selected alternative for source control was excavation and on site treatment of the contaminated soil by a mobile thermal desorption treatment unit and backfilling with the treated soil.

The ROD for OU 2 identified one RAO to reduce the risk to human health and the environment from contaminated groundwater at Site 17:

- Protect human health from potable water use of groundwater that contains concentrations of VOCs, SVOCs, pesticides, and inorganics above drinking water-based ARARs or risk assessment RAOs.

The selected remedy for the contaminated groundwater was natural attenuation.

The interim remedial action for the contaminated soil is protective of human health and the environment and complies with federal and state ARARs, although it did not constitute the final remedy for all media. The interim remedial action combined with the remedial action for groundwater constitutes the final remedy. The alternative for groundwater will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and monitoring will verify compliance. The selected groundwater remedy will attain the other chemical-, location-, and action-specific ARARs.

3.3.2 Remedy Implementation

The remedial actions at Sites 5 and 17 are currently being implemented. A summary of the remedial actions that have been conducted is presented below.

3.3.2.1 OU 2, Site 5

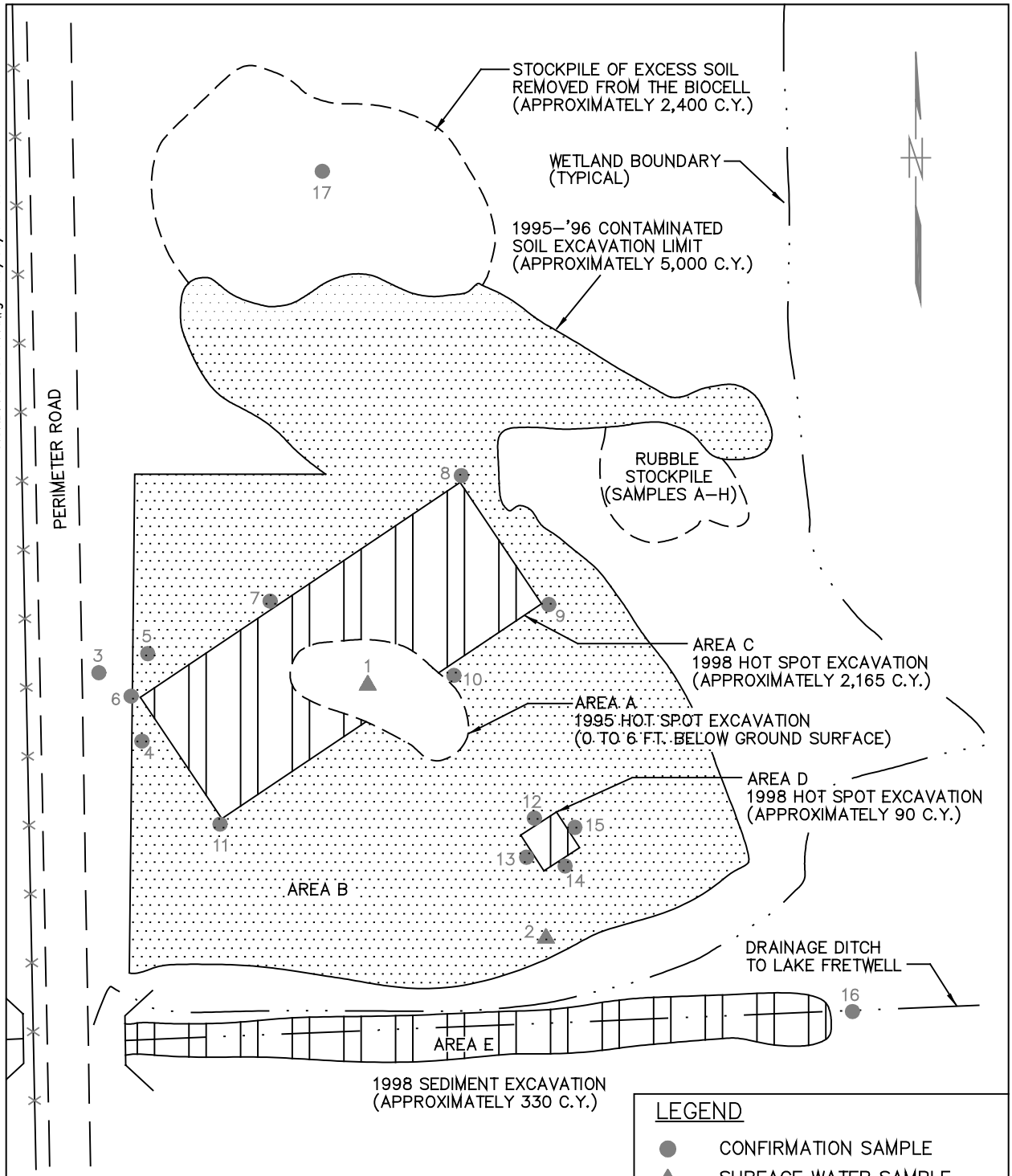
The Final Design and the Remediation Work Plan for the contaminated soil were prepared in 1995. The interim remedial action for the contaminated soil was completed in two phases from 1995 to 1998. Approximately 5,000 yd^3 of contaminated soil was excavated and treated on a biological treatment pad and approximately 2,200 yd^3 of contaminated soil was excavated and disposed at the Pecan Row Landfill in Valdosta, Georgia. Changes in the implementation of the interim remedial action were documented in an Action Memorandum for Soil and Sediment Removal, dated May 6, 1998. Figure 3-3 shows the area of excavation.

The Site 5 Sediment Design was prepared in 1997 and implementation of the remedial design began in May 1998. Approximately 330 yd^3 of contaminated sediment from the drainage ditch (from Area E on Figure 3-3) was excavated and placed in the excavated area for the interim remedial action more than 2 feet below ground surface. The remedial action was completed based on the Action Memorandum for Soil and Sediment Removal, dated May 6, 1998. The Navy's Remedial Action Contractor, Bechtel Environmental, Inc., performed the contaminated soil and sediment remedial actions.

A pilot-scale air sparging (AS) test was conducted in 1997 to determine the physical parameters needed for design of a full-scale AS system at Site 5. Groundwater samples were obtained before the start of the pilot test and, based on the groundwater monitoring results, the BCT decided to investigate the feasibility of natural attenuation as a remedial action for the Site 5 groundwater.

TtNUS completed a natural attenuation sampling work plan for the Navy in July 1998, and groundwater monitoring activities began in August 1998. Based on the results of the first two quarterly monitoring events, the BCT decided natural attenuation was a feasible remedial alternative for the groundwater at Site 5 and to continue the groundwater-monitoring program.

The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers Site 5 to the Jacksonville Economic Development Commission, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.



REFERENCE: BECHTEL, 1999. PROJECT COMPLETION REPORT FOR SITE 5, FIGURE 2–1.

DRAWN BY MF DATE 8/25/99		AREA OF EXCAVATION FOR INTERIM REMOVAL ACTION OPERABLE UNIT 2, SITE 5 FIVE–YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7898
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COST/SCHED–AREA			APPROVED BY DATE
SCALE NONE			DRAWING NO. FIGURE 3–3 REV. 0

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3.3.2.2 OU 2, Site 17

The interim remedial action for the contaminated soil was completed in 1995. Approximately 12,000 tons of contaminated soil were excavated from the area shown on Figure 3-4 and treated with a low-temperature thermal desorption unit. The excavation was backfilled with the treated soil. The Navy's Remedial Action Contractor, Bechtel Environmental, Inc., performed the contaminated soil remedial action.

ABB Environmental Services, Inc., prepared the Final Remedial Design Work Plan for the groundwater in 1997. Quarterly groundwater monitoring events began in April 1997. Semiannual groundwater monitoring events began in July 1998.

The institutional controls, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers Site 17 to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

3.3.3 System Operations/Operation and Maintenance

The Navy has contracted with TtNUS to continue to perform the long-term groundwater monitoring programs at Sites 5 and 17. The work is being conducted in accordance with the ROD and the sampling and analysis plans.

3.3.3.1 OU 2, Site 5

Five groundwater-sampling events have been conducted since August 1998. Four of the sampling events were from quarterly monitoring events. The fifth sampling event will be conducted in August 1999 and will be the start of semiannual sampling based on the results of the annual report from the quarterly sampling events. Monitoring wells within the plume, upgradient of the plume (background), downgradient of the plume, and a well point within the drainage ditch were sampled and analyzed for select VOCs, select SVOCs, select inorganics, TRPH, and natural attenuation parameters.

A long term subsurface soil monitoring plan has not been established at this site to determine if or when the LUCIPs may be lifted.

The Navy's original cost estimate for implementation of the Interim Removal Action was $1,600,000. The Navy's original cost estimate for excavation and treatment of the contaminated sediment was $236,000. The Remedial Action Contractors completed the excavation, treatment, disposal, and backfilling of the soil

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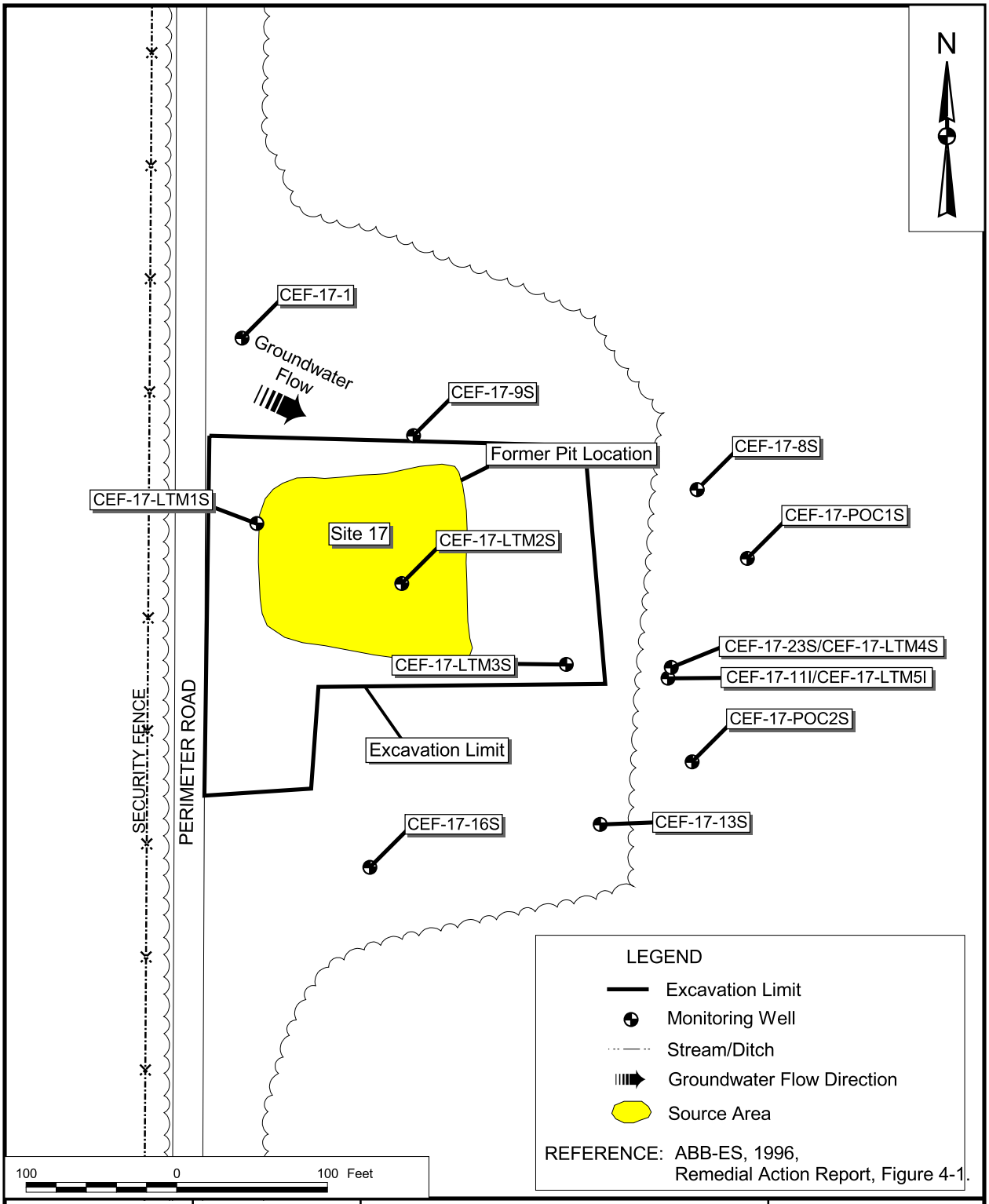

DRAWN BY JCB	DATE 31August99	AREA OF EXCAVATION FOR INTERIM REMOVAL ACTION OPERABLE UNIT 2, SITE 17 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-4 / REV 0

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and sediment for Site 5 for approximately $2,636.000. The Navy's original cost estimate for implementation of AS and institutional controls for the groundwater was approximately $816,000. The Navy's cost estimate of the revised selected alternative of natural attenuation and institutional controls for groundwater was $216,000. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

3.3.3.2 OU 2, Site 17

Seven groundwater-sampling events have been conducted since April 1997. Four of the sampling events were from quarterly monitoring events. The fifth, sixth, and seventh sampling events were conducted as semiannual sampling events based on the annual report from the quarterly sampling events. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for select VOCs, select SVOCs, select inorganics, and natural attenuation parameters.

The Navy's original cost estimate for implementation of the Interim Removal Action was $1,400,000. The Remedial Action Contractor completed the excavation and treatment of soil for Site 17 for approximately $1,946,000. The Navy's original cost estimate for implementation of natural attenuation and institutional controls for the groundwater was approximately $232,000. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

3.4 FIVE-YEAR REVIEW

3.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 2, Sites 5 and 17. The site inspections included visual observations of the former pit area, surface water, sediment, and groundwater monitoring wells. The former pit areas are becoming overgrown with vegetation. Visual observations of the area did not provide evidence of erosion problems. Signs of many wildlife species typical of the area were observed.

The surface water in the drainage ditch at Site 5 was cloudy. The sediment in the drainage ditch is brown to light brown silty sand. The groundwater monitoring wells, including the concrete base and the well casing, were in good condition. Most of the monitoring wells have well tags for identification.

TtNUS conducted several site visits at both Sites 5 and 17 as part of the field activities in 1998 and 1999. The site visits included groundwater sampling and site walkovers. No unusual observations were documented during these site visits.

The proposed land use for the site has remained unchanged. The Jacksonville Economic Development Commission intends to purchase the site and surrounding property and plans to use the surrounding property for commercial or industrial purposes. The land is currently a vacant, relatively featureless area with no residential, commercial, or industrial functions. OU 2, Site 5 is located north of the flight path of landing aircraft, and OU 2, Site 17 is located south of the flight path of landing aircraft.

3.4.2 Document and Analytical Data Review

The Interim ROD, ROD, and documents prepared after the Interim ROD were reviewed for this five-year review. A summary of the documents reviewed is presented below.

3.4.2.1 OU 2, Site 5

The review of the documents related to the interim remedial action indicates that the contaminated soil that acted as a source of groundwater contamination and the contaminated sediment that was a risk to ecological receptors were removed and treated or disposed. The interim remedial actions were completed to meet the requirement of the Interim ROD and ROD for OU 2 with modifications as documented in the Action Memorandum for Soil and Sediment Removal. This remedial action was effective and met the RAOs identified in the ROD. No further soil excavation is required.

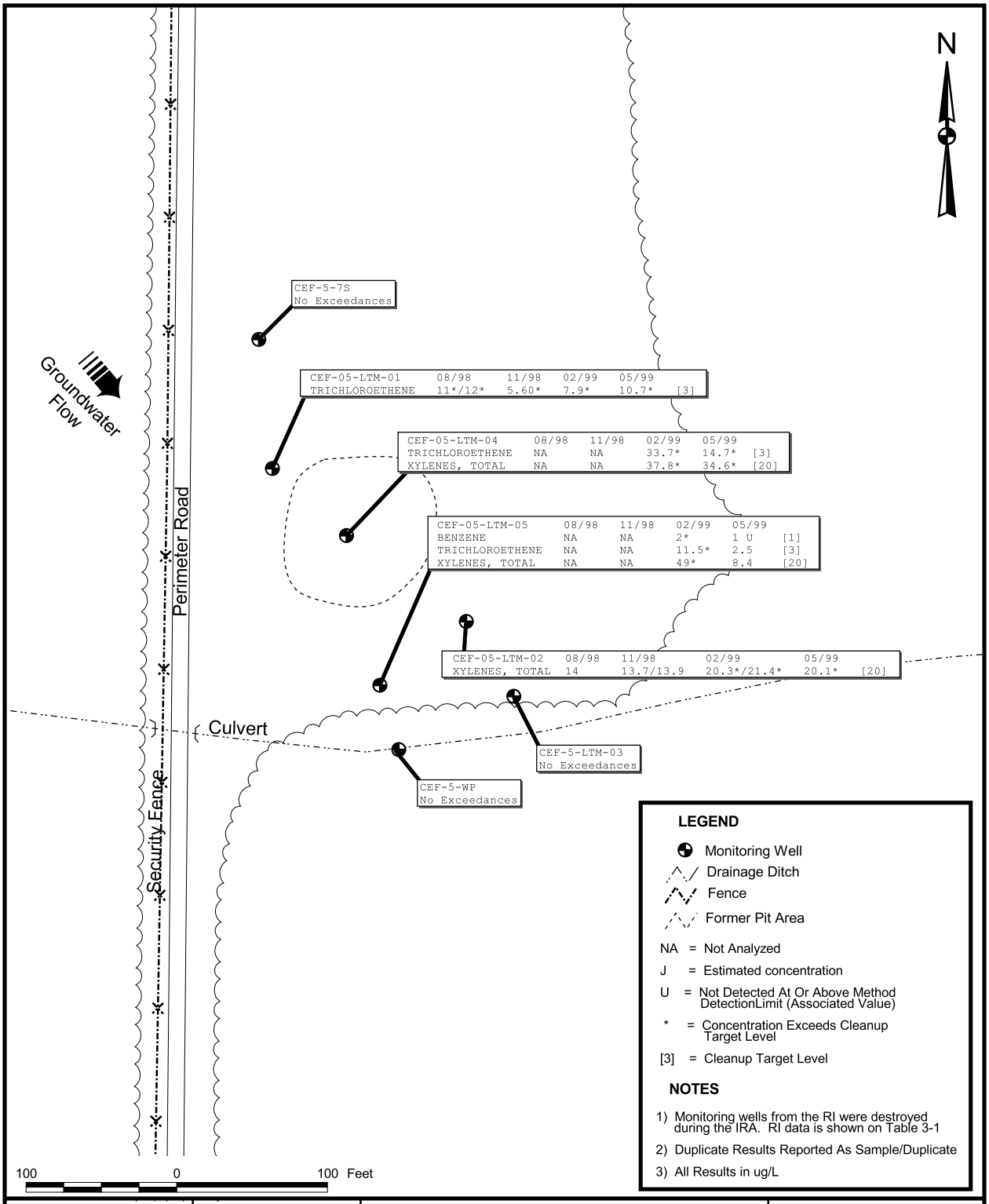
The review of the groundwater monitoring reports through July 30, 1999 indicates that four quarterly long-term monitoring sampling events were conducted in 1998 and 1999, and the draft annual report will be prepared in July 1999. The maximum concentration of the COCs identified in the RI are shown on Table 3-1. Reductions in concentrations of VOCs since the RI indicate that natural attenuation is occurring at OU 2, Site 5. Maximum detected concentrations of most of the VOC, SVOC, pesticides, and inorganic COCs have decreased significantly since the RI. In general, concentrations of COCs remained relatively consistent or decreased over the first year of groundwater monitoring at the site. In addition, COCs do not appear to be migrating beyond site boundaries or discharging into the drainage ditch south of the former disposal pit at unacceptable levels, based on the results of the analysis of the sample from the well point in the ditch (CEF-05-WP). The VOC, SVOC, TRPH, and inorganic exceedances from the groundwater monitoring are shown on Figures 3-5, 3-6, 3-7, and 3-8, respectively.

TABLE 3-1

MAXIMUM CONCENTRATION OF THE CHEMICALS OF CONCERN
OPERABLE UNIT 2, SITE 5
NAS CECIL FIELD, JACKSONVILLE, FLORIDA

Chemical of Concern	Frequency of Detection[1]	RI or Air Sparging Maximum Concentration (µg/L)	May 99 Maximum Concentration (µg/L)
VOLATILE ORGANIC COMPOUNDS			
Acetone	14/30	1,100	(3)
Benzene	3/30	16	2
Trichloroethene[2]	3/9	4.3	14.7
Ethylbenzene	5/30	41	(3)
Toluene	9/30	180	(3)
Total Xylenes	8/30	200	34.6
SEMIVOLATILE ORGANIC COMPOUNDS			
4-Methylphenol	9/30	820 J	26.5
bis(2-ethylhexyl)phthalate	9/30	130 J	(3)
Naphthalene	10/30	270	58.8
2,4-Dimethylphenol	6/30	110	
PESTICIDES			
alpha-Chlordane	1/30	0.15	(3)
beta-HCH	2/30	0.18	(3)
INORGANICS			
Antimony	2/30	29.4 J	(3)
Arsenic	21/30	79 J	(3)
Beryllium	4/30	12.5	(3)
Cadmium	4/30	5.9	(3)
Chromium	27/30	583 J	(3)
Manganese	23/30	263	16.6
Vanadium	27/30	489	122

1 Frequency of detection is the number of samples in which the analyte was detected over the number of samples analyzed (excluding rejected values) from the RI and air sparging pilot-scale test sampling activities.
2 Trichloroethene (TCE) was not detected in the RI. TCE was detected in the air sparging pilot-scale test.
3 Below groundwater cleanup target level.



DRAWN BY JCB	DATE 25 AUG 99	EXCEEDANCES OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 2, SITE 5 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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SCALE AS NOTED			DRAWING NO. FIGURE 3-5 REV 0

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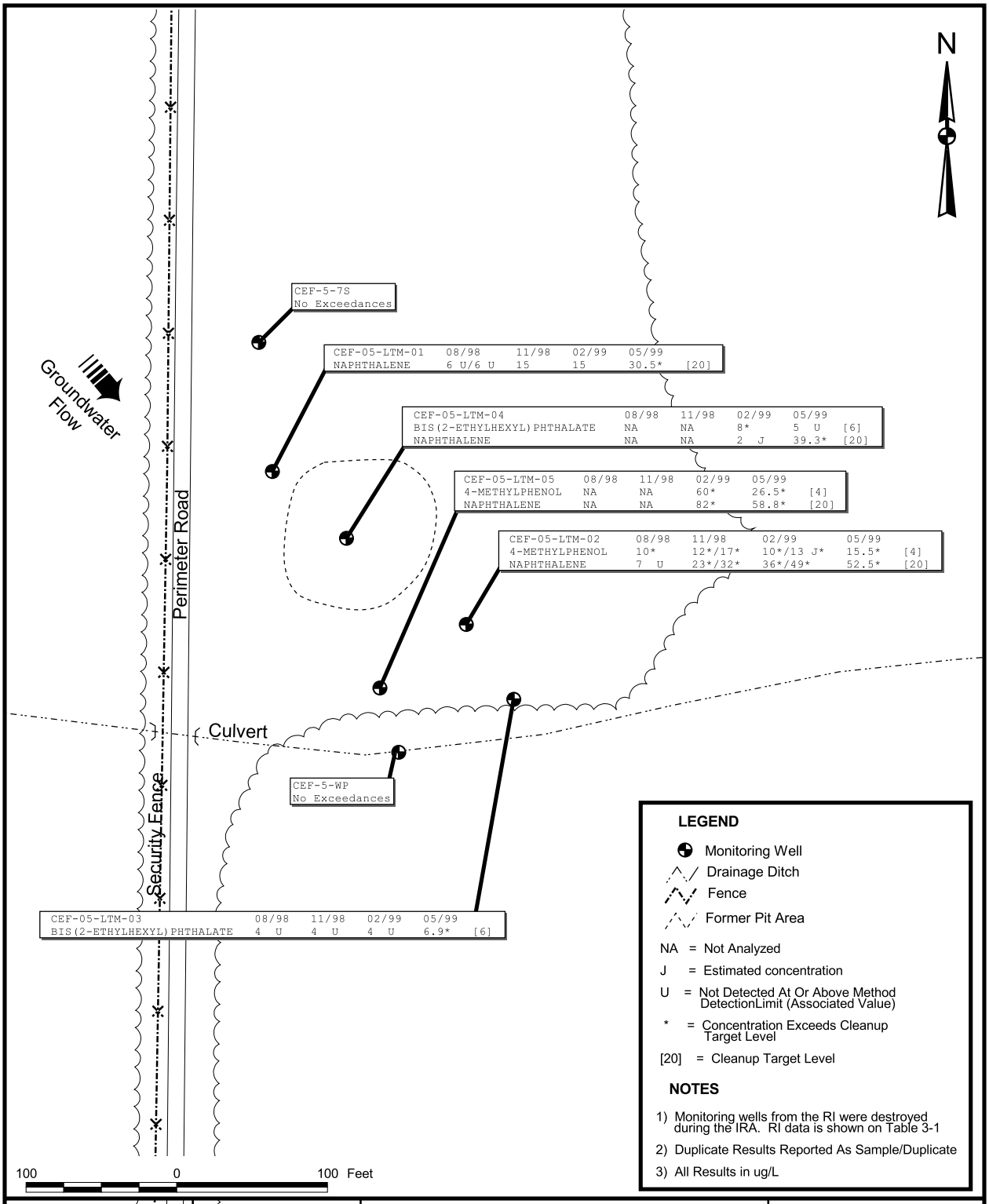

DRAWN BY JCB	DATE 25 AUG 99	EXCEEDANCES OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 2, SITE 5 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-6 REV 0

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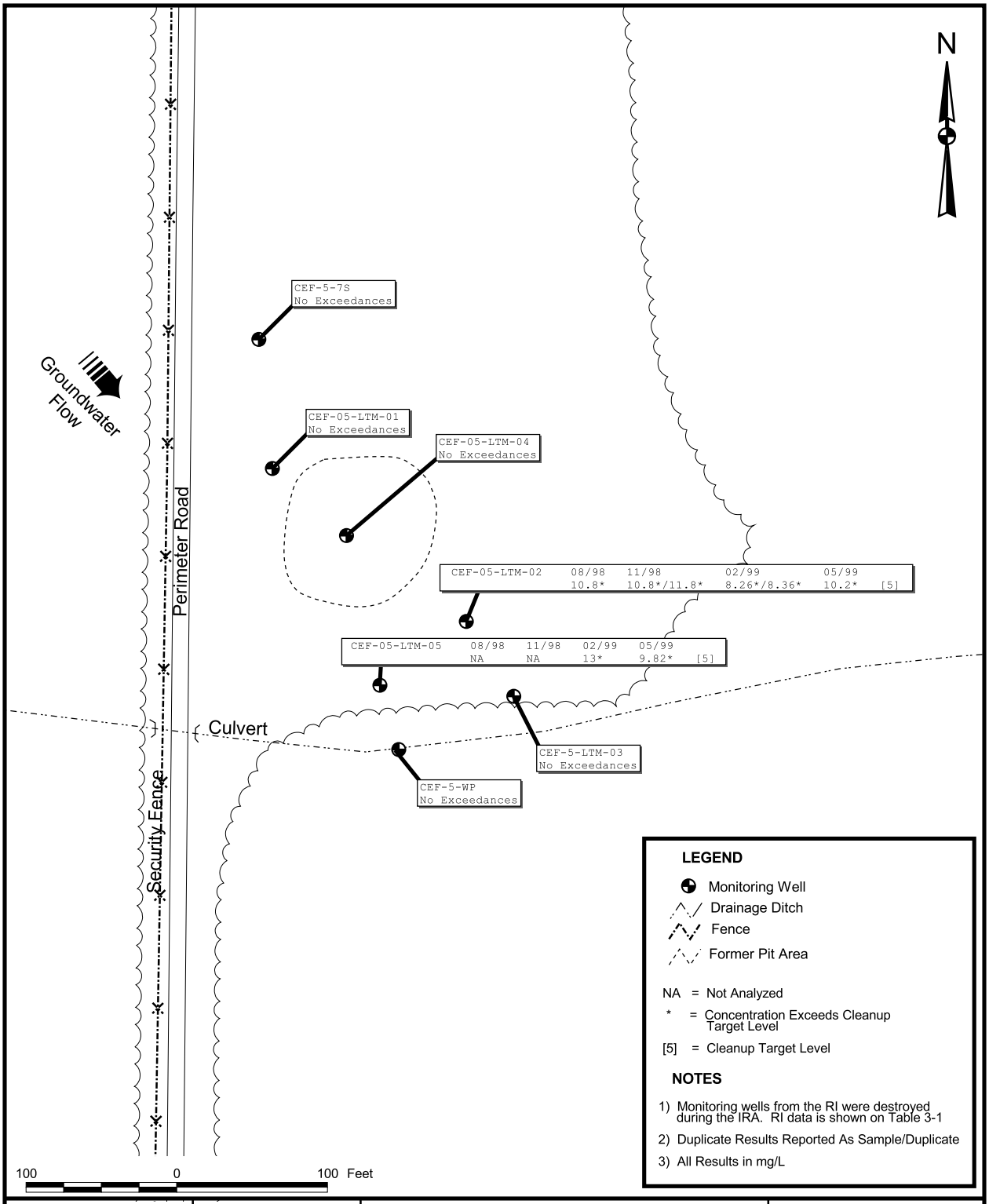

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JCB	25 AUG 99		EXCEEDANCES OF TRPH IN GROUNDWATER OPERABLE UNIT 2, SITE 5 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	7898
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COST/SCHEDULE-AREA				APPROVED BY DATE
SCALE AS NOTED				DRAWING NO. FIGURE 3-7 / REV 0

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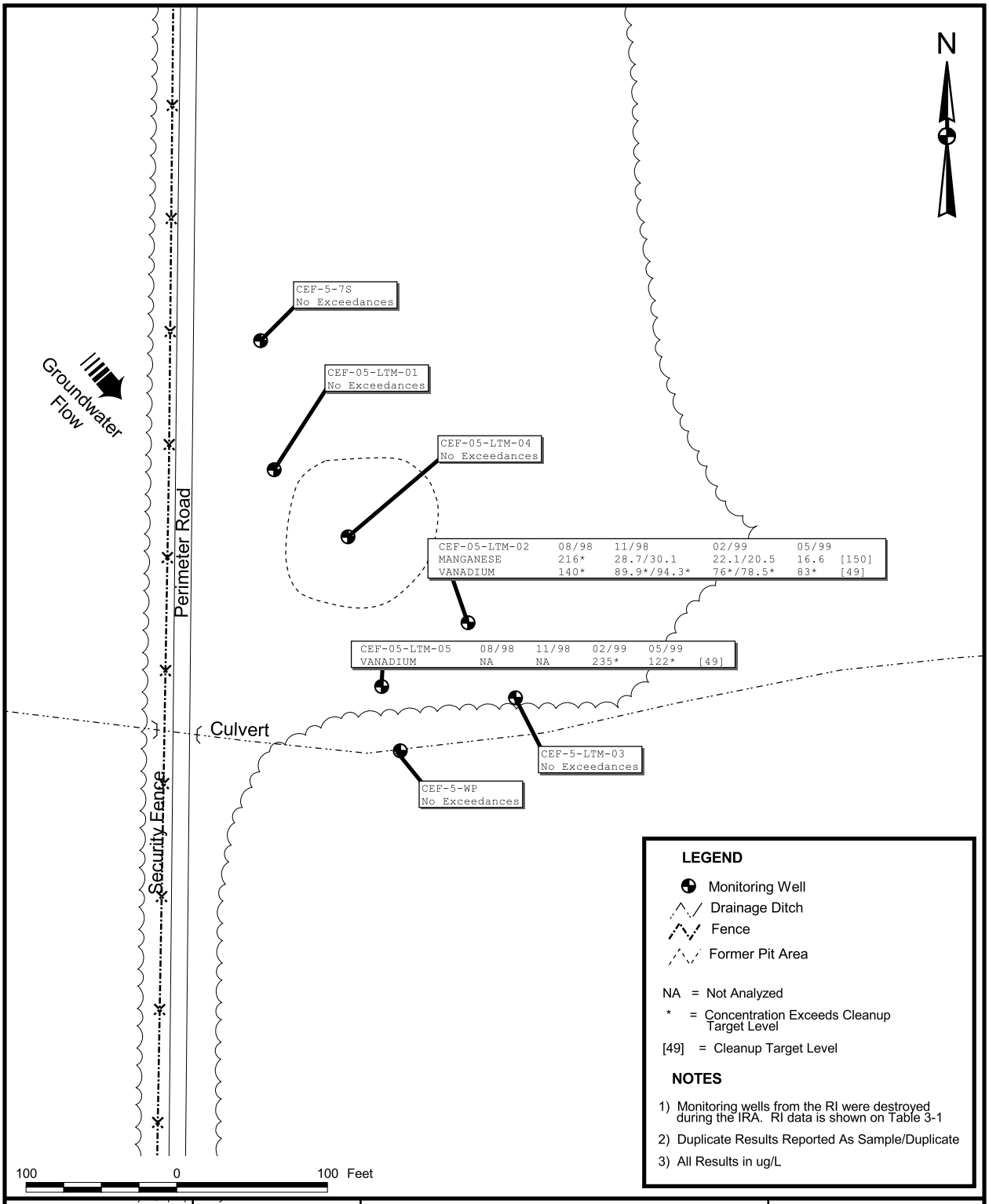

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AS NOTED				

EXCEEDANCES IN INORGANICS
IN GROUNDWATER
OPERABLE UNIT 2, SITE 5
FIVE - YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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COCs that were not detected in excess of groundwater target cleanup goals during the first year of monitoring include acetone, ethylbenzene, toluene, 2,4-dimethylphenol, antimony, arsenic, beryllium, cadmium, and chromium. Natural attenuation data can be found in the annual groundwater monitoring reports.

The review of these documents indicates that the Navy is meeting the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU. The frequency of the monitoring specified in the long-term monitoring program of twice per year appears to be adequate.

3.4.2.2 OU 2, Site 17

The review of the documents related to the interim remedial action indicates that the contaminated soil that acted as a source of groundwater contamination was removed, treated, and placed back into the excavation. The interim remedial actions were completed to meet the requirement of the Interim ROD.

The review of the groundwater monitoring reports through June 30, 1999 indicates that four quarterly monitoring sampling events were conducted from April 1997 to March 1998 and two semiannual monitoring events were conducted from July 1998 to January 1999. An annual report for the second year of groundwater monitoring was prepared in June 1999. The maximum concentrations of COCs identified in the RI are shown on Table 3-2. The concentrations and numbers of VOCs and SVOCs detected at the site have decreased significantly since the RI. Concentrations of inorganic COCs also have decreased significantly since the RI. Organic COCs detected during the sixth sampling (January 1999) event were limited to benzene, vinyl chloride (VC), and 2,4-dimethylphenol. Concentrations of TCE have decreased to below detection limits. Benzene was the only organic COC and manganese was the only inorganic COC detected above target cleanup goals during the sixth sampling event. The VOC, SVOC, and inorganic exceedances from the groundwater monitoring are shown on Figures 3-9, 3-10, and 3-11 respectively. Natural attenuation data can be found in the annual groundwater reports.

3.4.3 <u>ARAR and Site-Specific Action Level Changes</u>

Chemical-specific ARARs and site-specific action levels that have changed since the ROD was signed are shown in the table below. The ARAR changes are from the promulgation of the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC). The site-specific action level changes are from the development of an Inorganic Background Data Set at NAS Cecil Field.

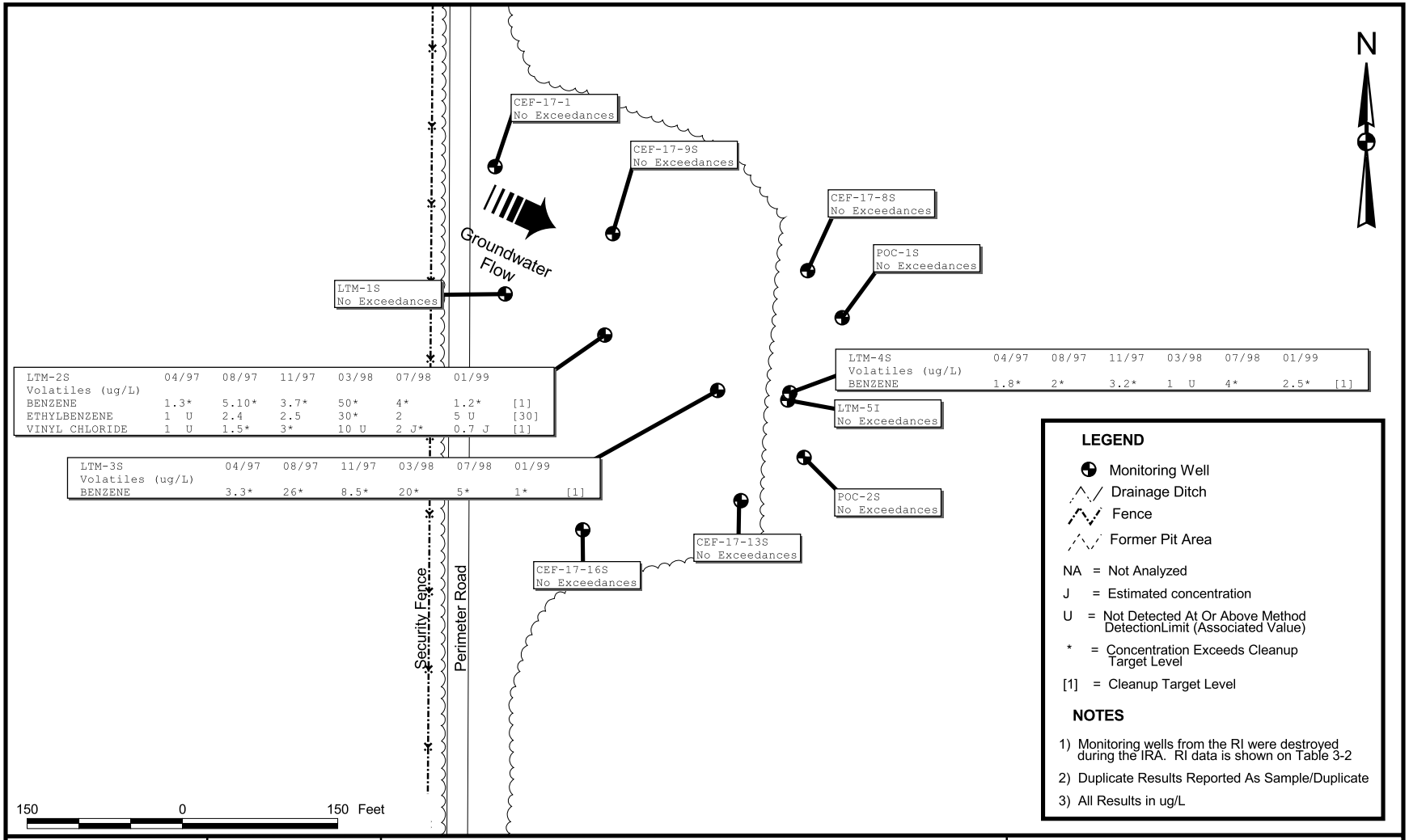
TABLE 3-2

MAXIMUM CONCENTRATION OF THE CHEMICALS OF CONCERN
OPERABLE UNIT 2, SITE 17
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

COCs	Frequency of Detection(2)	RI Maximum Concentration (µg/L)	January 99 Maximum Concentration (µg/L)
VOLATILE ORGANIC COMPOUNDS (µg/L) (1)			
Benzene	7 / 33	170	2.5
Methylene chloride	24 / 33	24,000	(3)
Trichloroethene	6 / 33	140	(3)
Vinyl chloride	2 / 21	3	0.7
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)			
4-Methylphenol	4 / 12	19,000	(3)
2,4-Dimethylphenol	4 / 12	3,750	(3)
2-Methylphenol	4 / 12	22,000	(3)
Phenol	4 / 12	5,550	(3)
INORGANICS (µg/L)			
Aluminum	6 / 12	201,000	(3)
Arsenic	6 / 12	22.3	(3)
Manganese	8 / 12	5,660	639
Vanadium	7 / 12	169	(3)

1 Volatile organic samples include data from 12 shallow surficial monitoring wells and 21 screening locations.
2 Frequency of detection from the RI.
3 Below groundwater cleanup target level.

Vinyl chloride was added to the list of COCs in January 1998 after it was detected in two consecutive sampling events.
COC = Chemical of concern
µg/L = micrograms per liter



DRAWN BY JCB	DATE 25 AUG 99	CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 2, SITE 17 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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SCALE AS NOTED			DRAWING NO. FIGURE 3-9 / REV 0

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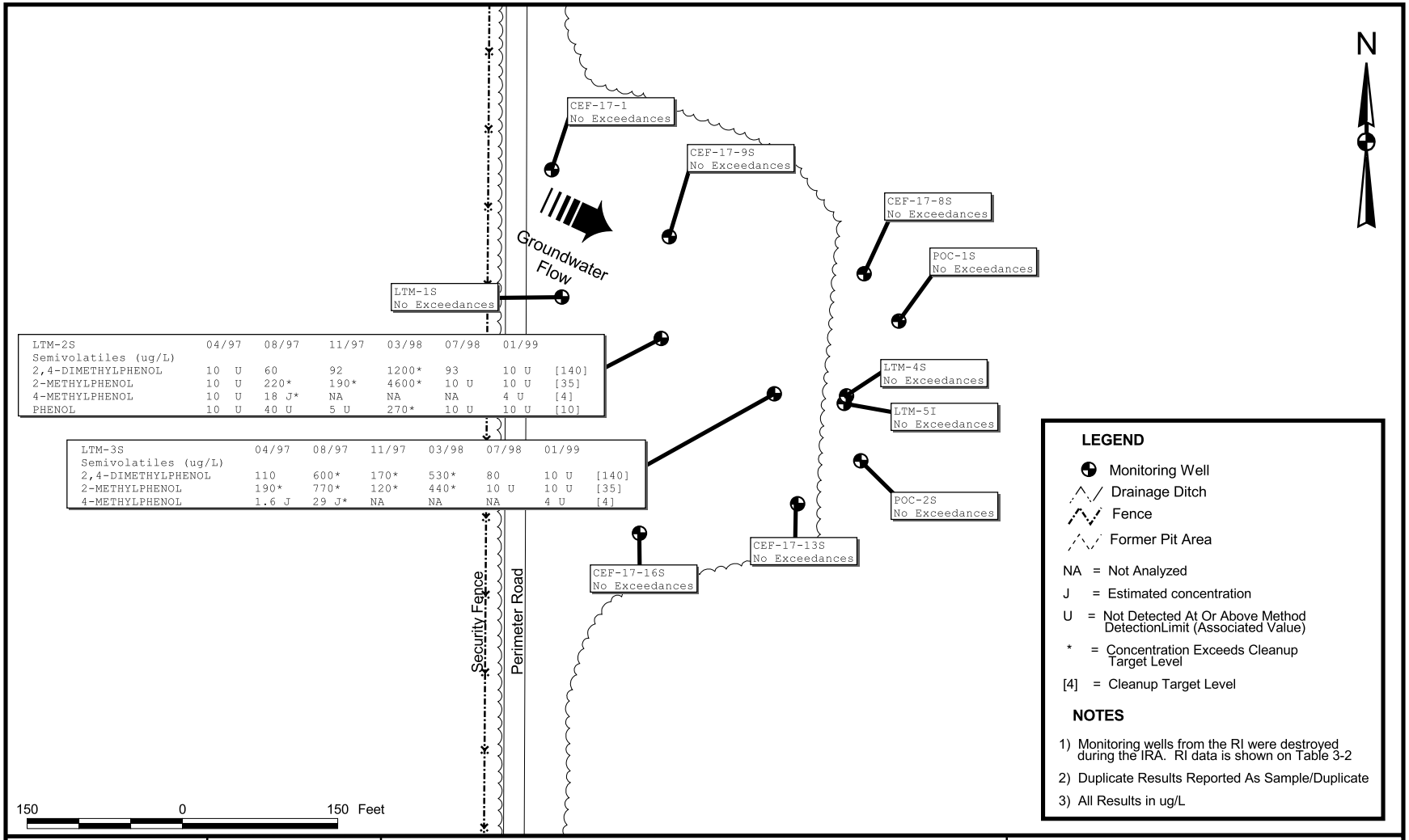

LTM-2S	04/97	08/97	11/97	03/98	07/98	01/99	
Semivolatiles (ug/L)							
2,4-DIMETHYLPHENOL	10 U	60	92	1200*	93	10 U	[140]
2-METHYLPHENOL	10 U	220*	190*	4600*	10 U	10 U	[35]
4-METHYLPHENOL	10 U	18 J*	NA	NA	NA	4 U	[4]
PHENOL	10 U	40 U	5 U	270*	10 U	10 U	[10]

LTM-3S	04/97	08/97	11/97	03/98	07/98	01/99	
Semivolatiles (ug/L)							
2,4-DIMETHYLPHENOL	110	600*	170*	530*	80	10 U	[140]
2-METHYLPHENOL	190*	770*	120*	440*	10 U	10 U	[35]
4-METHYLPHENOL	1.6 J	29 J*	NA	NA	NA	4 U	[4]

DRAWN BY JCB	DATE 25 AUG 99	CONCENTRATIONS OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 2, SITE 17 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-10 / REV 0

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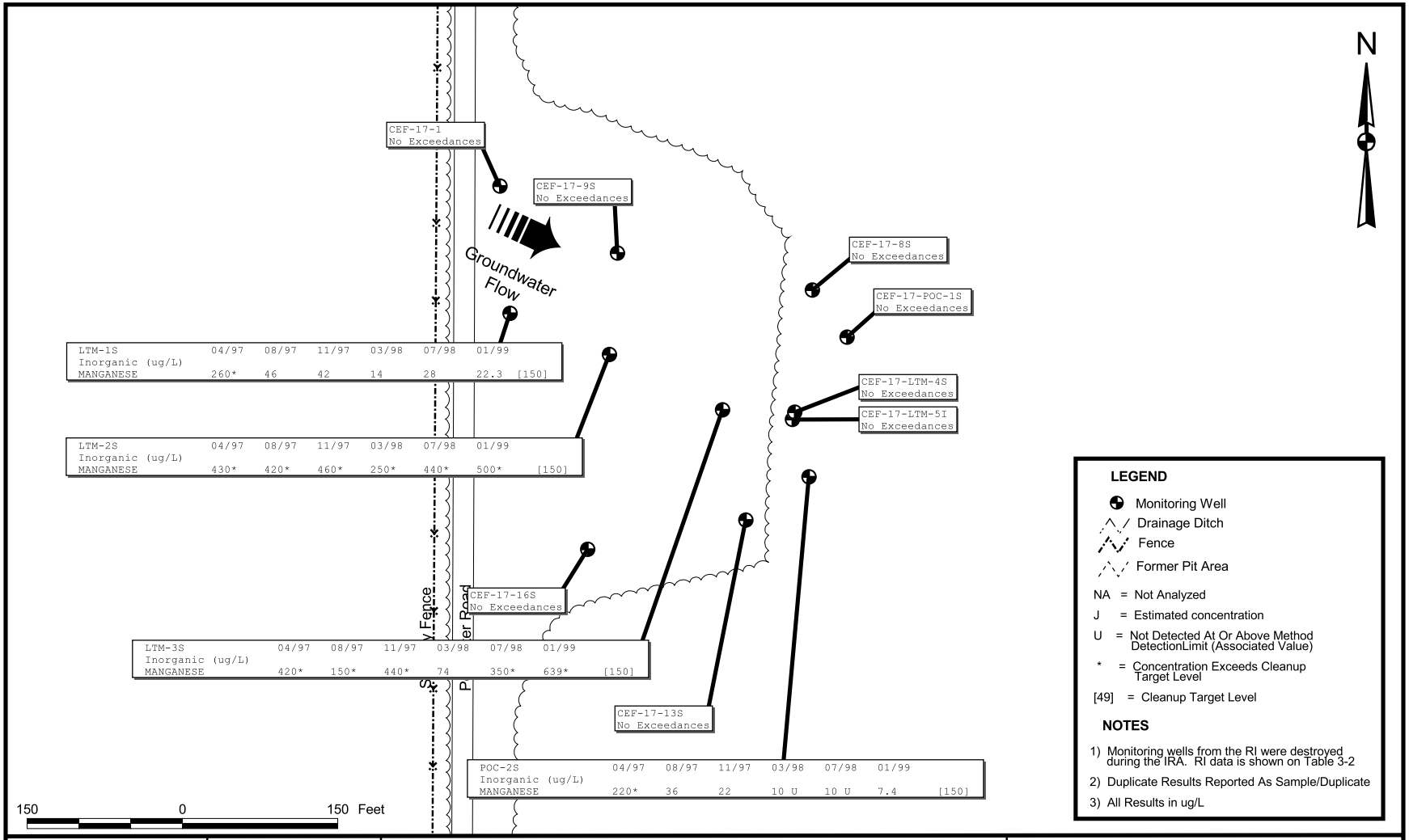

LEGEND

- Monitoring Well
- Drainage Ditch
- Fence
- Former Pit Area

NA = Not Analyzed

J = Estimated concentration

U = Not Detected At Or Above Method DetectionLimit (Associated Value)

* = Concentration Exceeds Cleanup Target Level

[49] = Cleanup Target Level

NOTES

1) Monitoring wells from the RI were destroyed during the IRA. RI data is shown on Table 3-2
2) Duplicate Results Reported As Sample/Duplicate
3) All Results in ug/L

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CHECKED BY	DATE		APPROVED BY DATE
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SCALE AS NOTED			DRAWING NO. FIGURE 3-11 / REV 0

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Contaminant	ARAR/Site-Specific Level		Source
GROUNDWATER			
2,4-Dimethylphenol	Previous	700 µg/L	Target Cleanup Level for OU 2
	Previous	400 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	140 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
2-Methylphenol	Previous	1000 µg/L	Target Cleanup Level for OU 2
	Previous	350 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	35 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
4-Methylphenol	Previous	100 µg/L	Target Cleanup Level for OU 2
	Previous	35 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	4 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
Phenol	Previous	20000 µg/L	Target Cleanup Level for OU 2
	Previous	10 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	10 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
Aluminum	Previous	36000 µg/L	Target Cleanup Level for OU 2
	New	13101 µg/L	NAS Cecil Field Inorganic Background Data Set
Manganese	Previous	100 µg/L	Secondary Drinking Water Standard
	New	150 µg/L	NAS Cecil Field BCT Minutes of Meeting, Minutes No. 1032
Vanadium	Previous	200 µg/L	Target Cleanup Level for OU 2
	New	49 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
SOIL			
TRPH	Previous	50 mg/kg	FAC 17-775, FL Soil Thermal Treatment Facilities Regulation
	New	340 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
SEDIMENT			
Aroclor	Previous	1 mg/kg	EPA Guidance on Remedial Actions for Superfund Sites with PCB Contamination
	New	21.6 mg/kg	Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders, U.S. EPA Region 4

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARARs for phenol in groundwater did not change; however, the cleanup level presented in the ROD was higher than the ARAR. The ARARs for 2,4-dimethylphenol, 2-methylphenol, and 4-methylphenol have become more stringent since the ROD was signed. These new contaminant cleanup target levels rely upon health-based risk assessments. This change will not affect the protectiveness of the remedial design but will require additional time and resources to complete the remedial action.

The ARARs for the soil and the sediment increased and do not affect the protectiveness of the remedial action. These ARARs have not become more stringent since the ROD was signed.

New chemical-specific ARARs have also been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC), FDEP Approach to the Assessment of Sediment Quality in Florida Coastal Waters, and the U.S. EPA Region IV Ecological Screening Values. The ecological risk toxicity values developed in the new regulations and guidance manuals do not affect the protectiveness of the remedial action. The BRA results indicated that the ecological receptors were at risk from exposure to the Site 5 soil and sediment. The soil and sediment were excavated and disposed to remove the exposure pathway.

Potential ecological risks were evaluated for the surface water in the drainage ditch and groundwater discharge into the drainage ditch at Site 5. Potential ecological risks were evaluated for the surface soil, surface water, and sediment at Site 17 also. No ecological effects were identified.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the ROD.

3.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when Site 5 is transferred to the Jacksonville Economic Development Commission and Site 17 is transferred to the Jacksonville Port Authority, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers Site 5 to the Jacksonville Economic Development Commission and Site 17 to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted. The current and future land use at these sites suggests that these controls should be effective.

3.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of Site 5 to the Jacksonville Economic Development Commission and Site 17 to the Jacksonville Port Authority are shown in the table below.

Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Program.	Navy	U.S. EPA and FDEP	Semi-Annual in January and July
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property
Prepare Subsurface Soil Monitoring Plan	Navy	U.S. EPA and FDEP	Before next five-year review
Issue Explanation of Significant Differences	Navy	U.S. EPA and FDEP	Before next five-year review

3.7 PROTECTIVENESS STATEMENT

The remedy at OU 2 is expected to be protective of human health and the environment upon completion. The implementation of the long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The remedial action for the source removal/control was implemented. The soil excavation and treatment or disposal remedy, as a measure that would reduce exposure, has been completed at OU 2, was effective, and met the RAOs identified in the ROD. No additional excavation is required.

The long-term groundwater monitoring program has been implemented as designed to reduce the risk related to exposure to groundwater. The results of this program indicate that the concentrations of contaminants have decreased since the RI; however, some of the concentrations were still greater than the groundwater cleanup target levels (FDEP GCTLs, F.A.C. 62-777 and the Inorganic Background Data Set).

The institutional controls will be implemented before the transfer of Site 5 to the Jacksonville Economic Development Commission in 2001 and the transfer of Site 17 to the Jacksonville Port Authority in 1999. The Navy will temporarily retain control of OU 2, Sites 5 and 17 and will transfer the property when it has determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

Most of the remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that have been completed (soil and sediment excavation) and that are currently in operation (groundwater monitoring) are operating as designed, and the data indicate progress is evident in meeting the RAOs.

4.0 OPERABLE UNIT 3, SITES 7 AND 8

Implementation of the remedial actions at OU 3 began in late 1998. This five-year review consists of an approximate 1-year period of data and provides a current status update for OU 3. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions. A more detailed review of the remedial actions will be conducted during the next review.

This five-year review is being conducted as a matter of policy until the cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. OU 3 consists of Site 7, the Old Firefighter Training Area, and Site 8, the Boresite Range/Hazardous Waste Storage/Firefighter Training Area. These sites are grouped as OU 3 because both are located within the flightline in the southern part of the main base and because of their close proximity to each other and the similarity of wastes and activities conducted.

4.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 3, Sites 7 and 8 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 7 Old Firefighter Training Area operation	1950s to 1975
Site 8 Boresite Range/Hazardous Waste Storage/Firefighter Training Area operation	1975 to 1984
RI/FS complete	1997
FS Addendum	2/98
ROD signature, Site 7	3/98
ROD signature, Site 8	3/98
Soil and Groundwater Remedial Design, Site 7	5/98
Groundwater Remedial Design Workplan, Site 8	6/98
Long-term Groundwater Sampling Work Plan, Site 7	7/98
Remedial Design for Soils, Site 8	11/98
Technical Memorandum, Surface Soil Remediation, Site 7	12/98
Technical Memorandum, Soil Remediation, Site 8	12/98
Remedial Design for Soils, Site 7	2/99
ROD, Site 8	5/99
Groundwater Monitoring, Site 7	Ongoing annual
Groundwater Monitoring, Site 8	Ongoing semiannual

4.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 3. A sketch of OU 3, Site 7 showing the firefighting training area, burn pit, and the runway is provided on Figure 4-1. A sketch of OU 3, Site 8 showing the unlined firefighting training pits and the hazardous waste storage area is provided on Figure 4-2. Site 7 occupies approximately 8 acres and Site 8 occupies approximately 13 acres of OU 3. Both sites are considered possible sources of contamination to the groundwater through migration of contaminants. Site 7, the Old Firefighter Training Area, operated as a firefighter training area from the 1950s until 1975, training military personnel in aircraft firefighting techniques. An estimated 200,000 gallons of waste fuel, oil, chlorinated and non-chlorinated solvents, hydraulic fluid, enamel paint, epoxy paint, and/or paint strippers were reportedly used to ignite the airframes used for training. The sources of the liquid wastes used at the site were the fuel farm, squadrons, public workshops, and the AIMD. The drummed wastes from these sources were transported to the site, ignited in the unlined pit and on the two fire pads, and extinguished with water and a biodegradable and non-toxic protein foaming agent. The two fire pads were used from the 1950s until 1975. The unlined pit was used from the mid-1960s until 1975. When the training activities at the site ceased in 1975, the pit was filled with soil, and it is no longer visually distinguishable.

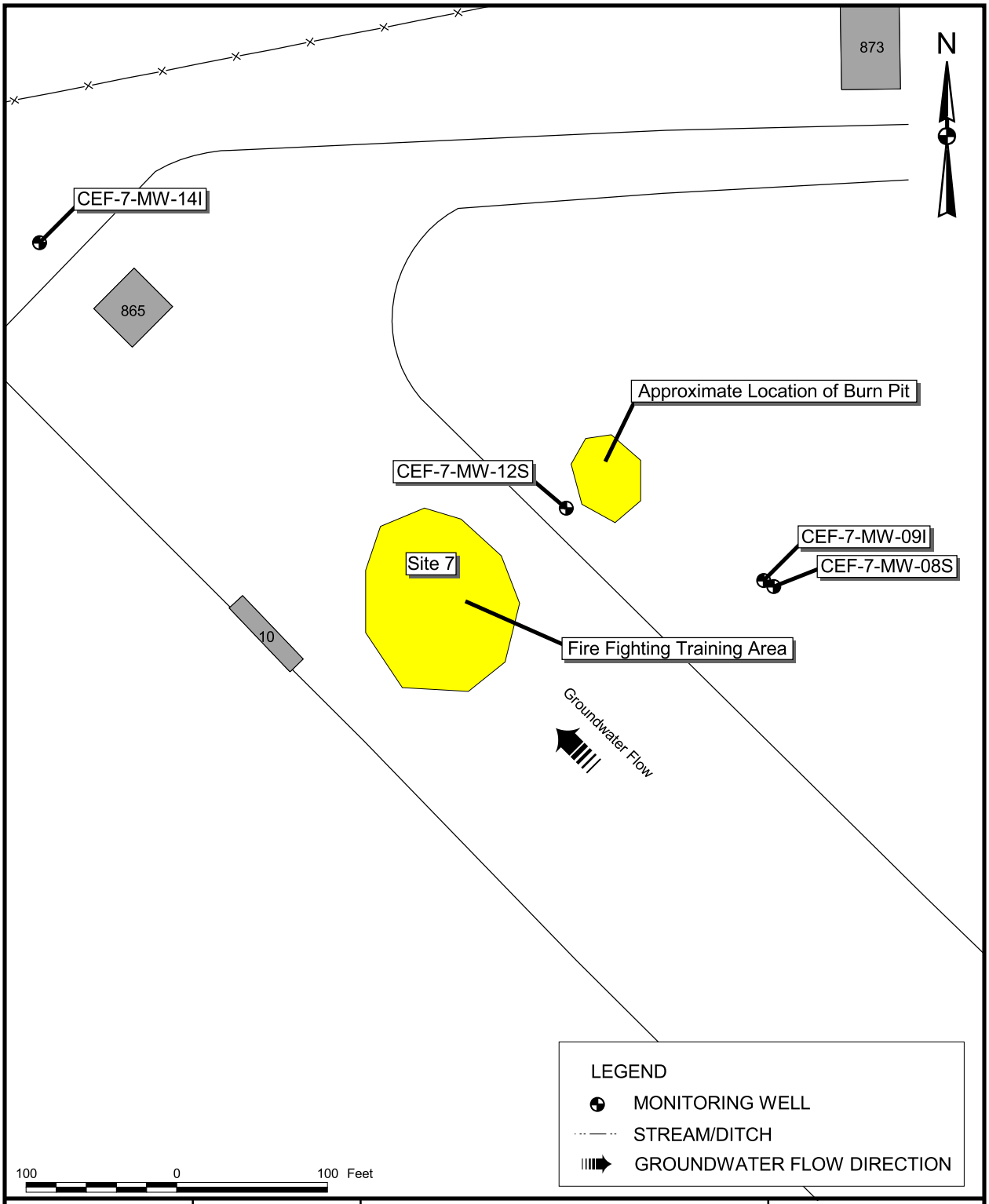
Site 8, the Boresite Range Hazardous/Waste Storage/Firefighter Training Area, was operated as a boresite testing area for aircraft gunnery from 1975 until 1984. Aircraft would taxi to the concrete pad and "sight in" their guns by firing at targets located in front of a backstop. Similar to Site 7, Site 8 was a firefighting training area in which drummed liquid wastes, such as those used at Site 7, were used to ignite and extinguish airframes in three unlined pits. Approximately 145,000 gallons of liquid wastes were reportedly used in the fire training area.

Site 8 was also reportedly used as a hazardous waste storage area for drummed liquid wastes in unmarked 55-gallon drums. Some of these drums were reported to have been punctured by bullets fired at the backstop and, reportedly, the contents of some of the drums spilled onto the ground. Some drums were reported to have deteriorated and leaked on the ground or were spilled onto the ground. As many as 100 of these unmarked 55-gallon drums may have leaked or spilled at Site 8.

4.3 REMEDIAL ACTIONS

4.3.1 <u>Remedy Selection</u>

The purpose of remedial action at OU 3 is to comply with ARARs and to reduce the risk of possible adverse effects to human and ecological receptors posed by physical and chemical conditions found at Sites 7 and 8. The RAOs for OU 3, Site 7 were published in the ROD, Site 7, Operable Unit 3 in March



DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 3, SITE 7 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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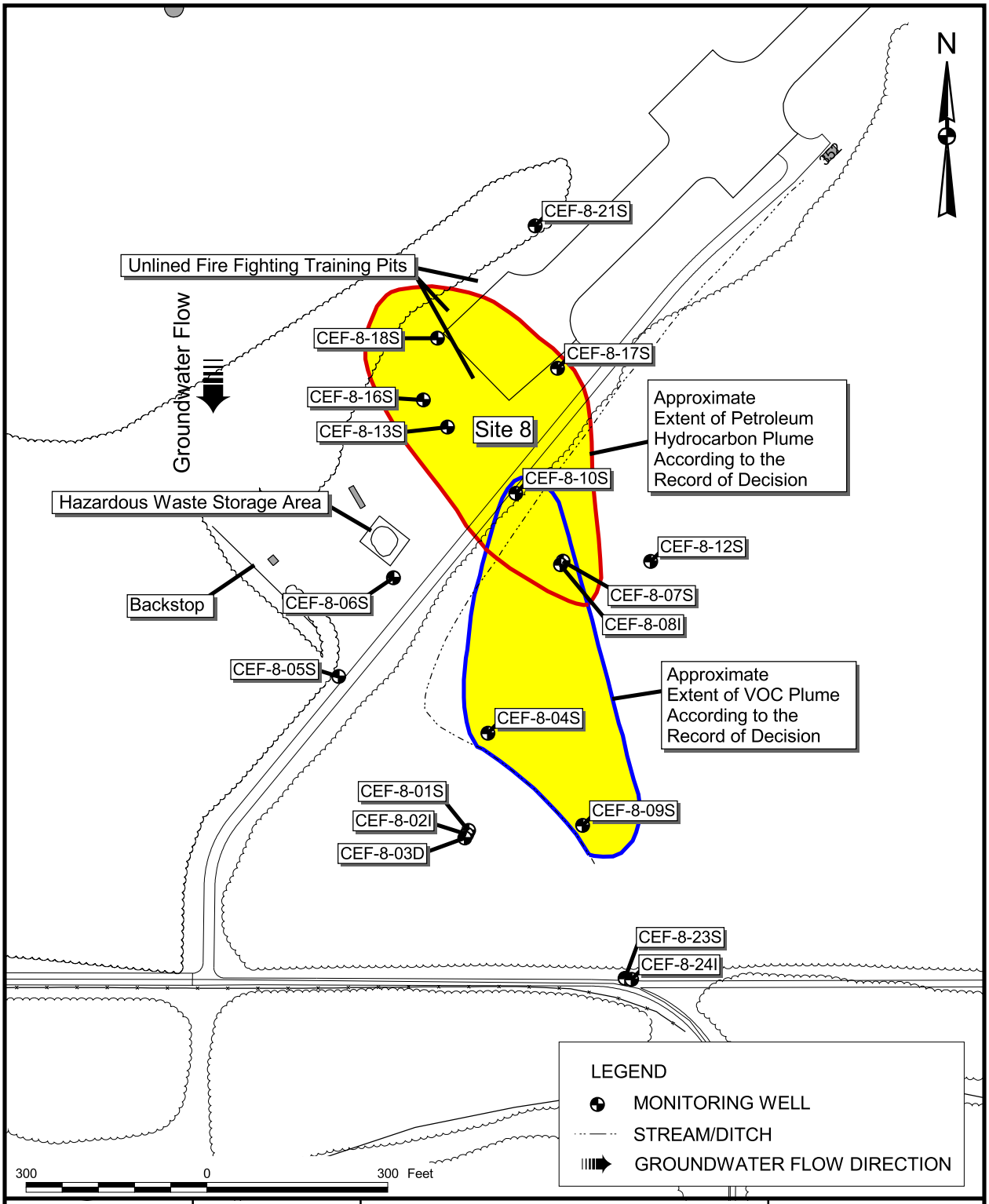
P:\GIS\CECIL\5yr_review.apr 18August99 MJJ Figure 4-1 Layout



DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 3, SITE 8 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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SCALE AS NOTED			DRAWING NO. FIGURE 4-2 / REV 0

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1998 and the RAOs for OU 3, Site 8 were published in the ROD, Site 8, Operable Unit 3 in March 1998. These RAOs were based on an evaluation of site conditions, risks, and legal requirements (ARARs).

4.3.1.1 OU 3, Site 7

The two RAOs identified for OU 3, Site 7 were developed based on the investigations that indicated that the presence of surface soil and groundwater contamination posed a potential risk to the public health, welfare or the environment. The RAOs identified in the OU 3, Site 7 ROD were

- Prevent exposure to contaminants that pose an unacceptable human health risk and are present at concentrations exceeding the Florida soil cleanup goal for industrial sites.

- Prevent exposure to groundwater that contains benzene at concentrations greater than the Florida groundwater cleanup goal.

The selected alternatives at Site 7 were excavation and disposal of the contaminated soil and annual monitoring of the contaminated groundwater. These selected alternatives were considered protective of human health and the environment, attained the ARARs, and were cost effective. The remedial alternative selected for soil at Site 7 complied with the chemical- and action-specific ARARS as defined in the OU 3 FS. No location-specific ARARs are applicable to Site 7 soil alternatives. The remedial alternative selected for groundwater at Site 7 will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and monitoring will verify compliance. These alternatives comply with the action- and location-specific ARARs.

4.3.1.2 OU 3, Site 8

One RAO was identified for OU 3, Site 8 in the March 1998 ROD. The RAO was developed based on the investigations that indicated that the presence of groundwater contamination could pose a human health risk if the groundwater was used as a potable water source. The RAO in the OU 3, Site 8 ROD was

- Prevent exposure to groundwater at Site 8 that contains 1,1-dichloroethene (DCE) at concentrations greater than the state of Florida guidance criteria and that causes unacceptable risk to human health.

The selected alternative at Site 8 to address the contaminated groundwater was natural attenuation. The remedial alternative selected for groundwater at Site 8 will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and monitoring will verify compliance. This alternative complies with the action- and location-specific ARARs.

The Site 8 contaminant concentrations in sediment were reviewed in the ROD. The no action alternative was selected for sediment because the contaminant concentrations were below the state of Florida probable effect level criteria and remedial action is not required. This selected alternative is considered protective of human health and the environment and does not result in habitat loss or wetland destruction.

Although not part of the ROD, the BCT elected to remediate surface soil contaminated with total recoverable petroleum hydrocarbons (TRPH) at Site 8. A remedial design for soils calling for excavation and disposal of the contaminated surface soil at OU 3, Site 8, established the following additional RAO:

- Reduce human health risk associated with residential exposure to soil containing TRPH concentrations in excess of the state of Florida Brownfields Cleanup Criteria Rule of 350 mg/kg.

The remedial action for soil at Site 8 will comply with the chemical- and action-specific ARARS.

4.3.2 Remedy Implementation

The remedial actions at Sites 7 and 8 are currently being implemented. A summary of the remedial actions that have been conducted is presented below.

4.3.2.1 OU 3, Site 7

The remedial design for soil for OU 3, Site 7 was prepared in 1998. A remedial design for soil was prepared by HLA to meet the goals of the RAO; however, the BCT decided to excavate and dispose of the soil that exceeded the state of Florida soil cleanup goal for residential rather than industrial sites. TtNUS prepared another remedial design for soil to meet the residential criteria. The Navy implemented the soil remedial actions at the Site 7 at NAS Cecil Field in accordance with the remedial designs. The remedial action for soil removal was conducted in December 1998 and 5,000 yd^3 of contaminated soil was excavated.

The remedial design for groundwater for OU 3, Site 7 was prepared in 1998 by HLA and by TtNUS. Annual groundwater monitoring was conducted in 1998, and groundwater samples are scheduled to be obtained in July 1999. Annually and during the 5-year cumulative review of the analytical data, an evaluation will be conducted to determine if conditions warrant continuing the groundwater-use restrictions and monitoring or if more aggressive remedial actions should be undertaken.

Institutional controls will be implemented at the site to prevent exposure of human receptors to the groundwater of the surficial aquifer. The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human

health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

4.3.2.2 OU 3, Site 8

The remedial design for groundwater for OU 3, Site 8 was completed in 1998 and outlines the long-term monitoring plan for groundwater for the site. The objective is to evaluate the performance, progress, and effectiveness of natural attenuation in reducing contaminants and retarding their migration. The monitoring plan is designed to measure plume migration and contaminant level trends over a period of time by using a network of 15 wells. TtNUS personnel have performed four groundwater sampling events at Site 8 since August 1998 in support of the OU 3, Site 8 remedial design.

Institutional controls will be implemented at the site to prevent exposure of human receptors to the groundwater of the surficial aquifer. The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

A Remedial Design for Soils for OU 3, Site 8 was prepared in 1998. The remedial design for soil was prepared to meet the goals of the RAO, approved by the BCT which decided to excavate and dispose of the soil that exceeded the state of Florida soil cleanup goal for residential, rather than industrial, sites. The remedial design estimates approximately 2,215 yd^3 of contaminated surface soil will be excavated and disposed off site. The Navy has contracted with a Remedial Action Contractor to implement the soil remedial actions at Site 8 at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The remedial action for soil removal is scheduled for August 1999.

4.3.3 System Operations/Operation and Maintenance

The Navy has contracted with TtNUS to perform the Long-Term Groundwater Monitoring Program in support of the selected remedial action, annual monitoring of groundwater at Site 7 and long-term natural attenuation groundwater monitoring at Site 8. The work is being conducted in accordance with the RODs and the Long-term Groundwater Sampling Work Plan for OU 3, Site 7 and the Groundwater Remedial Design Workplan for OU 3, Site 8.

4.3.3.1 OU 3, Site 7

The activities completed for annual groundwater monitoring at Site 7 include one annual groundwater sampling event. Samples for the second annual groundwater monitoring event were collected in late July 1999. Four groundwater monitoring wells were sampled and one field duplicate sample was obtained. The samples were sent to a fixed-based laboratory and analyzed for benzene.

The Navy's original cost estimate in the ROD for implementation of excavation and disposal for Site 7 soil was $99,100 to $609,000, under the industrial land use scenario. The Technical Memorandum estimates the cost for implementation of excavation and disposal for the industrial and residential land use scenarios at $462,000 and $568,000, respectively. The Navy's Environmental Detachment completed the excavation and disposal of soil for Site 7 for approximately $372,000. The Navy's original cost estimate for implementation of the groundwater monitoring program at Site 7, was approximately $137,000 over a 30-year period. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

4.3.3.2 OU 3, Site 8

The completed activities for natural attenuation at Site 8 include five groundwater sampling events that have been conducted since August 1998. Four of the sampling events were from quarterly monitoring events. The fifth sampling event will be conducted in August 1999 and will be the start of semiannual sampling based on the results from the annual report from the quarterly sampling events. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for select VOCs, select SVOCs, select inorganics, and natural attenuation parameters.

The Navy's original cost estimate for implementation of natural attenuation for groundwater at Site 8 was approximately $465,000 over a 30-year period. The Navy's cost estimate for implementation of excavation and disposal of the contaminated surface soil under the residential land use scenario was approximately $306,000. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

4.4 FIVE-YEAR REVIEW

4.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 3, Sites 7 and 8. The site inspections included visual observations of the area, surface water/drainage ditches, sediment, and groundwater monitoring wells. The vegetative cover at Sites 7 and 8 was established and was recently cut.

The surface water in the Site 8 drainage ditches was cloudy. The sediment in the Site 8 drainage ditch was black to gray silty sand. The groundwater monitoring wells, including the concrete base and the well casing, were in good condition. Most of the wells had well tags for identification.

TtNUS conducted several site visits at both Sites 7 and 8 as part of the field activities in 1998 and 1999. The site visits included groundwater and soil sampling and site walkovers. No unusual observations were documented during these site visits.

The proposed land use for the site has remained unchanged. The Jacksonville Port Authority intends to purchase the site and surrounding property and will continue to use NAS Cecil Field as a civilian airport. OU 3 is located near the ends of taxiways within the flightline of the airport. Site 7 is near the old 310 flightline, and Site 8 is near flightlines 9 and 27. These sites are in the flight path of landing aircraft. There are plans for a new runway as part of the airport that would prevent locating any buildings at OU 3. These plans reflect an anticipated industrial undeveloped land use for OU 3.

4.4.2 Document and Analytical Data Review

The ROD and documents prepared after the ROD were reviewed for this five-year review. A summary of the documents reviewed is presented below.

4.4.2.1 OU 3, Site 7

The remedial design for soil prepared by TtNUS was reviewed with a new RAO. The new remedial action for soil at OU 3, Site 7 includes excavation of approximately 3,901 yd^3 of contaminated soil that exceeds the state of Florida residential cleanup criteria (areas of excavation shown on Figure 4-3).

The Technical Memorandum for Surface Soil Remediation was also reviewed that provided the rationale for the selection of the cleanup criteria used to delineate the extent of excavation. The soil cleanup criterion was selected based on a comparison that was performed of the respective

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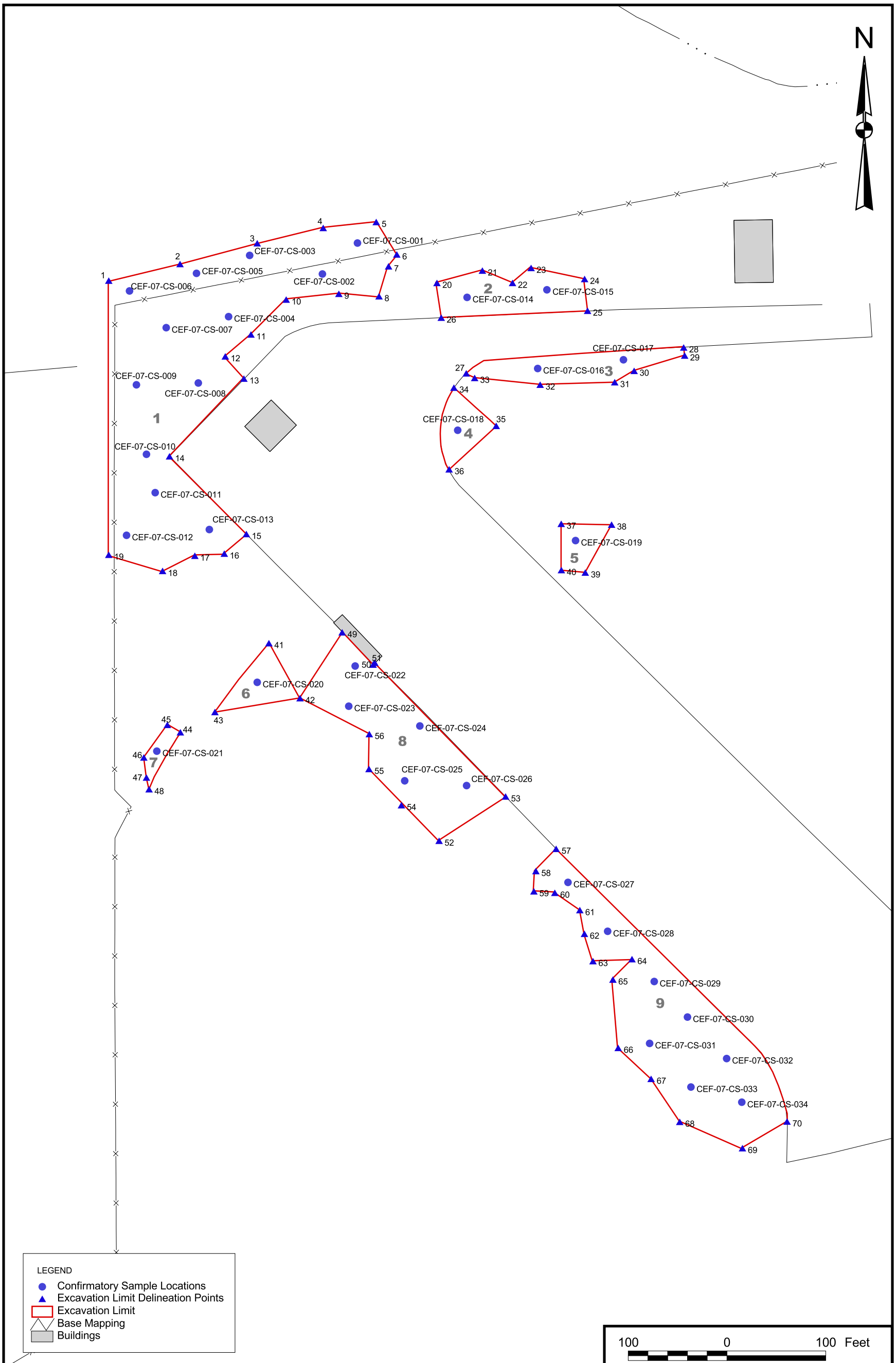

DRAWN BY YLI	DATE 11/09/98	SURFACE SOIL EXCAVATION AND CONFIRMATORY SAMPLE LOCATIONS OPERABLE UNIT 3, SITE 7 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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consequences of removing contaminated soil in excess of the industrial or residential exposure criteria. The use of residential cleanup goals instead of industrial cleanup goals increased the volume of soil to be excavated from 790 yd^3 to 3,901 yd^3. The residential cleanup goal is being used to significantly reduce the need for institutional controls and thus lessen the administrative burden of post-removal action monitoring at the site after closure. Removing the soil in excess of the residential cleanup criteria will also maximize the flexibility of post-removal action site use and thus guarantee site transfer acceptance. This removal action was effective and met the RAOs identified in the ROD. No further soil excavation is required.

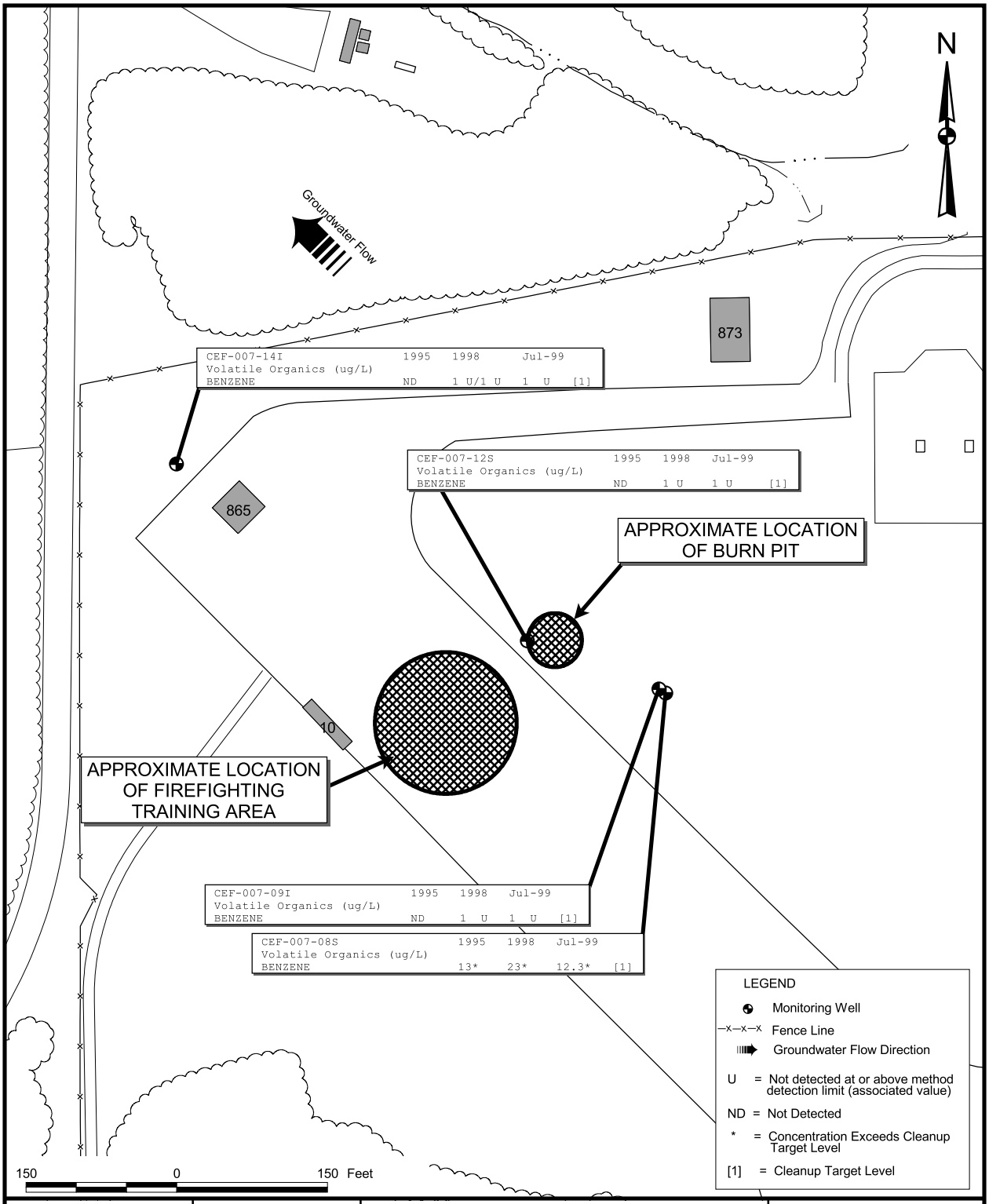
As required by the OU 3, Site 7 ROD, the groundwater at Site 7 will be monitored on an annual basis and analyzed for benzene. One annual groundwater monitoring report has been completed, based on the August 8, 1998 sampling event conducted by TtNUS personnel. Groundwater samples at Site 7 show that the benzene concentrations detected in the first annual (1998) groundwater monitoring report were consistent with the results given in the RI. The concentration of benzene in monitoring well CF7MW8S was reported to be above the FDEP guidance criteria, which is consistent with the RI. The other wells sampled, including the field duplicates, had concentrations that were below the method concentration detection limit, which is also consistent with the RI (see Figure 4-4).

The review of these documents indicates that the Navy is planning to perform remedial actions beyond the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU. The monitoring frequency specified in the groundwater remedial design for Site 7 is adequate.

4.4.2.2 OU 3, Site 8

Four quarterly sampling events were conducted between August 1998 and July 1999 at Site 8. The reduction in VOC concentrations since the RI in 1995 indicates that natural attenuation is occurring at OU 3, Site 8. In general, concentrations of VOCs and SVOCs decreased over the first year of groundwater monitoring events. Volatile COCs detected at concentrations greater than target cleanup goals during fourth-quarter sampling are limited to 1,1-DCE and 1,1-dichloroethane (DCA), daughter products of TCE and TCA, in three wells and benzene in one well (see Figure 4-5). Semivolatile COCs detected in excess of target cleanup goals in the fourth quarter are limited to 2-methylnaphthalene and naphthalene in one well (see Figure 4-6). Inorganic COCs were not detected at concentrations greater than target cleanup goals during the first four monitoring events. Natural attenuation data can be found in the annual groundwater monitoring reports.

The remedial design prepared for soil was reviewed with the RAO that was not published in the ROD. The remedial action for soil at OU 3, Site 8 includes excavation of approximately 2,215 yd^3 of TRPH



DRAWN BY MJJ	DATE 09August99	EXCEEDANCES OF BENZENE IN GROUNDWATER OPERABLE UNIT 3, SITE 7 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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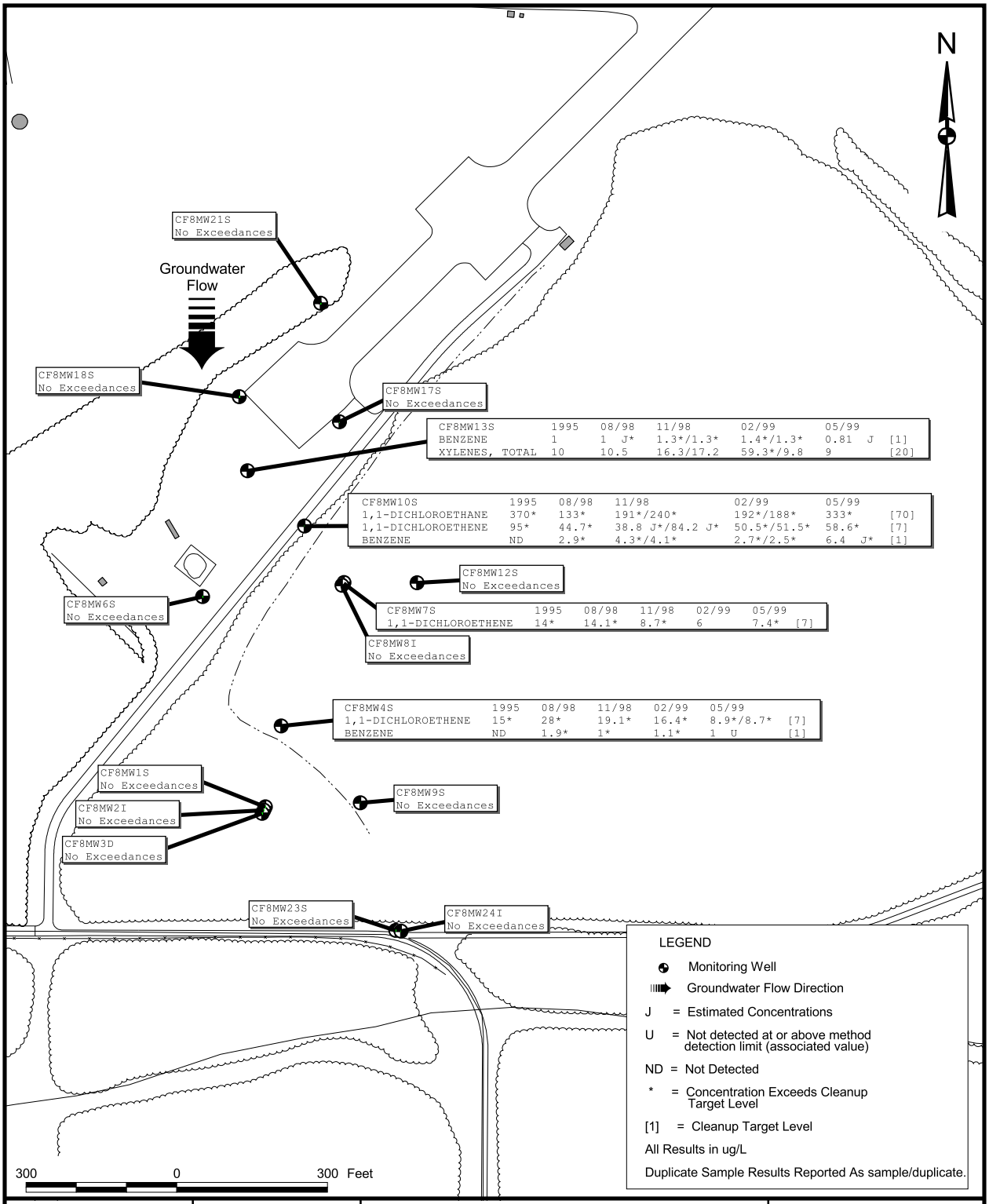

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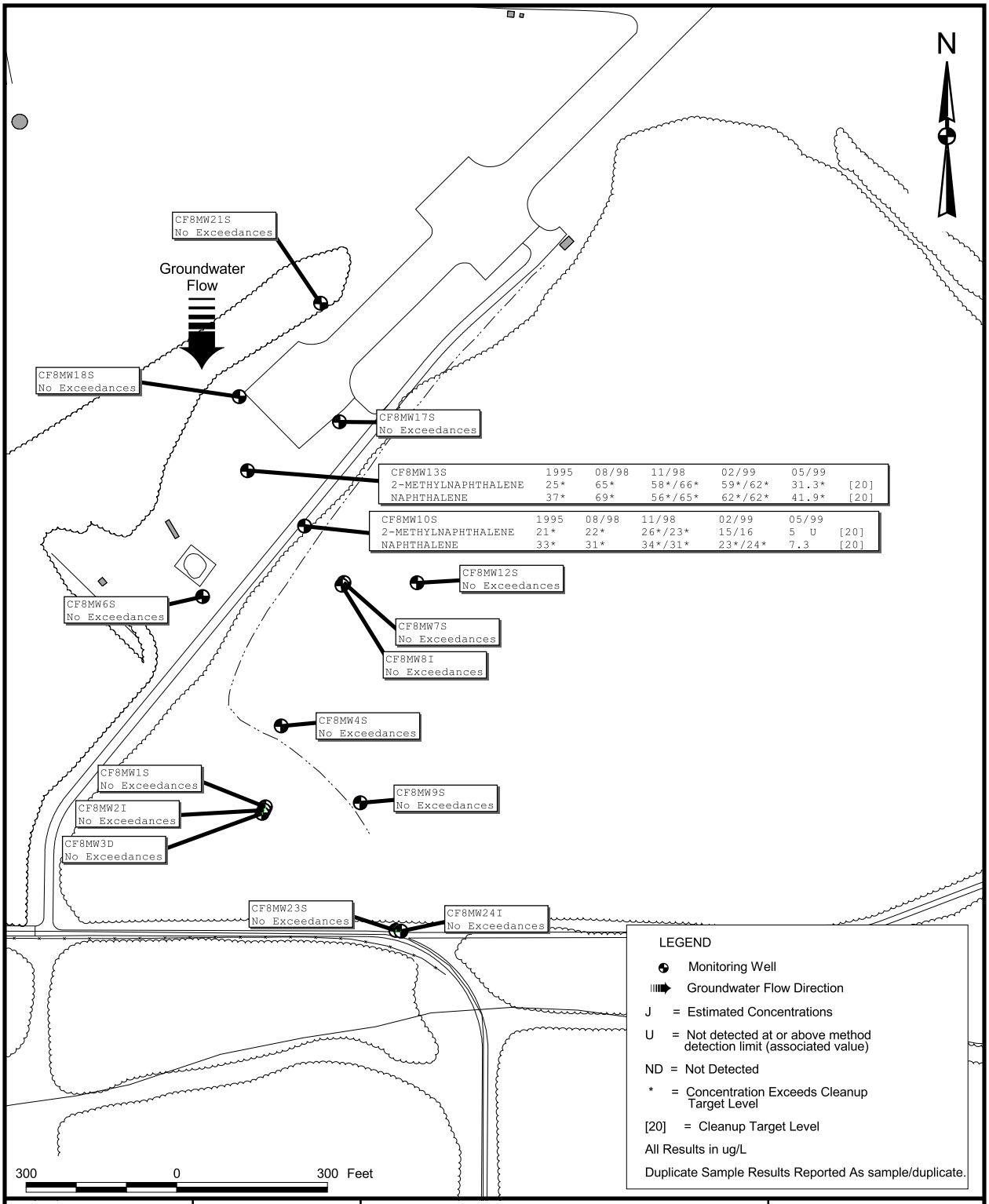

DRAWN BY MJJ	DATE 09August99		EXCEEDANCES OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 3, SITE 8 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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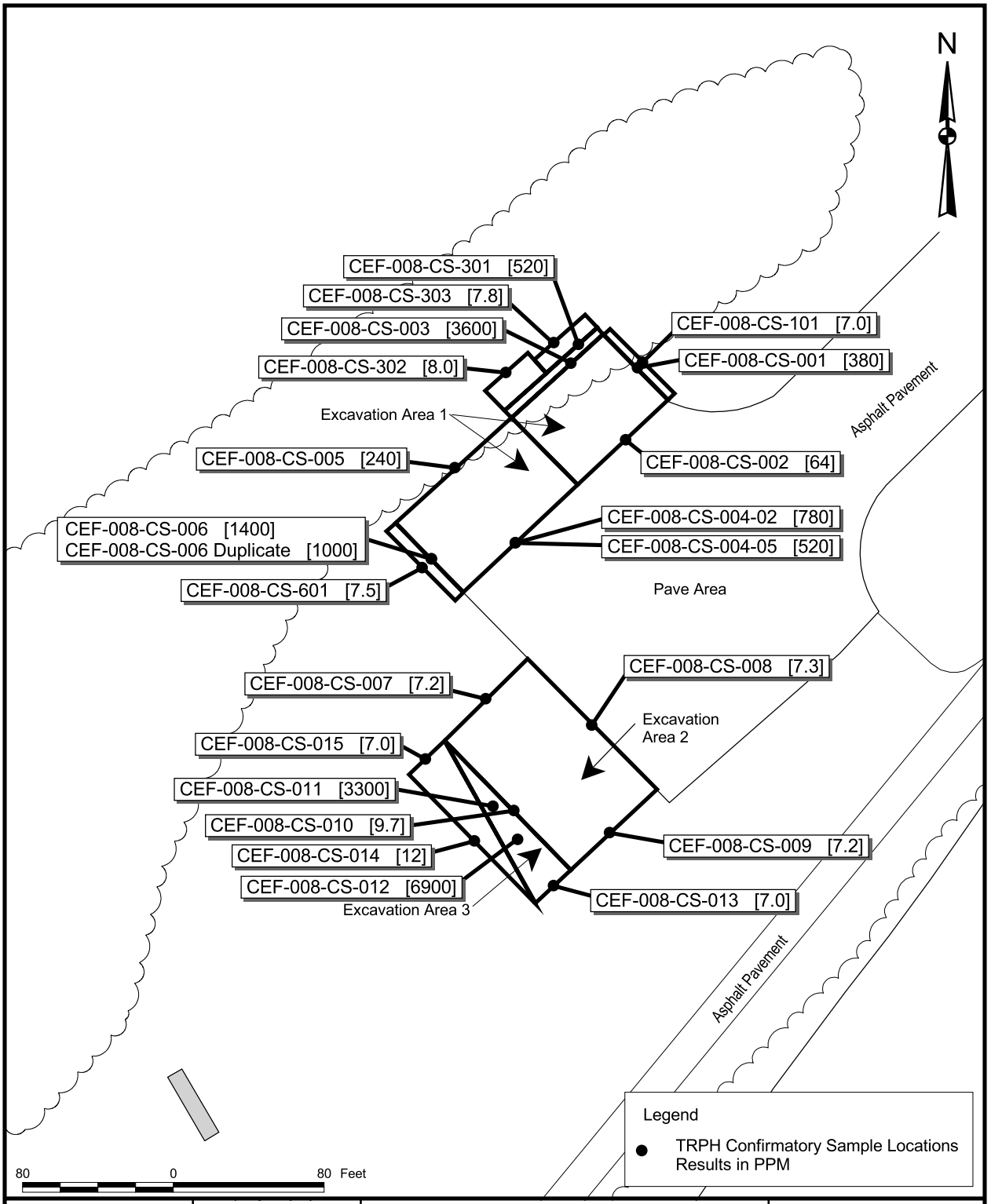

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contaminated soil that exceeds the state of Florida Brownfields Cleanup Criteria Rule for residential use (see Figure 4-7).

The Technical Memorandum for Surface Soil Remediation was also reviewed that provided the rationale for the selection of the cleanup criteria used to delineate the extent of excavation for TRPH-contaminated soils. The soil cleanup criterion was selected based on a comparison that was performed of the respective consequences of removing soil contaminated with TRPH in excess of the industrial or residential exposure criteria. The residential cleanup goal is being used to significantly reduce the need for institutional controls and thus lessen the administrative burden of post-removal action monitoring at the site after site closure. Removing the soil with TRPH in excess of the residential cleanup criterion will also maximize the flexibility of post-removal action site use and thus guarantee site transfer acceptance.

The review of these documents indicates that the Navy is planning to perform remedial actions beyond the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU. The monitoring frequency specified in the annual groundwater report for Site 8 is adequate.

4.4.3 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs and site-specific action levels that have changed since the ROD was signed are shown in the table below. The ARAR changes are from the promulgation of the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC). The site-specific action levels are from the development of an Inorganic Background Data Set at NAS Cecil Field.

Contaminant	**ARAR/Site-Specific Levels**		**Source**
GROUNDWATER			
1,1-Dichloroethane	Previous	700 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	70 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Aluminum	Previous	200 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	13100 µg/L	NAS Cecil Field Inorganic Background Data Set
Iron	Previous	300 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	7760 µg/L	NAS Cecil Field Inorganic Background Data Set

Contaminant	ARAR/Site-Specific Levels		Source
SOIL			
Benzo(k)fluoranthene	Previous	14 mg/kg	FDEP Soil Cleanup Goals
	New	15 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Indeno(1,2,3-cd) pyrene	Previous	1.4 mg/kg	FDEP Soil Cleanup Goals
	New	1.5 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Arsenic	Previous	0.8 mg/kg	FDEP Soil Cleanup Goals
	New	2.04 mg/kg	NAS Cecil Field Inorganic Background Data Set
Cadmium	Previous	37 mg/kg	FDEP Soil Cleanup Goals
	New	75 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Iron	Previous	2300 mg/kg	U.S. EPA Risk-Based Concentrations
	New	23000 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Lead	Previous	500 mg/kg	FDEP Soil Cleanup Goals
	New	197 mg/kg	NAS Cecil Field Inorganic Background Data Set
	New	400 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure
Thallium	Previous	0.63 mg/kg	U.S. EPA Risk-Based Concentrations
	New	2.84 mg/kg	NAS Cecil Field Inorganic Background Data Set
Total Recoverable Petroleum Hydrocarbons	Previous	380 mg/kg	FDEP Soil Cleanup Goals
	New	340 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARARs for 1,1-dichloroethane in groundwater and lead and TRPH in soil have decreased since the ROD was signed. These new contaminant cleanup target levels rely upon health-based risk assessments and have become more stringent since the signing of the ROD. However, this change will not affect the protectiveness of the remedial design but will require additional time and resources to complete the remedial action.

The ARARs and site-specific action levels for the other COCs in the table increased and do not affect the protectiveness of the remedial action. These five COCs have not become more stringent since the signing of the ROD.

New chemical-specific ARARs have been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC), FDEP Approach to the Assessment of Sediment Quality in

Florida Coastal Waters, and the U.S. EPA Region IV Ecological Screening Values. The ecological risk toxicity values developed in the new regulations and guidance manuals do not affect the protectiveness of the remedial action. The BRA results indicated that the ecological receptors were not likely to be at risk from exposure to the Site 7 surface soil. The BRA results suggest that terrestrial plants and invertebrates may be at risk from exposure to surface soil and aquatic receptors may be at risk from exposure to groundwater at Site 8. However, the estimated risks tend to overestimate the threat to the ecological receptors due to the conservative benchmarks used and because some of the benchmark species are not representative of NAS Cecil Field flora and/or fauna.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the ROD.

4.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when OU 3, Sites 7 and 8 are transferred to the Jacksonville Port Authority, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers these properties to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted. The current and future land use at these sites suggests that these controls should be effective.

4.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Port Authority are shown in the table below.

Recommendations/Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Programs.	Navy	U.S. EPA and FDEP	Annual for Site 7 in July, Semi-Annual for Site 8 in January and July
Complete Closure Reports for Contaminated Soil Remedial Actions	Navy	U.S. EPA and FDEP	October 1999
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property
Issue Explanation of Significant Differences	Navy	U.S. EPA and FDEP	Before next five-year review

4.7 PROTECTIVENESS STATEMENT

The remedy at OU 3 is expected to be protective of human health and the environment upon completion. The implementation of the long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The remedial action of excavation and disposal of the contaminated soil at Site 7 has been completed and, at Site 8, is scheduled for August 1999. The soil excavation and disposal remedial action at Site 7 is a measure that will reduce exposure and was completed in December 1998. The remedial action was effective and met the RAOs identified in the ROD. No additional excavation at Site 7 is required.

The long-term groundwater monitoring programs have been implemented as designed to reduce the risk related to exposure to groundwater. The results of these programs indicate that the some of the concentrations of contaminants were still greater than the cleanup criteria.

The institutional controls remedial action will be implemented before the transfer of the property to the Jacksonville Port Authority in 1999. The Navy will temporarily retain control of OU 3, Sites 7 and 8 and will transfer the property when it has determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

Most of the remedial actions have been implemented as designed and they are measures that will prevent exposure. The remedial actions that have been completed (soil excavation as Site 7) and that are currently in operation (groundwater monitoring at Sites 7 and 8) are operating as designed, and the data indicate progress is evident in meeting the RAOs. The remedial actions that are planned (soil excavation at Site 8), the intent and goals of the ROD for OU 3 will be met.

5.0 OPERABLE UNIT 4, SITE 10

Implementation of the remedial actions at OU 4 is scheduled for the fall of 1999. This five-year review provides a current status update of events that have occurred since the ROD was signed. A detailed review of the remedial action will be conduced during the next review.

This five-year review is required by policy due to the removal action that will occur. OU 4 consists of Site 10, the Rubble Disposal Area. Rubble materials (demolition debris, roadway concrete and asphalt, scrap metal, and furniture) are still on site, but the OU does not have limitations on its use or restrictions due to exposure.

5.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 4, Site 10 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 10 Rubble Disposal Area operation	1950s to 1960s
Remedial Investigation Report complete	1996
ROD signature	8/97
Dig and Haul Package complete	4/99
Explanation of Significant Difference	6/99

5.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 4, Site 10 in the southwestern portion of the facility. A sketch of OU 4 showing the relative location of Site 10 and the surface water drainage from the site (man-made drainage ditches, tributaries, and Rowell Creek) is provided on Figure 5-1. Site 10 occupies approximately 6.5 acres.

Site 10, the Rubble Disposal Area, operated as a disposal site for demolition debris, roadway concrete and asphalt, scrap metal, and furniture from the early 1950s through the 1960s. During the geophysical survey, file cabinets, bricks, chairs, pipes, and white phosphorus shells (ordnance) were observed, although the quantities are not known.

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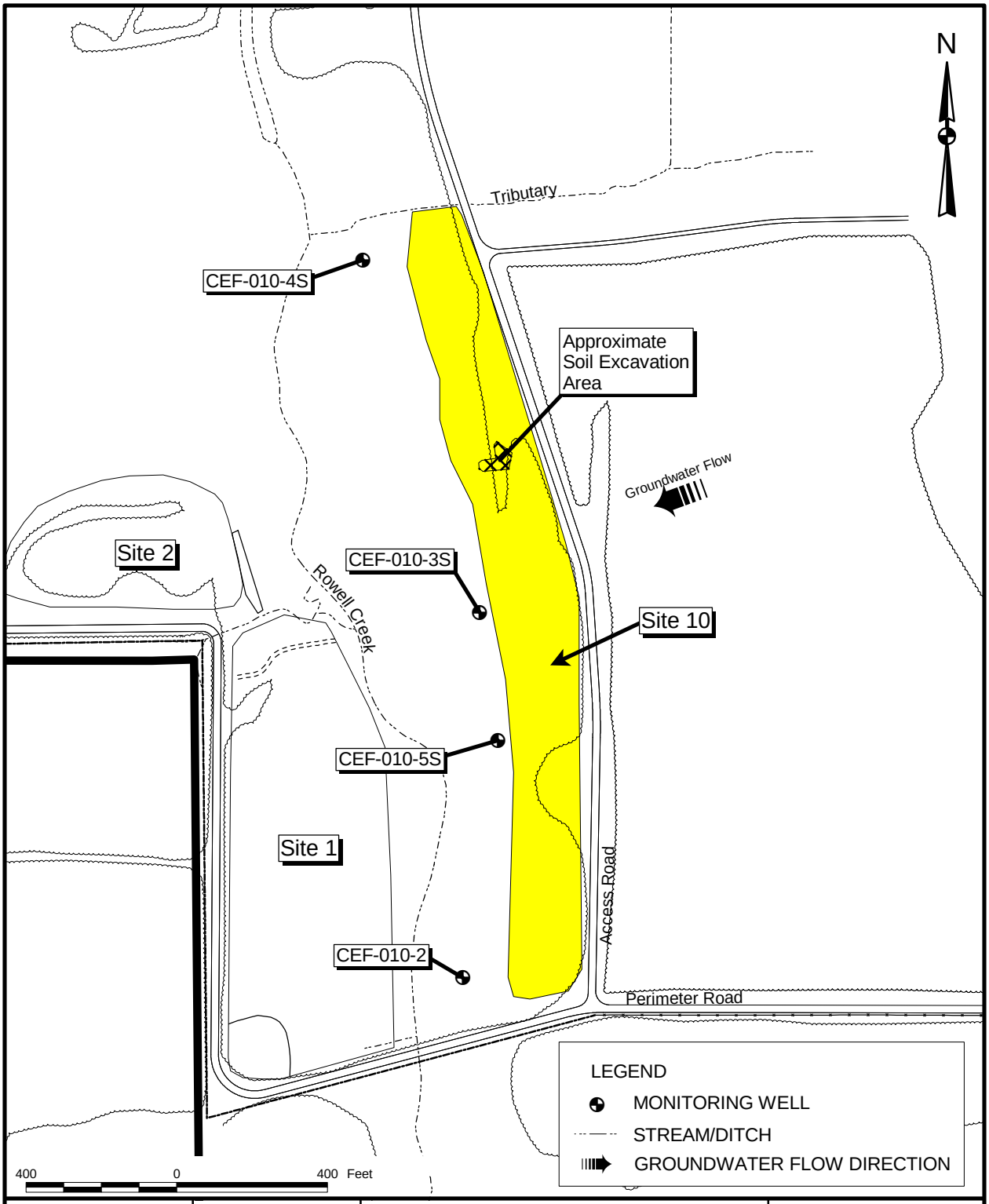

DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 4, SITE 10 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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P:\GIS\CECIL\5yr_review.apr 18August99 MJJ Figure 5-1 Layout

5.3 REMEDIAL ACTIONS

5.3.1 Remedy Selection

The ROD signed in August 1997 stated that no unacceptable human health or ecological risks were identified based on the BRA and no remedial action was needed. Under the no remedial action alternative, no treatment will be performed and the rubble will be left in place. Further review of the soil data in 1999 identified arsenic at concentrations in excess of the FDEP residential soil cleanup target levels and the NAS Cecil Field Inorganic Background Data Set. An Explanation of Significant Differences (ESD) was prepared in June 1999 to address the arsenic contamination.

As a result of this ESD, the locations with the highest arsenic concentrations will be excavated and replaced with clean fill. Approximately 276 yd^3 of soil will be excavated and transported to an off-site landfill for disposal. Upon completion of the soil disposal and backfilling with clean soil, no further action will be required at Site 10.

The selected remedy will attain the chemical-, location-, and action-specific ARARs.

5.3.2 Remedy Implementation

TtNUS completed a dig-and-haul package (remedial design) on April 15, 1999. The Remedial Action Contractor (CH2M Hill Contractors) will excavate the arsenic-contaminated soil in late 1999. A completion report and a technical memorandum will be prepared and signed in late 1999 or early 2000.

5.3.3 System Operations/Operation and Maintenance

Not Applicable

5.4 FIVE-YEAR REVIEW

5.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 4, Site 10. The site inspections included visual observations of the Rubble Disposal Area. Construction and demolition debris remains in the area, and the site is covered with thick vegetation. No unusual observations were documented during the site inspections.

The surface water in Rowell Creek west of OU 4 was clear. Signs of many aquatic species typical of the area were observed in the surface water.

TtNUS will conduct several site visits at OU 4 as part of the dig-and-haul removal action in late 1999. The site visits will include soil sampling and site walkovers. Unusual observations will be documented during these site visits.

The proposed land use for the site has remained unchanged. The Jacksonville Port Authority intends to purchase the site and surrounding property and will continue to use the area as an airport. OU 4 is located in an area identified for public buildings and facilities (Forestry Management/Airport Reserve). There are plans for a new runway as part of the airport that would prevent locating any buildings at OU 4. These plans reflect an anticipated industrial undeveloped land use for OU 4.

5.4.2 Document and Analytical Data Review

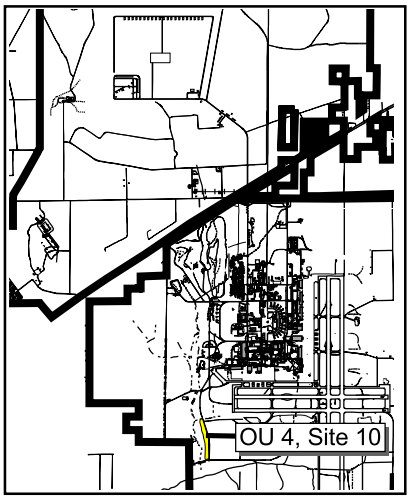
Review of records included the RI and BRA, ROD, ESD, the NAS Cecil Field Inorganic Background Data Set, and the dig-and-haul package. Figure 5-2 shows the area of excavation with the arsenic concentrations that exceed the cleanup goals. The excavation limit was based on a statistical evaluation to meet the cleanup goals. The review of these documents indicates that the Navy is meeting the requirements of the ROD. The review also indicates that the Navy is constantly re-evaluating the status of all the OUs at NAS Cecil Field (based on the ESD) to utilize permanent remedies and alternative treatment technologies to the maximum extent practical for each OU.

U.S. EPA Region 4 reviewed the ESD and concurs with the changes. U.S. EPA Region 4 agrees with the BCT's decision that it will be more economical and more protective of human health and the environment and will benefit future development needs to remove the soil rather than apply institutional controls to limit future residential reuse.

The review of these documents indicates that the Navy is meeting the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU.

5.4.3 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs and site-specific action levels for soil that have changed since the ROD was signed are shown in the table below. The maximum detected concentration for arsenic in the surface soil according to the 1995 RI was compared to the U.S. EPA Region III risk-based concentration, the Florida Soil Cleanup Goals for Military Sites in Florida, and the background screening concentrations in the case of inorganic analytes for the ROD. The background screening concentrations consisted of 12 samples originally collected for the investigation at OU 1.



N

CEF-10-SS-031 (4.6/3.6)
CEF-10-SS-026 (6.6/5.6 0-1'; 3.5 1-2')
CEF-10-SS-032 (2.8)
CEF-10-SS-030 (2.8)
CEF-10-SS-033 (4.3)
CEF-10-SS-027 (3.1)
CEF-10-SS-017 (4.0)
CEF-10-SS-012 (1.4)
CEF-10-SS-008 (1.7)
CEF-10-SS-025 (3.0)
CEF-10-SS-034 (2.3)
CEF-10-SS-018 (3.8)
CEF-10-SS-011 (2.0/2.6)
CEF-10-SS-009 (3.6)
CEF-10-SS-028 (2.0)
CEF-10-SS-024 (1.7)
CEF-10-SS-002/007 (3.9)
CEF-10-SS-013 (1.8/1.3)
CEF-10-SS-029 (1.2)
CEF-10-SS-014 (3.9)
CEF-10-SS-035 (4.4)
CEF-10-SS-016 (2.2)
CEF-10-SS-019 (4.1)
CEF-10-SS-010 (3.2)
CEF-10-SS-023 (2.0)
CEF-10-SS-037 (3.1)
CEF-10-SS-036 (2.1)
CEF-10-SS-015 (1.8)
CEF-10-SS-020 (2.3)
CEF-10-SS-022 (2.4)
Excavation area = 3726 sq. ft.
Excavation to 2 ft. below land surface
Volume to be removed = 276 cubic yards
CEF-10-SS-021 (2.1)

Notes:
1. WARNING: Obtain utility clearance before excavation;
2. Extent of excavation to be marked by Tetra Tech NUS, Inc.
3. Contaminant of concern is arsenic;
4. Waste characterization, transport, and disposal of all excavated soil are the responsibility of the remedial action contractor;
5. Return site to pre-excavation conditions.

LEGEND
● Soil Sampling Location
Excavation Area
(2.1) Arsenic concentration in ppm
(2.0/2.6) Duplicate Sample Results

25 0 25 Feet

DRAWN BY MJJ DATE 04/15/99			CONTRACT NUMBER 7898
CHECKED BY KCT DATE 04/15/99			APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-2 REV 1

REMEDIAL DESIGN PLAN - SOIL EXCAVATION
OPERABLE UNIT 4, SITE 10
FIVE - YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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Contaminant	ARAR/Site-Specific Level		Source
Arsenic	Previous	Not Detected	Background Screening Concentrations
	Previous	0.43 mg/kg	U.S. EPA Region III risk-based concentration
	Previous	0.8 mg/kg	FDEP Soil Cleanup Goals
	New	2.04 mg/kg	NAS Cecil Field Inorganic Background Data Set
	New	0.8 mg/kg	FAC 62-777, FDEP Residential Soil Cleanup Target Level

Chemical-specific ARARs that have changed since the ROD was signed are from the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule). The site-specific action levels that have changed are from the development of an Inorganic Background Data Set at NAS Cecil Field. The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action.

The RI and BRA did not identify any unacceptable human health risks for the soil at OU 4 based on exposure scenarios for a realistic current and future land use (trespasser or site maintenance worker). The RI and BRA also indicated that OU 4 was not suitable for residential or industrial development without significant alteration to the existing land use. However, the ESD requires an Interim Removal Action consisting of excavation of soil with the highest arsenic concentrations and off-site disposal of this soil. This will result in an average arsenic concentration that is less than the NAS Cecil Field Inorganic Background Data Set.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the ROD was signed.

5.5 DEFICIENCIES

No deficiencies were discovered during the five-year review.

5.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Port Authority are shown in the table below.

Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date
Complete the Interim Remedial Action.	Navy	U.S. EPA and FDEP	October 1999
Issue Explanation of Significant Differences	Navy	U.S. EPA and FDEP	Before next five-year review

5.7 PROTECTIVENESS STATEMENT

The remedy selected for OU 4 in the ROD and the ESD is expected to be protective of human health and the environment upon completion. The Interim Remedial Action described in the ESD is anticipated to occur in late 1999. The excavation of soil with the highest arsenic concentrations will result in an average arsenic concentration that is less than the NAS Cecil Field Inorganic Background Data Set . The Navy will temporarily retain control of OU 4, Site 10 and will transfer the property when it has determined that the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure. Based on the activities planned, the intent of the goals of the ESD will be met.

6.0 OPERABLE UNIT 6, SITE 11

Implementation of the remedial actions at OU 6 began in May 1997. This five-year review consists of a 2-year period of data for the remedial action for soil and a 6-month period of data for the remedial action for groundwater. This five-year review provides a current status update for the soil and groundwater remedial actions. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions on the groundwater remedial action. A more detailed review of the soil and groundwater remedial action will be conducted during the next review.

This five-year review is being conducted as a matter of policy until the cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. OU 6 consists of Site 11, the Golf Course Pesticide Disposal Area.

6.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 6, Site 11 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 11 Golf Course Pesticide Disposal Area operation	Early 1970s to 1978
Focused RI/FS – Source Removal/Control	1/94
Interim ROD – Source Removal/Control	9/94
Interim Remedial Action – Source Removal/Control	5/97
RI – Soil and Groundwater	1/97
FS – Soil and Groundwater	1/98
ROD – Soil and Groundwater	9/98
Final Design - Soil Removal	8/98
Remedial Action Soil Removal	12/98
Groundwater Remedial Design Work Plan	12/98
Soil Remedial Action Report	3/99
Groundwater Monitoring	Ongoing quarterly

6.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 6. A sketch of OU 6 showing the relative location of Site 11 and the surface water drainage pattern around the site is provided on Figure 6-1. Site 11 occupies approximately 2.5 acres.

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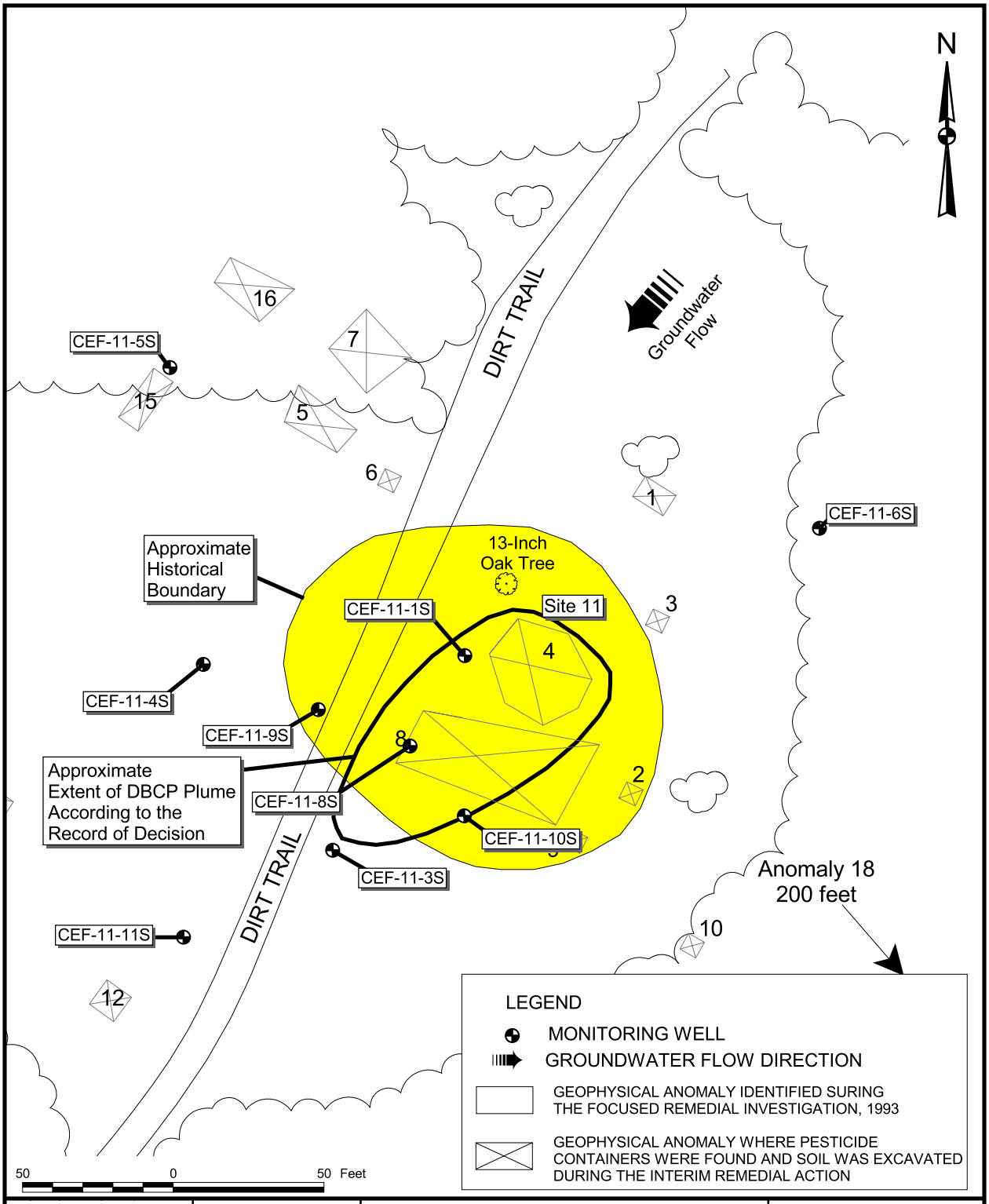

DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 6, SITE 11 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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Site 11 was operated as a Pesticide Disposal Area from the early 1970s until 1978, when a new facility was built as part of the golf course maintenance complex. Site 11 was used by golf course personnel for the disposal of empty, partially full, and full pesticide, fungicide, and herbicide containers. These containers were reportedly allowed to accumulate in a pit (approximately 40 feet wide by 40 feet long by 3 feet deep) for several months before they were crushed by a front-end loader and buried. Approximately 200 to 450 containers were buried in the pit during its operation. The pit was located in a wooded area at the golf course between fairways 11 and 17.

6.3 REMEDIAL ACTIONS

6.3.1 Remedy Selection

The purpose of remedial action at OU 6 is to comply with ARARs (source control) and to reduce the risk of possible adverse effects to human health and the environment posed by physical and chemical conditions at Site 11 (risk reduction). To meet these goals, three RAOs, one each for surface soil, subsurface soil, and groundwater, were identified. These RAOs, listed below, were based on an evaluation of site conditions, risks, and legal requirements (ARARs).

The following RAO was identified for surface soil:

- Reduce human health risk associated with exposure to surface soil containing arsenic in excess of the site-specific background concentration.

The following RAO was identified for subsurface soil:

- Reduce human health risk associated with exposure to subsurface soil containing arsenic above leachability potential action levels and DBCP (1,2-dibromo-3-chloropropane) in excess of its practical detection limit.

The selected alternative for OU 6, Site 11 soil was excavation and disposal. The remedial action selected for soil includes removing soil with concentrations of COCs in excess of cleanup goals, testing excavated soil for RCRA hazardous characteristics in order to determine whether to dispose of soil at a Subtitle C or Subtitle D facility, backfilling the excavated area with clean soil followed by grading, and revegetating.

The following RAO was identified for groundwater:

- Reduce human health risk associated with exposure to groundwater containing DBCP and phenol in excess if their respective risk-based cleanup goals.

The selected alternative for OU 6, Site 11 groundwater was limited action . The remedial action selected for groundwater includes long-term monitoring of four newly installed wells and one existing well and implementation of institutional control measures to prevent exposure of human receptors to the groundwater in the surficial aquifer.

The selected alternatives are considered protective of human health and the environment. The selected soil remedy will eliminate human health risk from exposure to contaminated soil, is more effective and permanent, does not require long-term operation and maintenance, and is easier to implement and less costly. It is estimated that the groundwater remedy will require 10 years to complete. The groundwater remedy was selected because no human receptors were anticipated to be subjected to unacceptable risk, the extent of the contaminant plume is limited, and the long-term monitoring will monitor the rate the contaminants are removed and determine when action levels are met. The effectiveness of the groundwater remedy as it relates to achievement of the ARARs will be evaluated at five-year reviews to determine the appropriateness of the remedy and verify the continued implementation of the institutional controls.

The remedial alternative for OU 6 groundwater will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and monitoring will verify compliance. This alternative complies with the action- and location-specific ARARs.

6.3.2 Remedy Implementation

A Focused RI was conducted that included a geophysical survey that identified 19 anomalies, found 41 empty containers, 7 full or partially full containers, and 3 bags of powder, and recommended removal of the source of contamination to reduce the migration and volatilization of the pesticides away from the site. An Interim Remedial Action was conducted in 1995/1996 with excavation of test pits at the anomalies; sampling and analysis of product found in pesticide containers located at the site; excavating, sampling, and analysis of the contaminated soil; and treatment or disposal of the containers and contaminated soil. Approximately 400 yd^3 of soil were excavated and disposed, and the containers identified during the Focused RI were removed. Some soil with DBCP and some drums remained after the interim remedial action was completed.

The soil and groundwater remedial designs for OU 6, Site 11 were completed in 1998 by TtNUS and included the specifications to conduct the remedial actions listed in the ROD. Soil remedial action activities began in late 1998 with removal action of soils from anomalies 4 and 7 conducted by the Charleston Environmental Detachment. During this removal action, a portion of the north wall fell into the excavation, revealing additional containers not observed previously. The discovery of these additional

containers prompted a geophysical investigation to determine if containers were still located at the site. This geophysical investigation was conducted in early 1999 using a magnetometer and a conductivity meter. Several additional anomalies were identified during this investigation and further action, such as test pitting and sampling, is anticipated.

The excavation was backfilled with soil from the Site 5 BioCell and a vibratory compaction roller was used to compact the fill soil. The dirt trail and the access road were repaired, but the vegetation seeding of the site has been postponed until the proposed site activities are completed.

The long-term groundwater monitoring program, consisting of sampling and analysis, is being conducted by TtNUS and was started in late 1998. Groundwater samples were collected from five monitoring wells and analyzed for phenol and DBCP. Three quarters of groundwater sampling and analysis have been conducted. The groundwater sampling and analysis are ongoing.

Institutional controls will be implemented at OU 6, Site 11 to prevent exposure of human receptors to the groundwater of the surficial aquifer. The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Economic Development Commission, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

6.3.3 System Operations/Operation and Maintenance

The Navy has contracted with TtNUS to perform the Long-Term Monitoring Program. The work is being conducted in accordance with the ROD and the OU 6, Site 11 Groundwater Remedial Design.

Three groundwater sampling events have been conducted since August 1998. The fourth sampling event is scheduled for August 1999, and an annual report from the four quarterly sampling events will be prepared. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for phenol and DBCP.

The Navy's cost estimate for the source control/removal activities ranged from $700,000 to $1,700,000. The actual cost for this activity was approximately $400,000 for the remedial action conducted in 1995/1996. The Navy's original cost estimate for implementation of excavation and disposal was between $153,000 and $318,000, depending on the classification of the excavated soil. The Navy's original cost estimate for implementation of limited action was approximately $252,000. The Navy has contracted with a Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial designs are in

progress. The actual cost for the implementation of the remedial designs has not yet been tabulated since the remedial actions are ongoing.

6.4 FIVE-YEAR REVIEW

6.4.1 Site Inspection

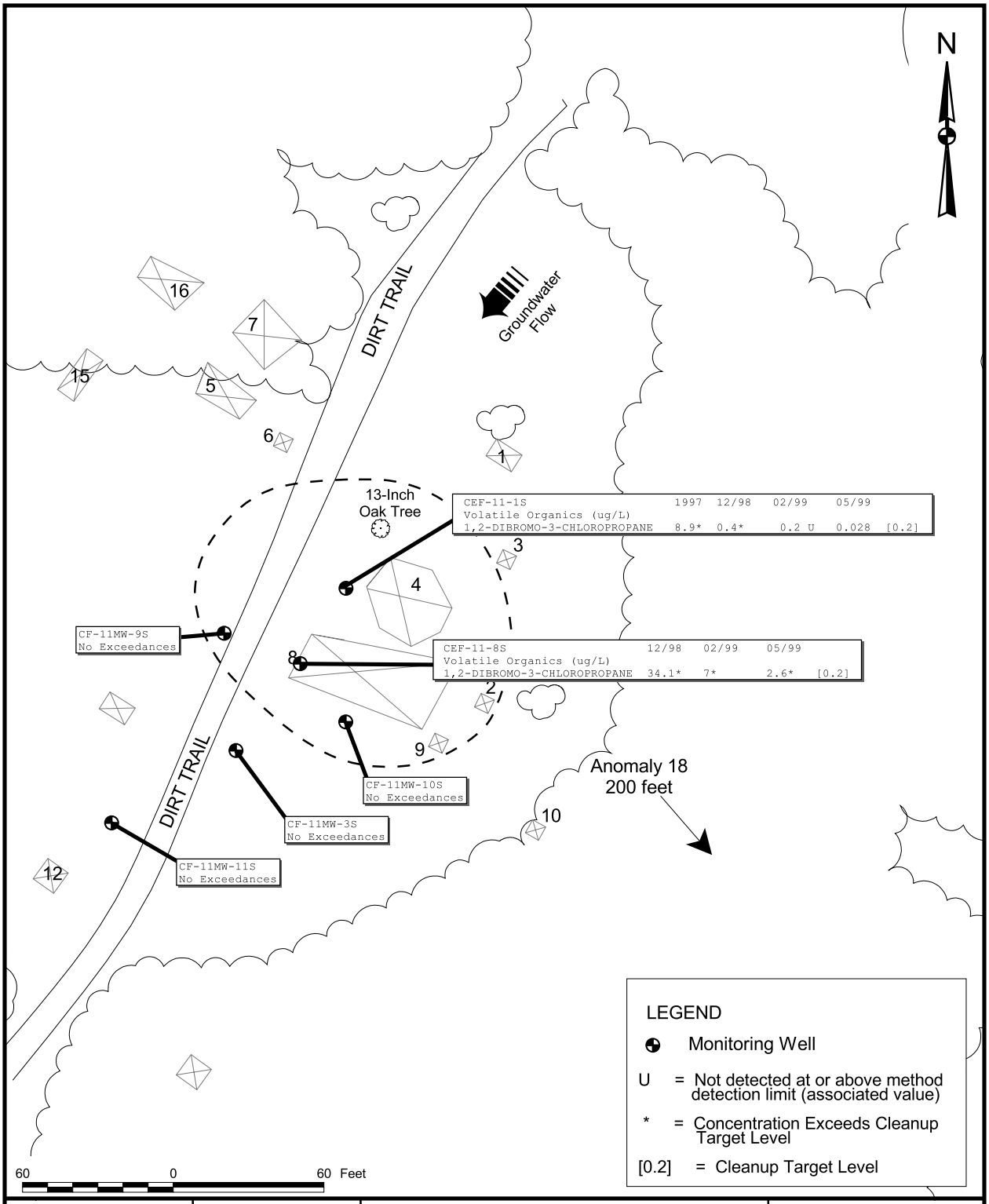
The NAS Cecil Field BCT has conducted site inspections at OU 6, Site 11. The site inspections included visual observations of the golf course, the area of the anomalies, and groundwater monitoring wells at OU 6, Site 11. The site was relatively well graded, and the area where the containers were found and the areas of newly identified anomalies were marked. The groundwater monitoring wells, including the concrete base and the well casing, were in good condition.

TtNUS conducted several site visits at Site 11 as part of the field activities in 1998 and 1999. The site visits included groundwater sampling, soil sampling, and site walkovers. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Jacksonville Economic Development Commission intends to purchase the site and surrounding property. They intend to maintain the golf course as a public golf course.

6.4.2 Document and Analytical Data Review

Three quarterly sampling events were conducted between December 1998 and May 1999. Quarterly reports have been completed based on the laboratory results. The results from the chemical analysis are shown on Figure 6-2. Groundwater samples were analyzed for phenol and DBCP, which have cleanup levels of 10 µg/l and 0.2 µg/l (Chapter 62-777 F.A.C.), respectively. Phenol, which was detected during the RI at a maximum concentration of 25 µg/l in monitoring well CEF-11-1S, was not detected in the three quarterly groundwater samples. DBCP was detected in two monitoring wells, CEF-11-1S and CF11MW8S, at a concentration that exceeded the cleanup level. The DBCP concentrations in monitoring well CEF-11-1S decreased from 8.9 µg/l during the RI sampling event to 0.4 µg/l in the first-quarter sampling event, was not detected (0.2 µg/l) in the second-quarter sampling event, and decreased to 0.028 µg/l in the third-quarter sampling event. The DBCP concentration in monitoring well CEF11MW8S decreased from 34.1 µg/L during the first-quarter sampling event to 2.6 µg/L during the third-quarter sampling event. DBCP was not detected in the cross-gradient monitoring well, CEF11MW10S, or in the two downgradient monitoring wells, CEF-11-3S and CF11MW11S.



DRAWN BY MJJ	DATE 09August99	EXCEEDANCES OF CHEMICALS OF CONCERN IN GROUNDWATER OPERABLE UNIT 6, SITE 11 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
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The frequency of the monitoring specified in the Groundwater Remedial Design appears to be adequate. This remedy may take less than 10 years to complete. The Annual Groundwater Report will be prepared in September 1999 and will possibly recommend changes to the Groundwater Remedial Design, such as reduced analysis and/or reduced frequency of sampling.

The Soil Remedial Action Report for Operable Unit 6, Site 11; the Completion Report, Remedial Action, Sites 5, 7, and 11; and the technical memorandum on the geophysical survey were reviewed for the excavation and disposal remedy. The area of soil excavation is shown on Figure 6-3. The finding of seven additional anomalies, three of which are greater than 10 feet in diameter and are likely related to a cluster of buried individual metallic items, means test pits and excavation and disposal activities will continue to be conducted. The results of the geophysical survey are shown on Figure 6-4.

The review of these documents indicates that the Navy is meeting the requirements of the ROD and is constantly re-evaluating the status to optimize the monitoring for this OU.

6.4.3 ARAR and Site-Specific Action Level Changes

No chemical-specific ARARs or site-specific action levels have changed since the ROD was signed. Chemical-specific ARARs that were promulgated by the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) are the same as the cleanup goals stated in the ROD. There have been no changes in the site-specific action levels developed in the NAS Cecil Field Inorganic Background Data Set.

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. No changes were made to the ARARs and site-specific action levels that affect the remedial activities at OU 6, Site 11. The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the ROD.

6.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when OU 6, Site 11 is transferred to the Jacksonville Economic Development Commission, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Economic Development Commission, these LUCIPs, by way of deed restrictions, notices, or other agreements must be adopted. The current and future land use at these sites suggests that these controls should be effective.

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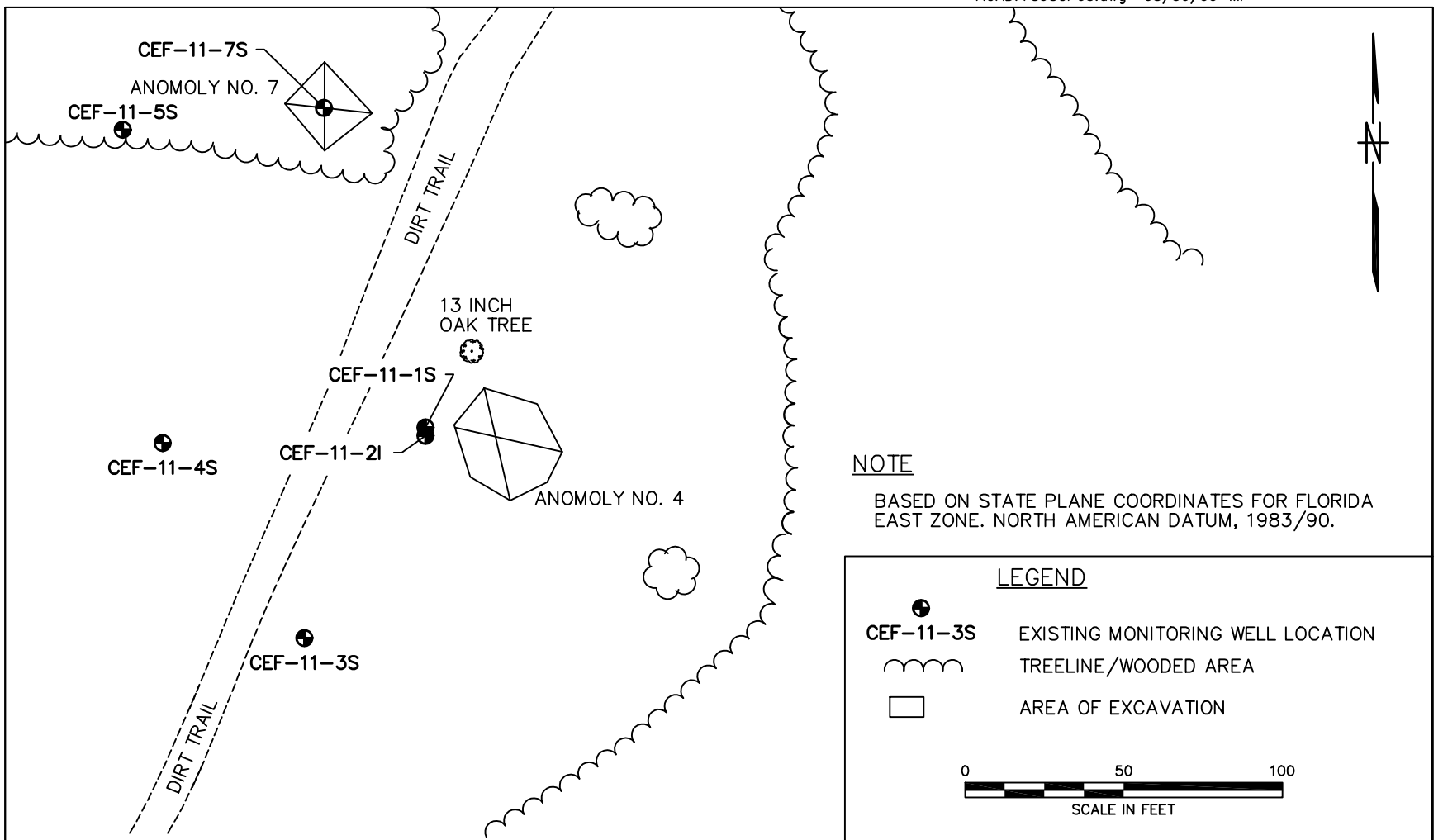

NOTE

BASED ON STATE PLANE COORDINATES FOR FLORIDA EAST ZONE. NORTH AMERICAN DATUM, 1983/90.

LEGEND

CEF-11-3S EXISTING MONITORING WELL LOCATION

TREELINE/WOODED AREA

AREA OF EXCAVATION

0 50 100

SCALE IN FEET

SOURCE: ARC SURVEYING & MAPPING, INC., JACKSONVILLE, FLORIDA, 32210.

DRAWN BY MF DATE 8/25/99	EXCAVATION OF ANOMOLIES OPERABLE UNIT 6, SITE 11 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7898	
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COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 6-3	REV. 0

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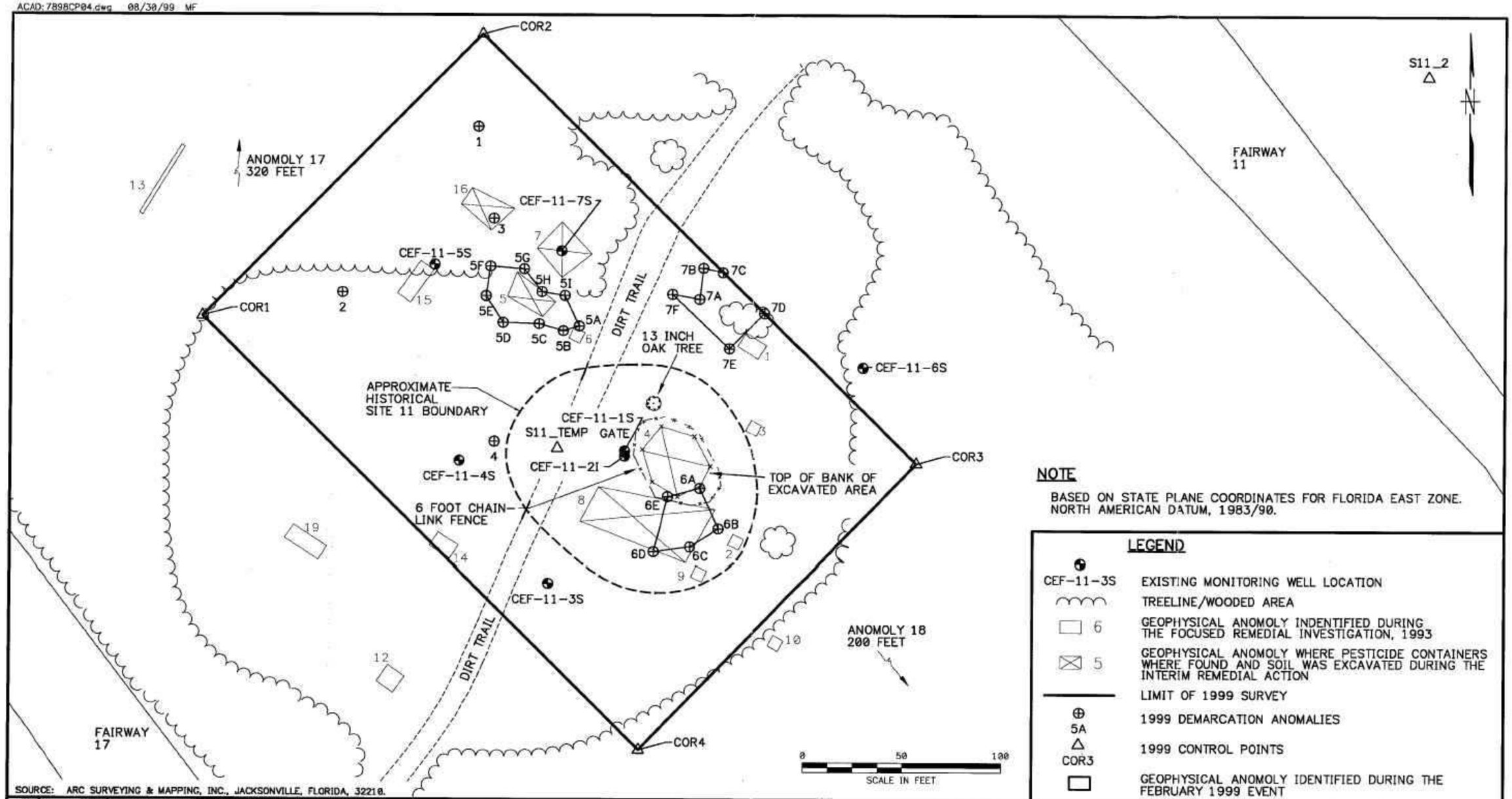

SOURCE: ARC SURVEYING & MAPPING, INC., JACKSONVILLE, FLORIDA, 32210.

NOTE

BASED ON STATE PLANE COORDINATES FOR FLORIDA EAST ZONE. NORTH AMERICAN DATUM, 1983/90.

LEGEND

CEF-11-3S	EXISTING MONITORING WELL LOCATION
	TREELINE/WOODED AREA
6	GEOPHYSICAL ANOMOLY INDENTIFIED DURING THE FOCUSED REMEDIAL INVESTIGATION, 1993
5	GEOPHYSICAL ANOMOLY WHERE PESTICIDE CONTAINERS WHERE FOUND AND SOIL WAS EXCAVATED DURING THE INTERIM REMEDIAL ACTION
	LIMIT OF 1999 SURVEY
5A	1999 DEMARCATION ANOMALIES
COR3	1999 CONTROL POINTS
	GEOPHYSICAL ANOMOLY IDENTIFIED DURING THE FEBRUARY 1999 EVENT

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

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SCALE AS NOTED

RESULTS OF GEOPHYSICAL SURVEY
OPERABLE UNIT 6, SITE 11
FIVE-YEAR REVIEW
NAVAL AIR STATION, CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7898
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 6-4
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

6.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Economic Development Commission are shown in the table below.

Recommendations/Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Program.	Navy	U.S. EPA and FDEP	Semi-Annual in January and July
Complete Excavation and Disposal Activities.	Navy	U.S. EPA and FDEP	November 1999
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property

6.7 PROTECTIVENESS STATEMENT

The remedy at OU 6 is expected to be protective of human health and the environment upon completion. The implementation of the long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The remedial action for the source removal/control was implemented. The soil excavation and disposal remedy, as a measure that would reduce exposure, has uncovered additional containers. A geophysical survey, conducted after the additional containers were uncovered, indicates that the source removal/control remedy with the excavation and disposal remedy will continue to proceed. Additional soil excavation is required to meet the RAOs identified in the interim ROD.

The long-term groundwater monitoring program has been implemented as designed to reduce the risk related to exposure to groundwater. The results of this program indicate that the concentrations of phenol and DBCP have decreased over the three quarters of monitoring.

The institutional controls will be implemented before the transfer of the property to the Jacksonville Economic Development Commission in 2001. The Navy will temporarily retain control of OU 6, Site11 and will transfer the property when it has determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

Most of the remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that are being conducted (soil excavation geophysical testing, and test pits, groundwater monitoring) are operating as designed, and the data indicate progress is evident in meeting the RAOs.

7.0 OPERABLE UNIT 7, SITE 16

Implementation of the remedial actions at OU 7 began in 1994. This five-year review consists of a 5-year period of data for the remedial action for soil and a one-year period of data for the remedial action for groundwater. This five-year review provides a detailed review of the soil remedial action and provides a current status update for the groundwater remedial action. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions on the groundwater remedial action. A more detailed review of the groundwater remedial action will be conducted during the review.

This five-year review is being conducted as a matter of policy until the cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. OU 7 consists of Site 16, the AIMD Seepage Pit/NDI Holding Tank and associated contaminated groundwater plume.

7.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 7, Site 16 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 16 AIMD Seepage Pit/NDI Holding Tank operation	1959 to 1989
Remedial Investigation	1992
Focused Feasibility Study	1993
Interim ROD	1994
Interim Removal Action	1994
RI/FS complete	1995
Baseline Risk Assessment	1996
ROD	6/96
Proposed Plan	1996
Amended ROD	4/99
Groundwater Remedial Design	1999
AS/SVE System Installation	6/99
Groundwater Monitoring	Ongoing quarterly

7.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 7. A sketch of OU 7 showing the historical layout of the former AIMD disposal facilities and the contaminated groundwater plume at the site is provided on Figures 7-1 and 7-2, respectively.

Site 16 was operated from 1959 until 1980 and was used as a disposal area for grease, rust, scale, and paint that were generated during machine and engine parts-cleaning processes and activities associated with the airframes blasting shop. Liquid wastes generated from operations conducted within Building 313 drained toward a floor sump located at the north end of the building. This sump was connected to a 4,100-gallon holding tank that acted as a surge tank for the adjacent seepage pit. Most of the wastes were discharged into a seepage pit located north of Building 313, but, reportedly, some of the wastes were dumped onto the ground on the east side of the building. Wastes associated with Site 16 may have included sodium cyanide, TCE, creosol, phenol, methylene chloride, and oil. In 1980, following the discontinuation of the activities at the site, pipes leading from the tank and seepage pit to the sewer system were removed and plugged. From 1980 to 1989, the holding tank was used for 90-day storage of hazardous waste permitted under the facility's RCRA hazardous waste storage permit, granted in 1987 by U.S. EPA and FDEP.

7.3 REMEDIAL ACTIONS

7.3.1 Remedy Selection

The purpose of remedial actions at OU 7 is to comply with ARARs and to reduce the risk of possible adverse effects to human receptors posed by physical and chemical conditions in the groundwater at Site 16. The remedial actions for OU 7 were defined in the Interim ROD in 1994 and the Amended ROD in 1999.

The Interim ROD identified two RAOs to meet these goals. These objectives were based on an evaluation of site conditions, risks, and legal requirements (ARARs). The RAOs identified in the Interim ROD were

- Remove the 4,100-gallon holding tank, seepage pit, bead separator, piping, and associated soils to mitigate the release of contamination to the groundwater.

- Remove the 4,100-gallon holding tank to comply with the facility's RCRA permit issued by the state of Florida.

The remedial actions selected from the Interim ROD for Site 16 were excavation of debris and soil from the source area; treatment of contaminated debris; testing of excavated soils; transportation and disposal of soils to a hazardous waste landfill; transportation, treatment, and disposal in a hazardous waste landfill of all soils with concentrations of hazardous constituents that are higher than the Land Disposal Restrictions treatment standards; and transportation and disposal of decontaminated debris. This remedial action met the Land Disposal Restrictions as well as the RCRA permit requirements and was

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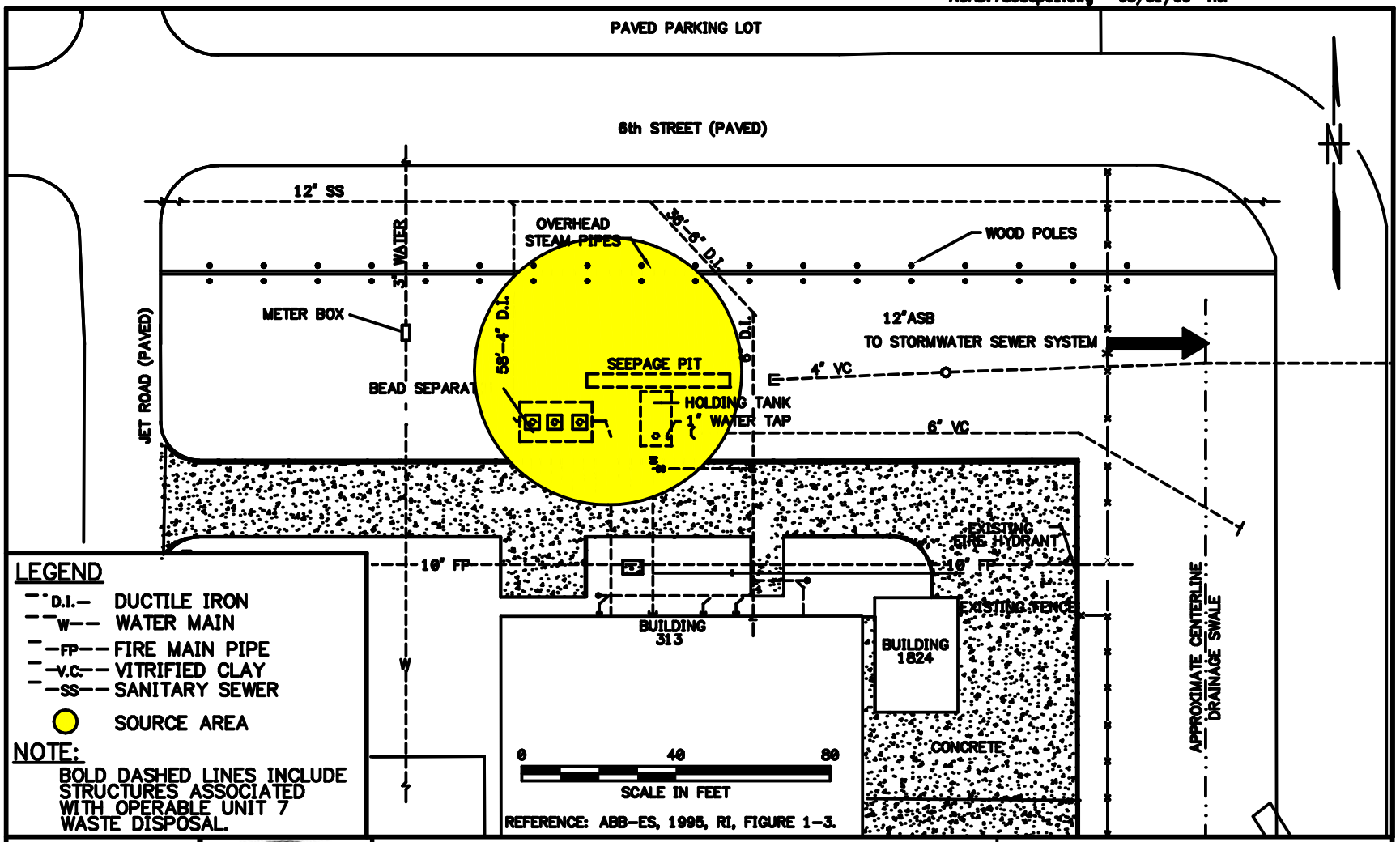

LEGEND

- D.I. — DUCTILE IRON
- W — WATER MAIN
- FP — FIRE MAIN PIPE
- V.C. — VITRIFIED CLAY
- SS — SANITARY SEWER
- SOURCE AREA

NOTE:

BOLD DASHED LINES INCLUDE STRUCTURES ASSOCIATED WITH OPERABLE UNIT 7 WASTE DISPOSAL.

DRAWN BY HJP	DATE 10/26/98	OPERABLE UNIT 7, SITE 16 LAYOUT (BEFORE REMOVAL ACTION) FIVE YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7898
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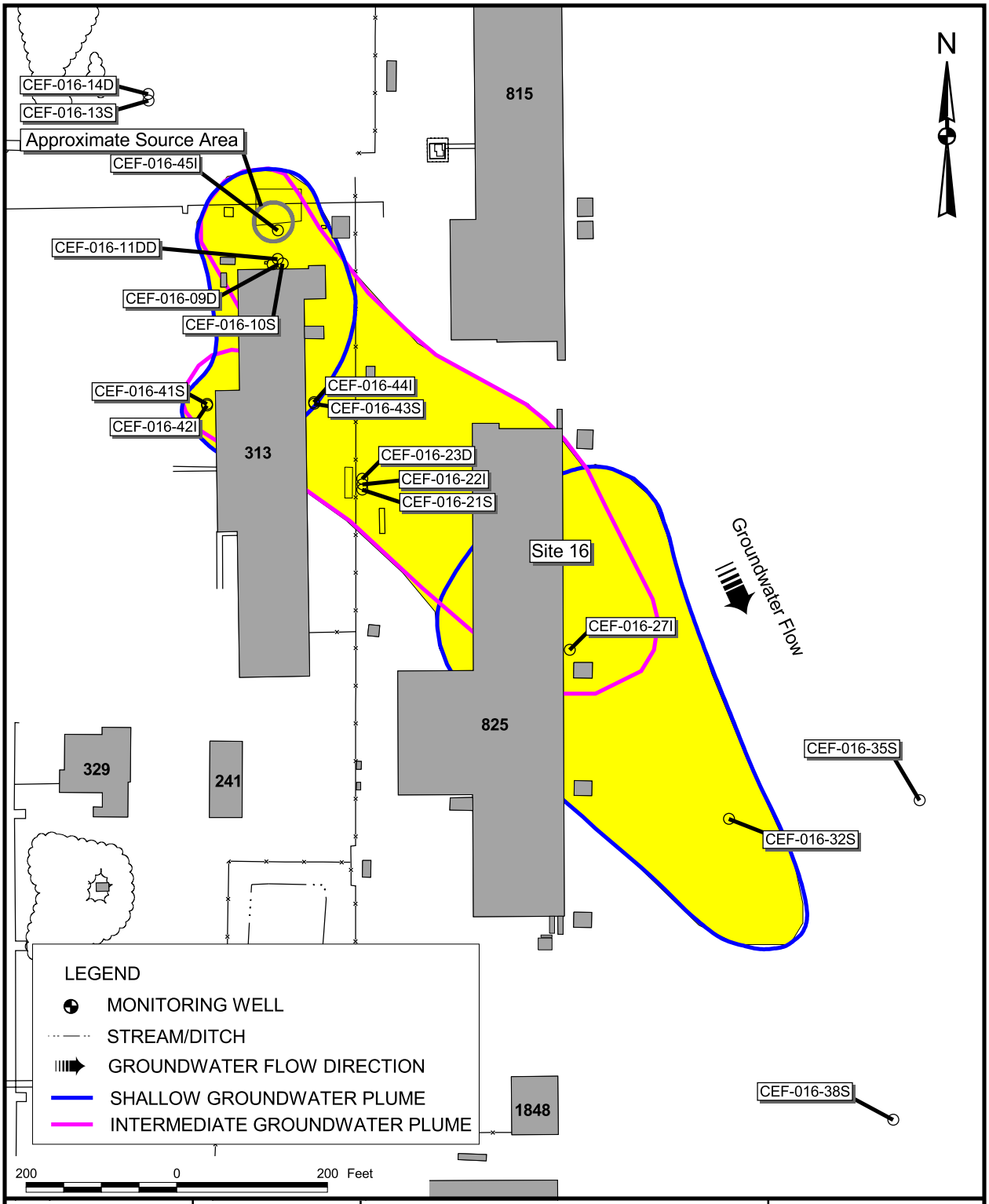

DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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consistent with CERCLA and the NCP. This action was considered protective of human health and the environment and would attain ARARs. Soil contamination that remained after the interim remedial action would be addressed during the RI and FS and the resulting ROD.

The ROD for the groundwater and stormwater sewer system was signed in June 1996. This ROD was amended to revise the RAO, based on re-evaluation of site conditions, risks, and legal requirements (ARARs). The Amended ROD was signed in April 1999. The RAO identified in the Amended ROD was

- Prevent exposure to groundwater that contains chlorinated VOCs at concentrations that are greater than the state of Florida Groundwater Cleanup Target Levels which includes the state and federal drinking water standards and that cause unacceptable risk to human health.

The original ROD for the groundwater remedial actions included groundwater extraction, pretreatment, and discharge to a wastewater treatment plant; groundwater treatment with enhanced bioremediation; institutional controls; and five-year reviews. Due to changes in the site conditions (closure of NAS Cecil Field), an Amended ROD was signed that selected a remedy that would fit the site conditions to address the contaminants in the Site 16 groundwater. The selected remedy for Site 16, based on the Amended ROD includes in-situ air sparging/soil vapor extraction (AS/SVE) for the groundwater in the source area, natural attenuation of the groundwater in the downgradient area, repair of a damaged section of the storm sewer, implementation of institutional controls, and five-year reviews. This selected remedial alternative for groundwater will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved and monitoring will verify compliance. The selected remedy will attain the chemical-, location-, and action-specific ARARs.

7.3.2 Remedy Implementation

The Interim Removal Action was completed in 1994 with the holding tank, seepage pit, and glass bead separator being excavated and removed from the site. Associated piping was removed or plugged with grout and 1,500 cubic yards of surrounding contaminated soil was excavated and disposed off site.

TtNUS completed the groundwater remedial design for the Navy in March 1999. The remedial design included the specifications necessary to conduct the remedial actions listed in the Amended ROD. A pilot-scale test was conducted in September 1998 to determine the physical parameters needed for design of a full-scale AS/SVE system at Site16. The full-scale AS/SVE system is being installed by the Remedial Action Contractor and will begin operation in late June 1999. The AS/SVE system is composed of a vapor extraction system, an air sparging system, and a gas-phase granular activated carbon adsorption system to treat the off gases.

The repair of the storm sewer was completed in June 1999. The Remedial Action Contractor cleaned and prepared the surfaces of the existing storm sewer, installed and cured the lining system, and sealed the ends in the manholes.

TtNUS included the natural attenuation sampling work plan in the groundwater remedial design. Quarterly groundwater monitoring activities began in September 1998. TtNUS personnel have performed four groundwater sampling events at Site 16 in support of the OU 7, Site 16 groundwater remedial design.

The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

7.3.3 System Operations/Operation and Maintenance

The Navy has contracted with the Remedial Action Contractor, CH2MHill Constructors, Inc., to implement the installation and start-up of the AS/SVE system. Operation and maintenance of the AS/SVE system will be transferred to TtNUS after 1 year of operation. The start-up of the AS/SVE system will occurr in late June 1999.

The Navy has contracted with TtNUS to perform the long-term groundwater-monitoring program. The work is being conducted in accordance with the Amended ROD and the OU 7, Site 16 Remedial Design.

Four quarterly groundwater sampling events have been conducted between 1998 and 1999. An Annual Natural Attenuation Groundwater Monitoring Report was prepared after review of the four sampling event results.

The Navy's original cost estimate for implementation of the Interim Removal Action was between $772,000 and $3,133,000. The Remedial Action Contractor completed the excavation and disposal for OU 7 for approximately $725,000. The Navy's original cost estimate for implementation of AS/SVE, natural attenuation, and institutional controls was approximately $1,498,000. The Navy has contracted with the Remedial Action Contractor to implement the remedial actions at the OUs at NAS Cecil Field in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

7.4 FIVE-YEAR REVIEW

7.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 7, Site 16. The site inspections included visual observations of the area, the AS/SVE system, the storm sewer system, and the groundwater monitoring wells. The AS/SVE system was in operation and the groundwater monitoring wells were in good condition, most of the well had well tags for identification.

TtNUS conducted several site visits at Site 16 as part of the field activities in 1998 and 1999. The site visits included construction monitoring of the AS/SVE system installation, groundwater sampling, and site walkovers. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Jacksonville Port Authority intends to purchase the site and surrounding property and to continue the land's use as an airport. The base reuse plan indicates OU 7, Site 16 will continue to be used for industrial purposes.

7.4.2 Document and Analytical Data Review

The review of the RI, FS, Non-Destructive Inspection (NDI) Holding Tank Closure Certification and Report indicate that the soils and structures that acted as a source of groundwater contamination were removed. The confirmatory sampling detected TCE concentrations in the soil at a maximum concentration of 0.65 mg/kg, below the established cleanup level. This remedial action was effective and met the RAOs of the Interim ROD. No further soil excavation is required. The area of excavation and the results of the sampling activities conducted for the RI in 1995 are shown on Figures 7-3, 7-4, and 7-5.

Four quarterly long-term groundwater monitoring sampling events were conducted between August 1998 and July 1999. Groundwater samples were analyzed for the site COCs [1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, TCE, and bis(2-ethylhexyl)phthalate]. The results of these sampling events are compared to the results of previous sampling events and the RI data. The VOC exceedances from the groundwater monitoring are shown on Figure 7-6.

The VOC concentrations in the source area remain high and have increased. The increase in concentration can be attributed to the short-term operation of a pilot-scale AS/SVE system in August 1998 that removed some contamination. The daughter products of TCE and the natural attenuation indicator parameters have also increased in the source area. The increase in the daughter products and the natural indicator parameters indicate biodegradation is occurring. Natural attenuation data can be

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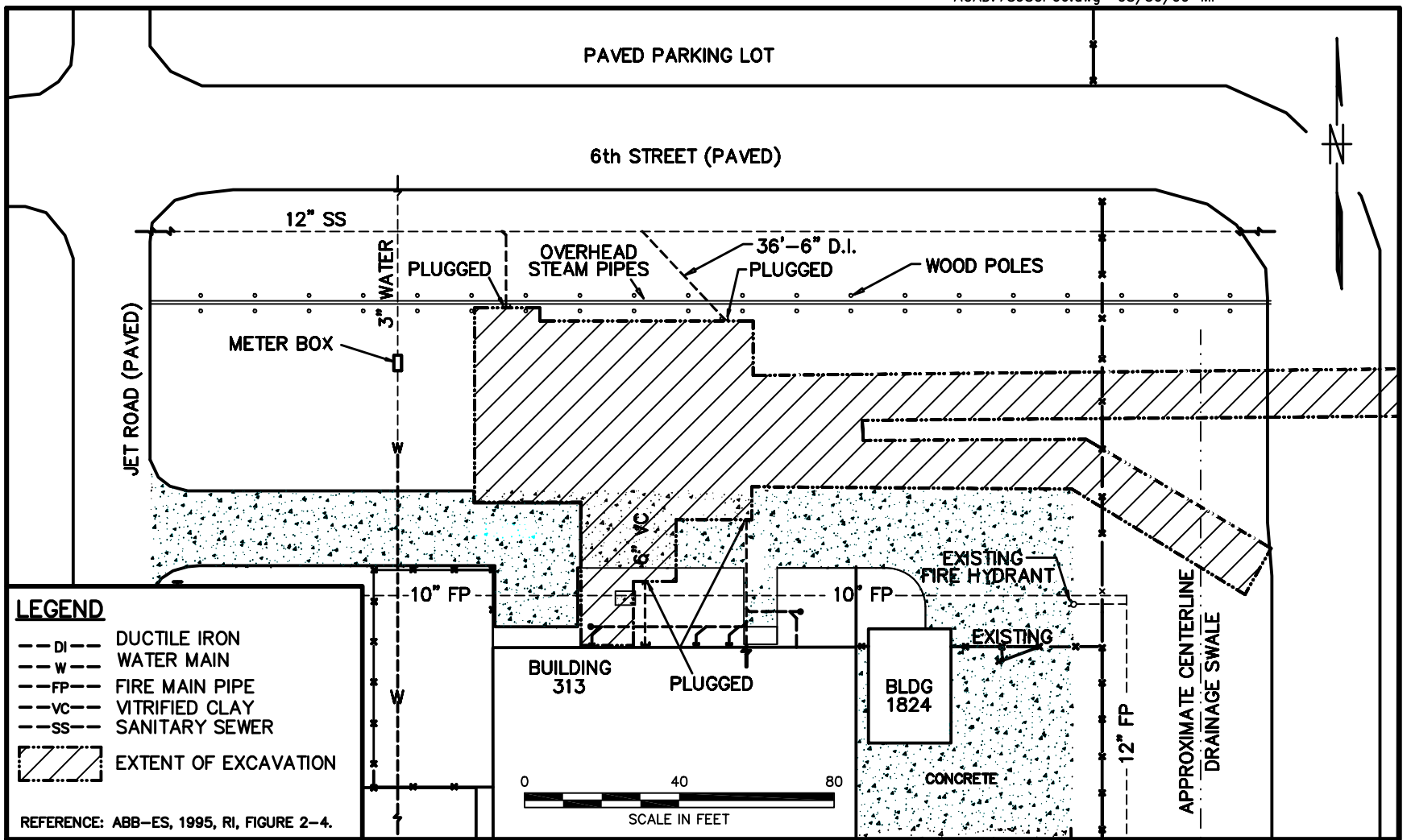

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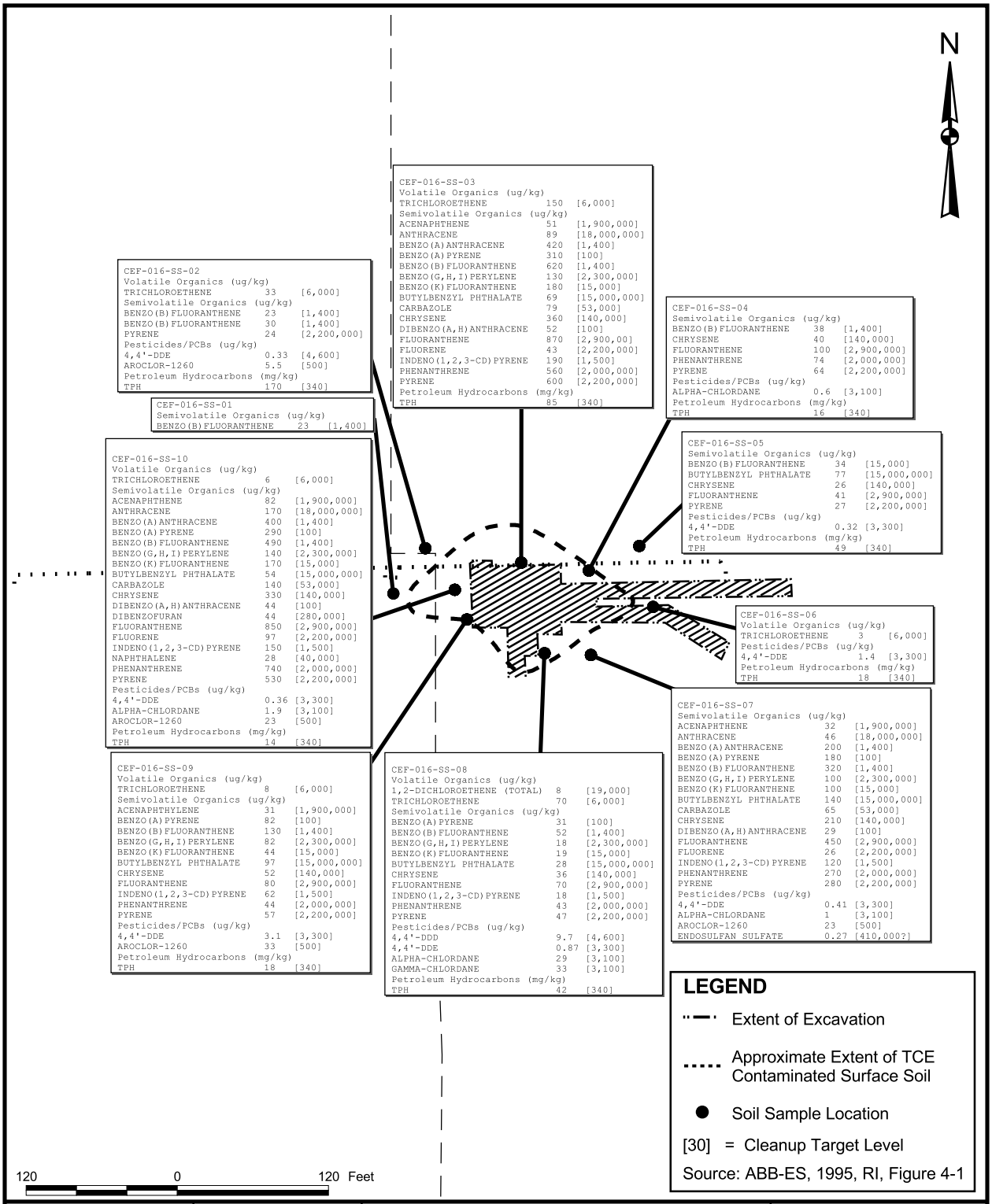

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MJJ	09August99	ORGANICS DETECTED IN SURFACE SOIL FOR REMEDIAL INVESTIGATION IN 1995 OPERABLE UNIT 7, SITE 16 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA		7898
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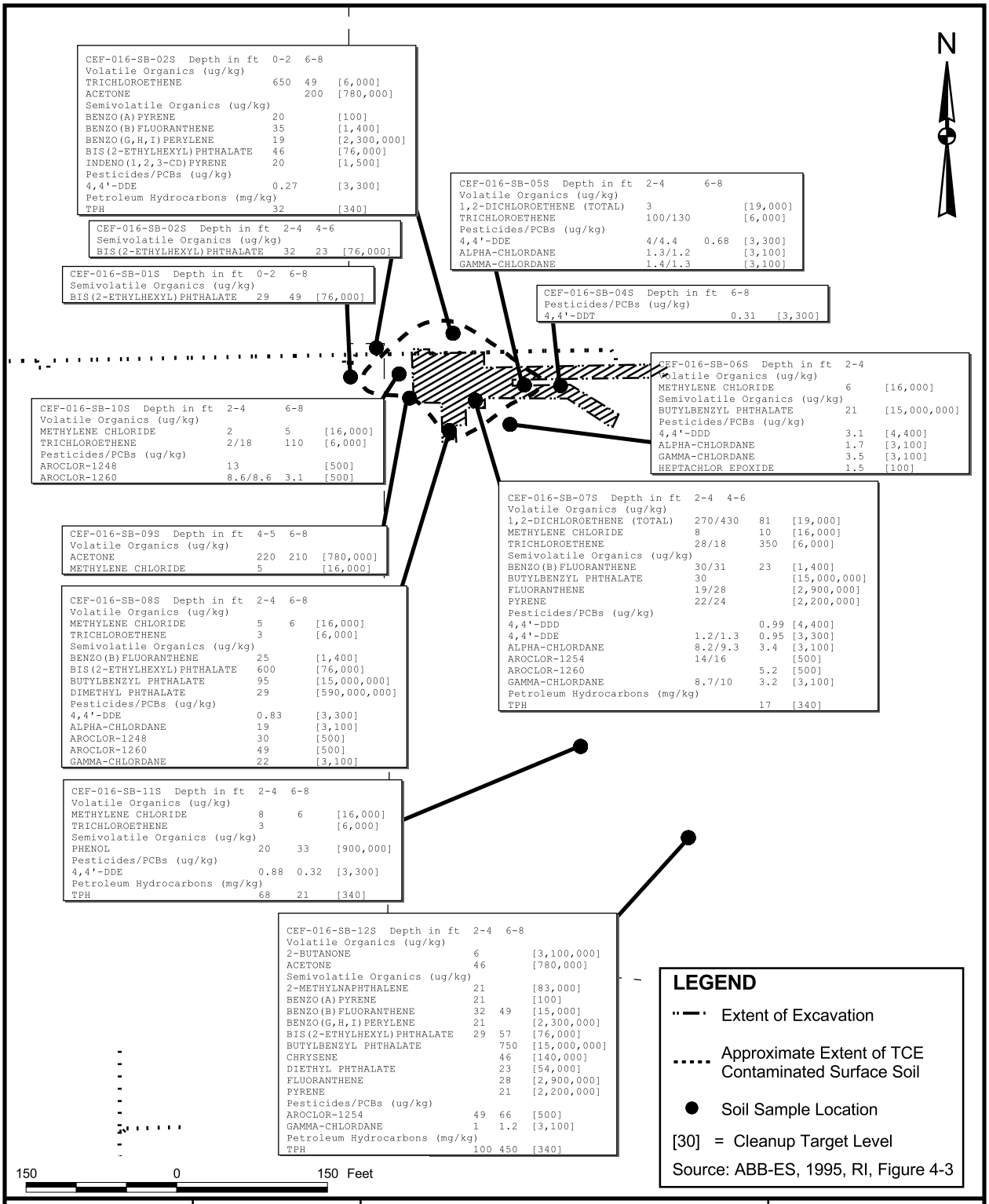

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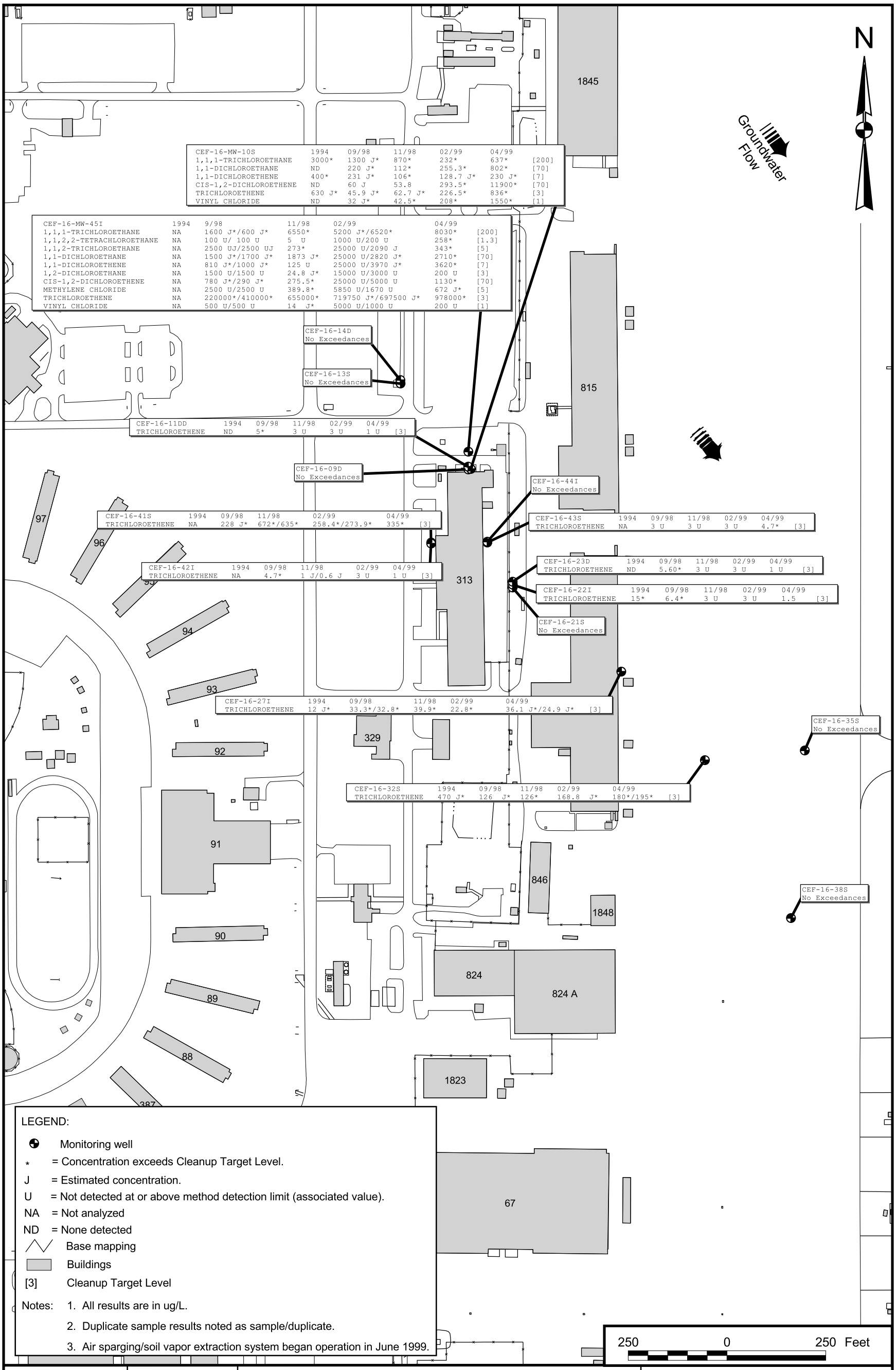

DRAWN BY MJJ	DATE 17Sept99	EXCEEDANCES OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER OPERABLE UNIT 7, SITE 16 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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found in the quarterly groundwater monitoring reports. The AS/SVE system that will begin operation in late June will volatilize, remove, and capture the groundwater contaminants in the source area.

The COC concentrations outside the source area have varied (increased, decreased, and remained approximately the same) in comparison to the data from the RI and baseline (first quarter) sampling event. The operation of the AS/SVE system to remove the high concentrations of the contaminants in the source area will be beneficial to the downgradient area. It is anticipated that a significant decrease in the high concentrations in the source area will allow natural attenuation in the downgradient area of the plume to occur, decreasing the concentrations of the COCs. TCE concentrations have decreased or remained relatively constant over time and have decreased to below detection limits in five wells, which indicates that biodegradation of TCE is occurring. TCE biodegradation at the site is supported by results that show increased concentrations of TCE biodegradation byproducts such as cis-1,2-DCE and vinyl chloride. Natural attenuation data can be found in the quarterly, groundwater monitoring reports.

Bis(2-ethylhexyl) phthalate was detected in the baseline and second quarter sampling events but was not detected during the third-quarter sampling event. Since bis(2-ethylhexyl) phthalate is a common laboratory contaminant, it is not regarded as a COC but is being analyzed for in order to confirm that seasonal variations are not significant.

The work plan for the construction and start-up of the AS/SVE system and the storm sewer repair was reviewed. The construction completion report was being prepared at the time of the five-year review. The AS/SVE system and the storm sewer repair appear to have been installed in accordance with the remedial design. The proposed layout of the wells and equipment building is shown on Figure 7-7, and conceptual layout of the AS/SVE equipment is shown on Figure 7-8. The location of the storm sewer repair is shown on Figure 7-9.

The review of these documents indicates that the Navy is meeting the requirements of the Interim and Amended RODs and is constantly re-evaluating the status to optimize the monitoring for this OU. The frequency of the monitoring specified in the long-term groundwater monitoring program (quarterly) appears to be adequate.

7.4.3 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs that have changed since the Interim ROD was signed are shown in the table below. There are no changes in the groundwater ARARs since the Amended ROD was signed in April 1999. The ARAR changes are from the promulgation of the FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC).

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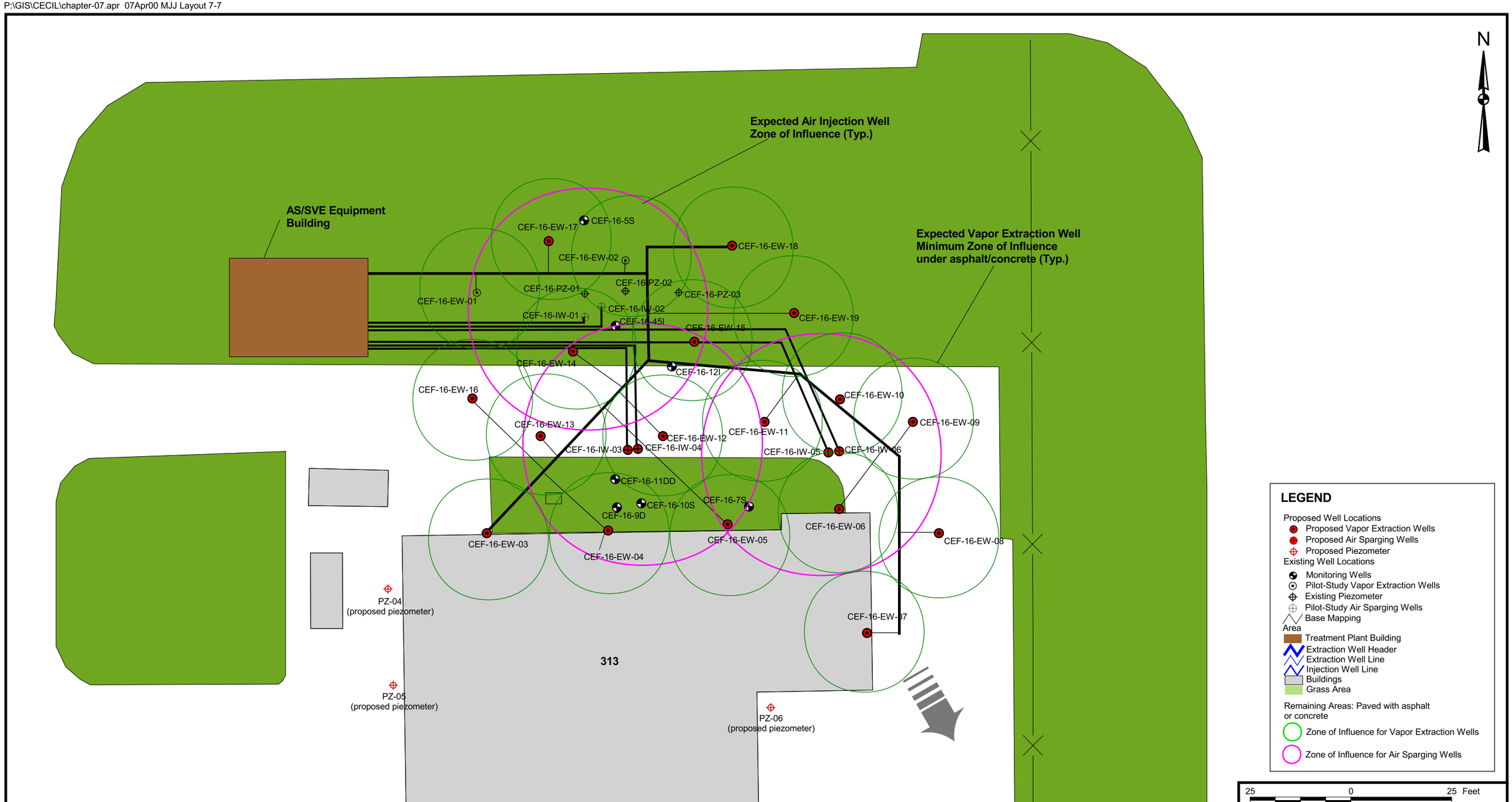

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AIR SPARGING / VAPOR EXTRACTION
SYSTEM LAYOUT
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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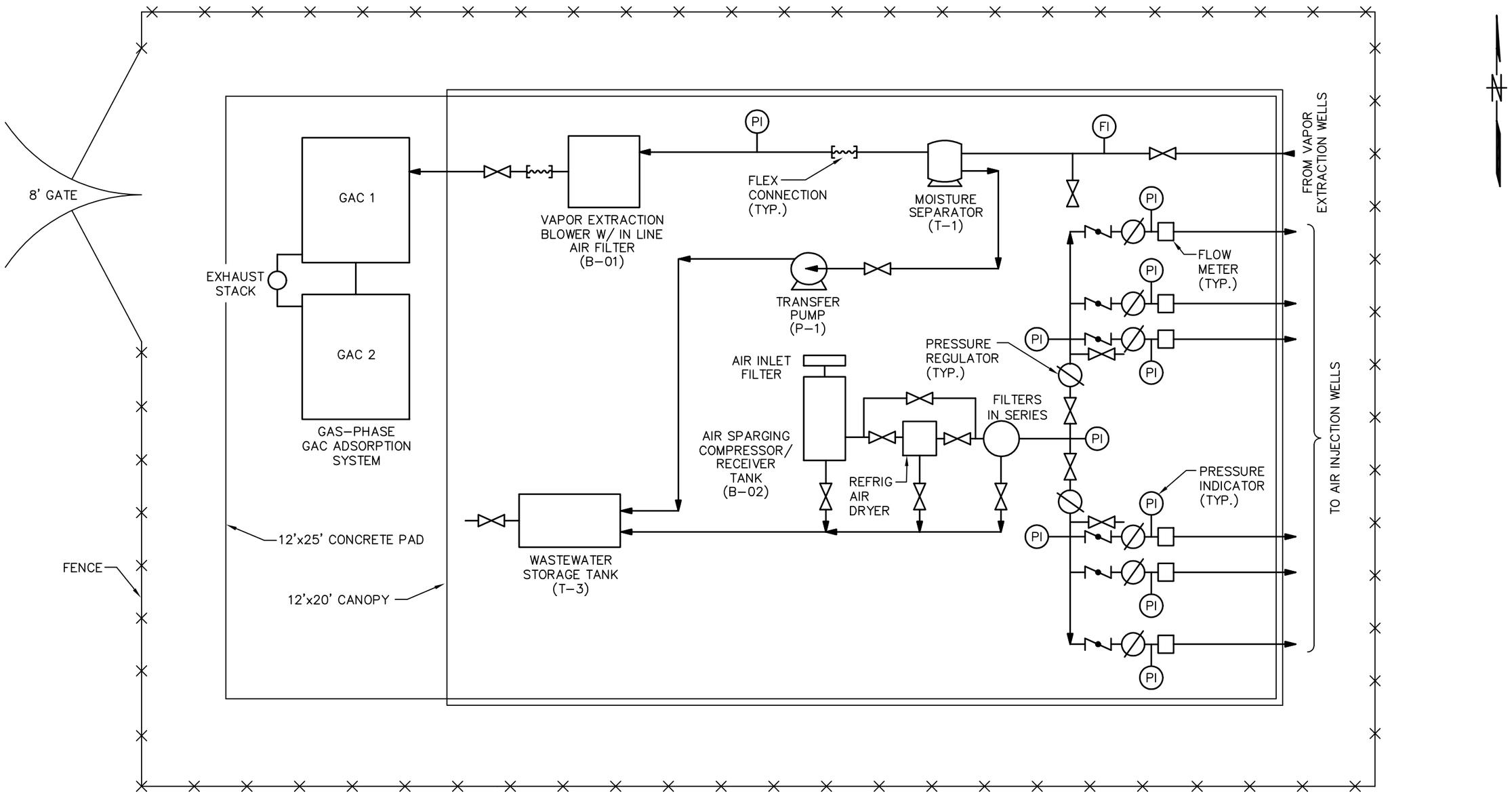

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CONCEPTUAL AIR SPARGING/VAPOR EXTRACTION SYSTEM EQUIPMENT CONTROL AREA LAYOUT
OPERABLE UNIT 7, SITE 16
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7898
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REV. 0

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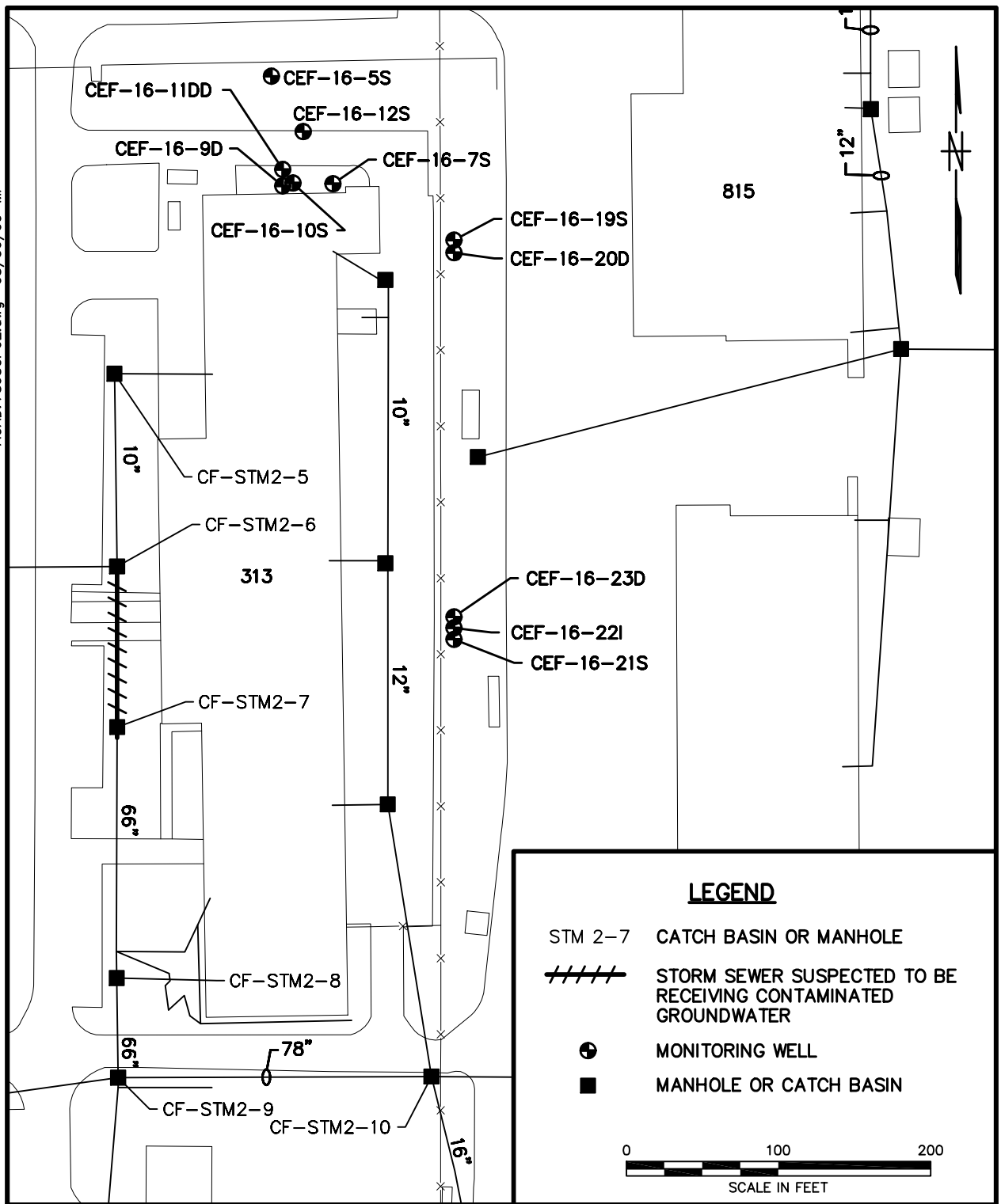

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STORM SEWER SYSTEM REPAIR
OPERABLE UNIT 7, SITE 16
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

Contaminant	ARAR/Site-Specific Level		Source
SOIL			
Trichloroethene	Previous	1 mg/kg	Established Action Level for the Interim Removal Action
	New	6 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule – Residential Direct Exposure

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARARs for the TCE in soil increased and do not affect the protectiveness of the remedial action. The TCE concentration has not become more stringent since the signing of the Interim and Amended RODs. These new contaminant cleanup target levels rely upon health-based risk assessments, and the cleanup target levels should remain within the risk range calculated in the risk assessment.

New chemical-specific ARARs have been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC), FDEP Approach to the Assessment of Sediment Quality in Florida Coastal Waters, and the U.S. EPA Region IV Ecological Screening Values. The ecological risk toxicity values developed in the new regulations and guidance manuals do not affect the protectiveness of the remedial action. The BRA results indicated that the ecological receptors were not likely to be at risk from exposure to the OU 7 surface water and sediment. The risk characterization also did not identify risks for aquatic receptors in Sal Taylor Creek from the contaminants in the groundwater.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the Interim and Amended RODs.

7.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when OU 7, Site 16 is transferred to the Jacksonville Port Authority, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements must be adopted. The current and future land use at these sites suggests that these controls should be effective.

7.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Port Authority are shown in the table below.

Recommendations/Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Program.	Navy	U.S. EPA and FDEP	Quarterly in February, May, August, and November
Complete AS/SVE System and Storm Sewer Repair Construction Documentation	Navy	U.S. EPA and FDEP	2002
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property

7.7 PROTECTIVENESS STATEMENT

The remedy at OU 7 is expected to be protective of human health and the environment upon completion. The implementation of the long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The Interim Removal Action to remove the soil and structures that acted as a source of groundwater contamination was completed in 1994, was effective, and met the RAOs identified in the Interim ROD. No additional excavation at Site 16 is required.

The long-term groundwater-monitoring program has been implemented as designed to reduce the risk related to exposure to groundwater. The results of this program indicate that the concentrations of contaminants outside the source area have remained constant or decreased over the monitoring period. The AS/SVE system has been installed and is in operation, and the storm sewer has been repaired. The results of future groundwater monitoring will be used to evaluate performance of the AS/SVE system and effectiveness of the storm sewer repair.

The institutional controls will be implemented before the transfer of the property to the Jacksonville Port Authority in 2001. The Navy will temporarily retain control of OU 7, Site16 and will transfer the property when it has determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

Most of the remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that have been completed (soil excavation) and that are currently in operation (groundwater monitoring) are operating as designed. Based on the completed activities and the activities that are underway or planned, the intent and goals of the RODs for OU 7 have been met or will be met.

8.0 OPERABLE UNIT 8, SITE 3

Implementation of the remedial actions at OU 8 began in the fall of 1998. This five-year review consists of an approximate 1-year period of data and provides a current status update for OU 8. Five years of sampling data are necessary in order to establish more accurate trends of increasing/decreasing contamination needed to draw conclusions. A more detailed review of the remedial actions will be conducted during the next review.

This five-year review is being conducted as a matter of policy until the cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. OU 8 consists of Site 3, the Oil and Sludge Disposal Pit.

8.1 HISTORY AND SITE CHRONOLOGY

A list of important OU 8, Site 3 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 3 Oil and Sludge Disposal Pit	1950s to 1975
RI Completed	1996
FS Completed	1997
ROD signature	9/98
Remedial Design for Groundwater	10/98
AS system installation	5/99
Groundwater Monitoring	Ongoing quarterly

8.2 BACKGROUND

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 8. A sketch of OU 8 showing the relative location of Site 3 and the surface water drainage pattern in and around the site is provided on Figure 8-1. Site 3 occupies approximately 0.5 acre.

Site 3 was used to dispose of liquid wastes and sludge from as early as the mid-1950s until 1975. Liquid wastes were taken to the site in bowsers or 55-gallon drums, drained into the pit, and allowed to seep into the soil or evaporate. When the liquid level in the pit reached the top, the Station's fire department burned the wastes. About 200 to 300 gallons of waste oil, fuel, and tank sludge from the fuel farm were disposed weekly at the site, and a total of 210,000 to 310,000 gallons were disposed throughout the 20-year lifetime of the site. Sources of the wastes were the squadrons, AIMD, and the public works and

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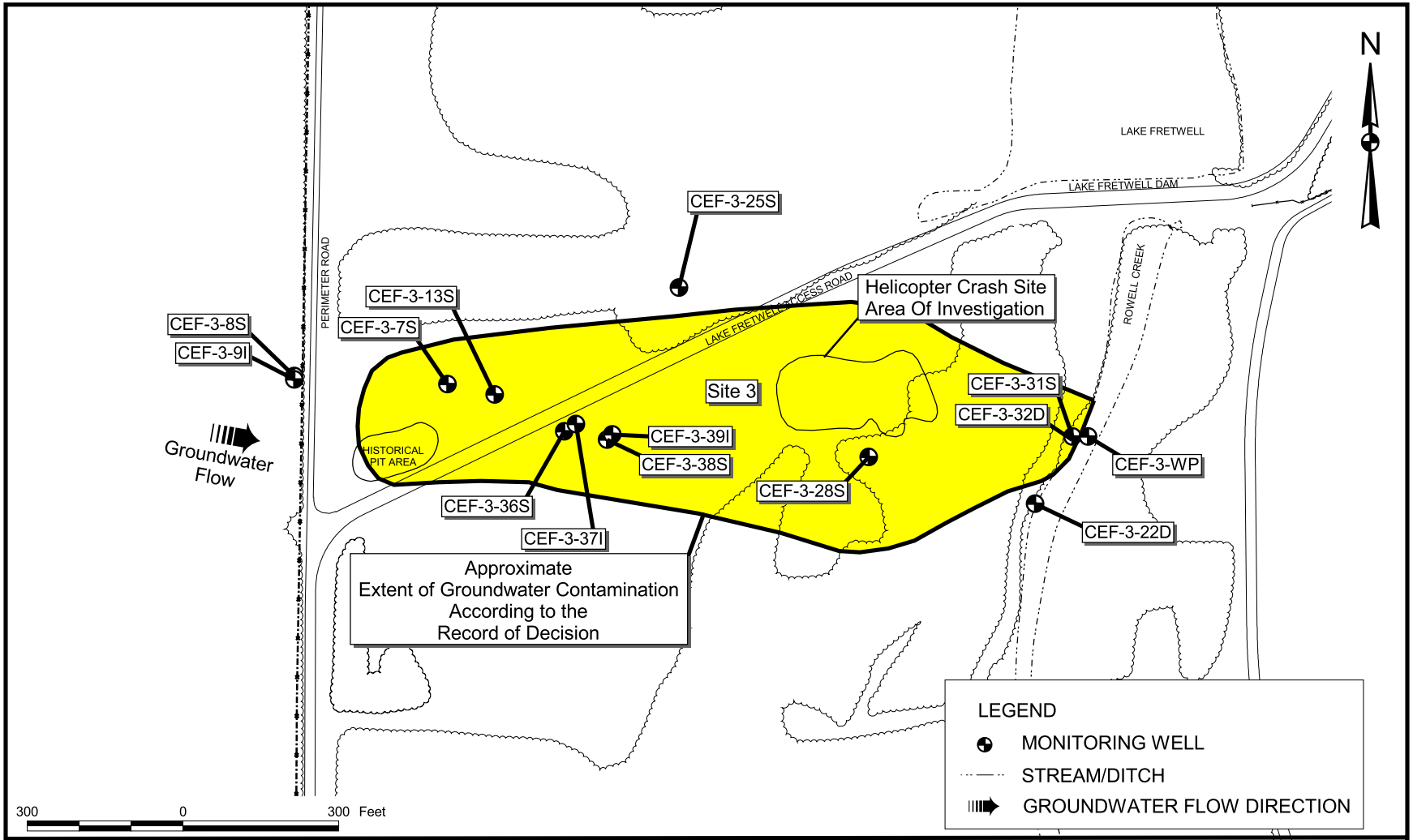

DRAWN BY MJJ	DATE 09August99	OPERABLE UNIT 8, SITE 3 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7898
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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-1 / REV 0

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the wastes were composed of fuels, oils, solvents, paint, and paint strippers. Following closure of the site in 1975, the pit was filled and covered with soil. In 1992, a Navy helicopter crashed into a wooded area east of the site. The helicopter had a fuel capacity of between 1,800 and 2,000 gallons and ignited on impact.

8.3 REMEDIAL ACTIONS

8.3.1 Remedy Selection

The purpose of remedial action at OU 8 is to comply with ARARs and to reduce the risk of possible adverse effects posed by physical and chemical conditions in the Site 3 groundwater. To meet these goals, one RAO was identified. This objective was based on an evaluation of site conditions, risks, and legal requirements (ARARs):

- Prevent exposure to groundwater that contains VOCs at concentrations that are greater than the state of Florida guidance criteria and that cause unacceptable risk to human health.

A combination of two of the alternatives that were analyzed in the FS was selected as the remedy for Site 3 to address the contaminants in groundwater. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The selected remedy also provides flexibility to implement additional remedial measures, if necessary, to address RAOs or unforeseen issues. The remedial actions for the selected remedy include in-situ air stripping of VOCs from the source area groundwater by air sparging (AS), natural attenuation of downgradient groundwater, institutional controls, and five-year site reviews.

The selected remedial alternative will not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through the in-situ air stripping of source area groundwater and natural processes downgradient, and monitoring will verify compliance. The selected remedy complies with the chemical-, location-, and action-specific ARARs.

8.3.2 Remedy Implementation

TtNUS completed the remedial design for the Navy in October 1998. The remedial design included the specifications necessary to conduct the remedial actions listed in the ROD.

The completed activities at Site 3 include the installation and start-up of the AS system in May 1999 and the sampling and analysis of groundwater for three quarterly events between December 1998 and May

1999. The sampling and analysis of the groundwater documented the effectiveness of natural attenuation in reducing the concentrations of COCs in the contaminant area and plume prior to the start-up of the AS system.

The institutional controls, such as deed restrictions, are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted.

8.3.3 System Operations/Operation and Maintenance

The Navy has contracted with the Remedial Action Contractor, CH2MHill Constructors, Inc., to implement the installation and start-up of the AS system. Operation and maintenance of the AS system will be transferred to TtNUS. The start-up of the AS system occurred in late May 1999.

The Navy has contracted with TtNUS to perform the long-term groundwater monitoring program and AS system operation and maintenance. The work is being conducted in accordance with the ROD and the OU 8 Remedial Design and Closure Plan. Three groundwater sampling events have been conducted since August 1998. The fourth sampling event was conducted in August 1999, and an annual report from the four quarterly sampling events will be prepared. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for the chemicals of concern.

The Navy's original cost estimate for implementation of air stripping, natural attenuation, and institutional controls was approximately $1,708,000. The Navy has begun to implement the remedial actions at OU 8 in accordance with the remedial designs, and the implementation of the remedial design is in progress. The actual cost for the implementation of the remedial design has not yet been tabulated since the remedial actions are ongoing.

8.4 FIVE-YEAR REVIEW

8.4.1 Site Inspection

The NAS Cecil Field BCT has conducted site inspections at OU 8, Site 3. The site inspections included visual observations of the area, surface water and sediment in Rowell Creek and the wetlands, and the groundwater monitoring wells. Access roads to the groundwater monitoring wells are becoming overgrown with vegetation.

The surface water was clear in Rowell Creek and the wetlands. The sediment is brown to dark brown silty sand. The groundwater monitoring wells, including the concrete base and the well casing, were in good condition. Most of the wells had well identification tags.

TtNUS conducted several site visits at Site 3 as part of the field activities in 1998 and 1999. The site visits included construction monitoring of the AS system installation, groundwater sampling, and site walkovers. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Jacksonville Port Authority intends to purchase the site and surrounding property and to continue the land's use as an airport. The land is currently a vacant, relatively featureless area with no residential, commercial, or industrial functions in the flight path of landing aircraft. The site is north of OU 1, which is located in an area identified for public building and facilities (Forestry Management/Airport Reserve). There are plans for a new runway as part of the airport that would prevent locating of buildings in the area of OU 1, as well as OU 8.

8.4.2 Document and Analytical Data Review

Three quarterly long-term monitoring sampling events were conducted in 1998 and 1999. The concentrations of VOCs and SVOCs remained relatively constant or slightly decreased. The COCs that were detected above the target cleanup goals included 1,1,1-trichloroethane, 1,1-dichloroethane, 1-1,DCE, cis-1,2-DCE, TCE, vinyl chloride, benzene, xylenes, methylene chloride, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 2-methylnaphthalene, 4-methylphenol, and naphthalene. The VOC and SVOC exceedances are shown on Figures 8-2 and 8-3, respectively. Several COCs [trans-1,2-DCE, 2,4-dichlorophenol, phenol, bis(2-ethylhexyl)phthalate, and Aroclor 1248] were not detected or were detected at concentrations below target cleanup goals during the sampling events.

The highest concentrations of VOCs were detected in the historical disposal pit area and the former helicopter crash area. Lower concentrations of VOCs were detected in the areas between the disposal pit and the helicopter crash area and between the helicopter crash area and Rowell Creek. The SVOCs were detected above the target cleanup goals in the area of the historical disposal pit.

The work plan for the construction and start-up of the AS system was reviewed. The construction completion report was being prepared at the time of the five-year review. The AS system appears to have been installed in accordance with the remedial design. The proposed layout of the wells and equipment control unit is shown on Figure 8-4, and the conceptual layout of the AS equipment is shown on Figure 8-5.

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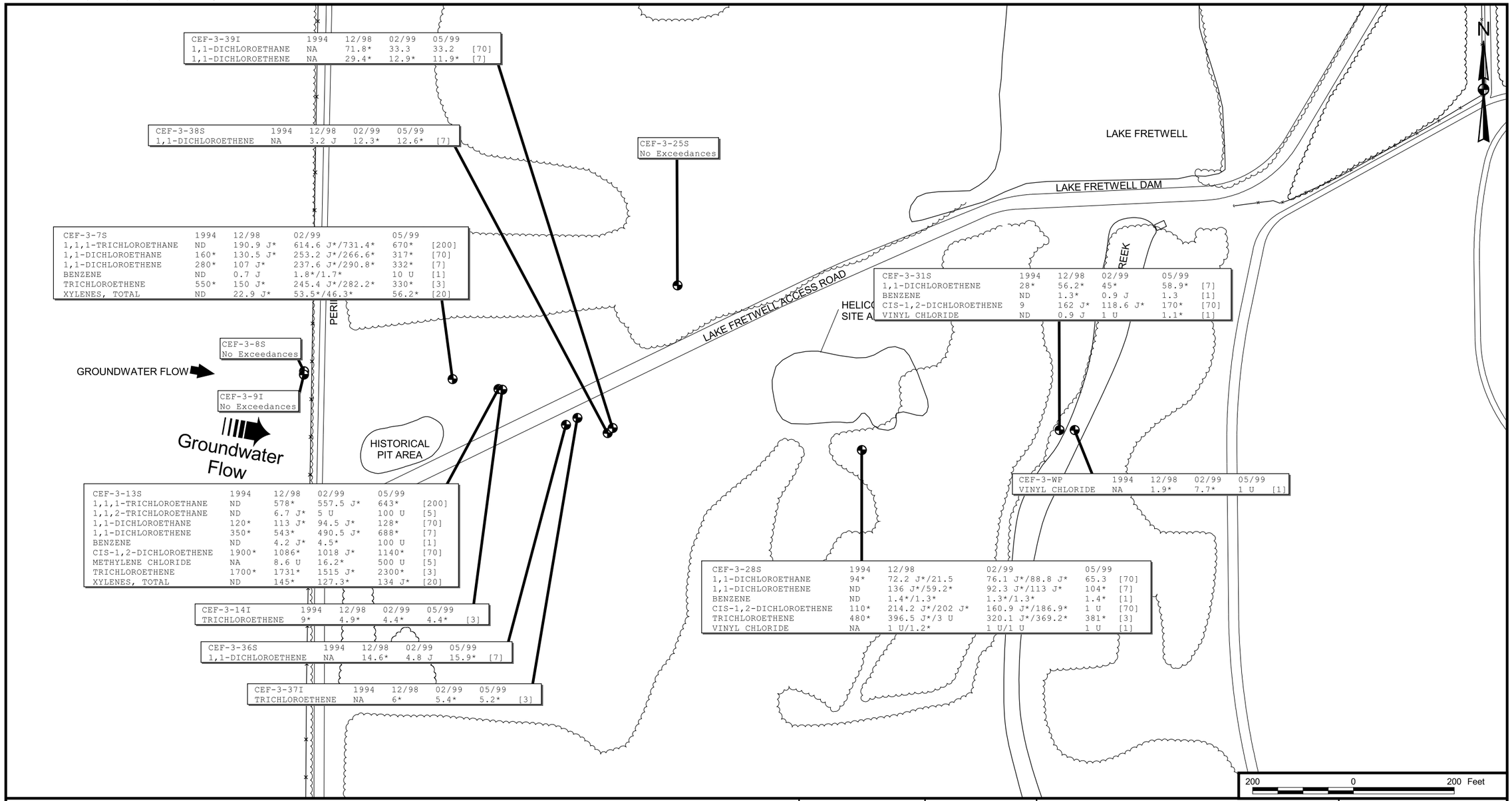

LEGEND:

U = Not detected at or above method detection limit (associated value)
J = Estimated concentration
* = Detect concentration exceeds Cleanup Target Level

ND - Not detected
NA - Not analyzed
◐ - Monitoring well

"ALL RESULTS IN ug/L"
Duplicate results reported as sample/duplicate
[3] = Cleanup Target Level

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EXCEEDANCES OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 8, SITE 3
FIVE - YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7898	
APPROVED BY	DATE
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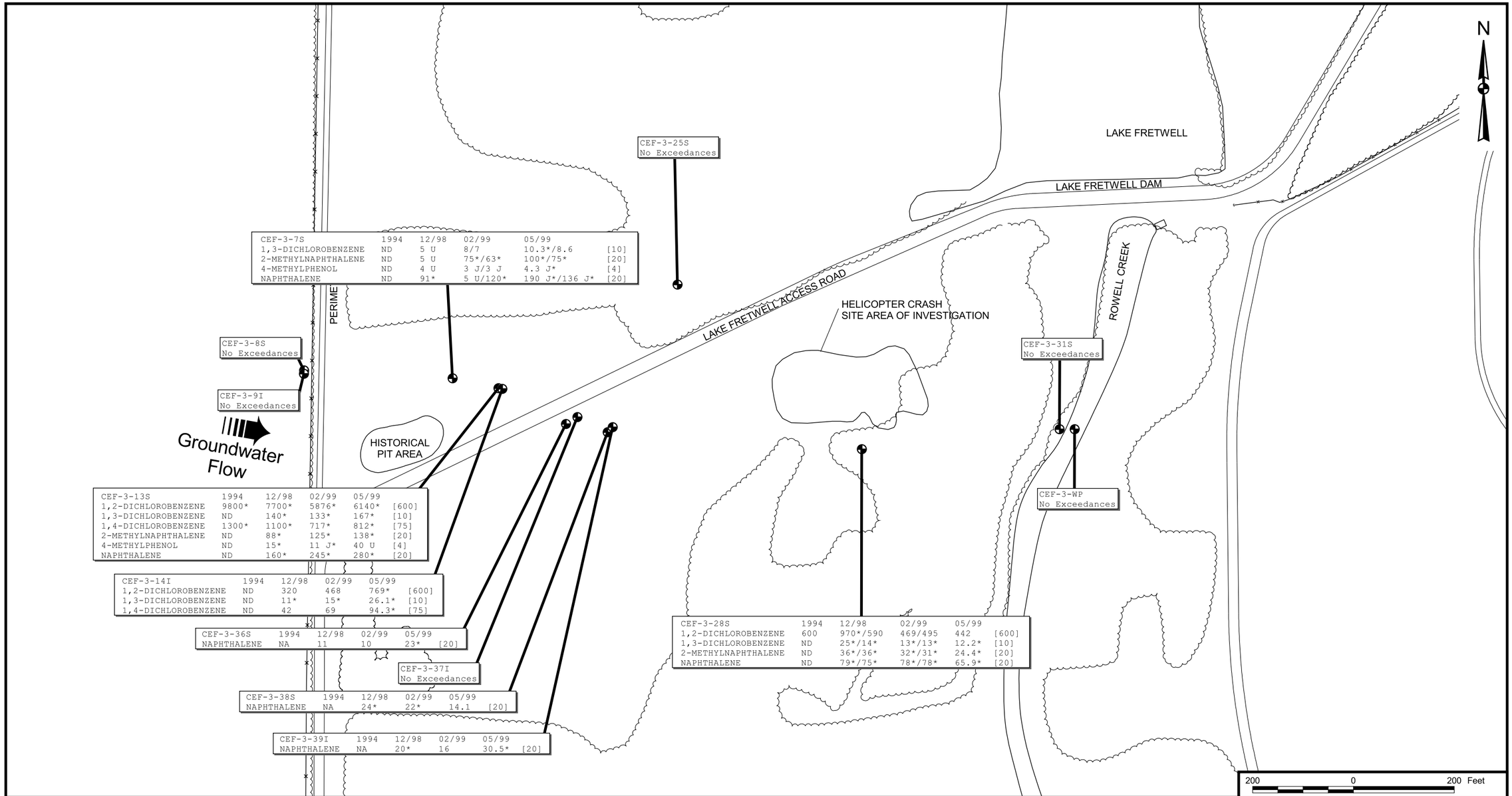

CEF-3-7S	1994	12/98	02/99	05/99	
1,3-DICHLOROBENZENE	ND	5 U	8/7	10.3*/8.6	[10]
2-METHYLNAPHTHALENE	ND	5 U	75*/63*	100*/75*	[20]
4-METHYLPHENOL	ND	4 U	3 J/3 J	4.3 J*	[4]
NAPHTHALENE	ND	91*	5 U/120*	190 J*/136 J*	[20]

CEF-3-13S	1994	12/98	02/99	05/99	
1,2-DICHLOROBENZENE	9800*	7700*	5876*	6140*	[600]
1,3-DICHLOROBENZENE	ND	140*	133*	167*	[10]
1,4-DICHLOROBENZENE	1300*	1100*	717*	812*	[75]
2-METHYLNAPHTHALENE	ND	88*	125*	138*	[20]
4-METHYLPHENOL	ND	15*	11 J*	40 U	[4]
NAPHTHALENE	ND	160*	245*	280*	[20]

CEF-3-14I	1994	12/98	02/99	05/99	
1,2-DICHLOROBENZENE	ND	320	468	769*	[600]
1,3-DICHLOROBENZENE	ND	11*	15*	26.1*	[10]
1,4-DICHLOROBENZENE	ND	42	69	94.3*	[75]

CEF-3-36S	1994	12/98	02/99	05/99	
NAPHTHALENE	NA	11	10	23*	[20]

CEF-3-38S	1994	12/98	02/99	05/99	
NAPHTHALENE	NA	24*	22*	14.1	[20]

CEF-3-39I	1994	12/98	02/99	05/99	
NAPHTHALENE	NA	20*	16	30.5*	[20]

CEF-3-28S	1994	12/98	02/99	05/99	
1,2-DICHLOROBENZENE	600	970*/590	469/495	442	[600]
1,3-DICHLOROBENZENE	ND	25*/14*	13*/13*	12.2*	[10]
2-METHYLNAPHTHALENE	ND	36*/36*	32*/31*	24.4*	[20]
NAPHTHALENE	ND	79*/75*	78*/78*	65.9*	[20]

LEGEND:

U = Not detected at or above method detection limit (associated value)
J = Estimated concentration
* = Detect concentration exceeds Cleanup Target Level

ND - Not detected
NA - Not analyzed
◐ - Monitoring well

"ALL RESULTS IN ug/L"
Duplicate results reported as sample/duplicate
[20] = Cleanup Target Level

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SCALE	AS NOTED

EXCEEDANCES OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 8, SITE 3
FIVE - YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7898	
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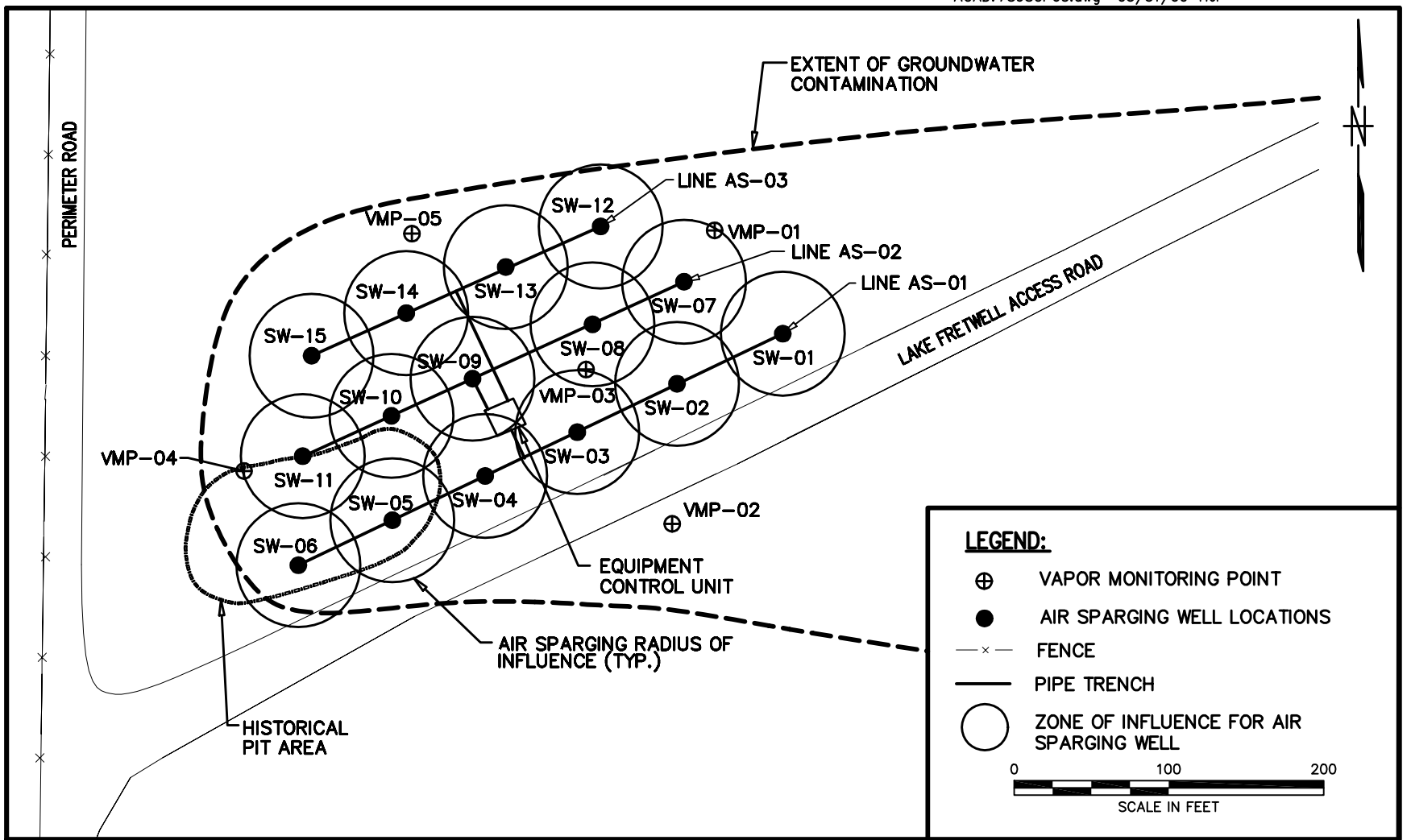

DRAWN BY MF DATE 8/25/99	WELL & EQUIPMENT CONTROL UNIT LAYOUT OPERABLE UNIT 8, SITE 3 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7898	
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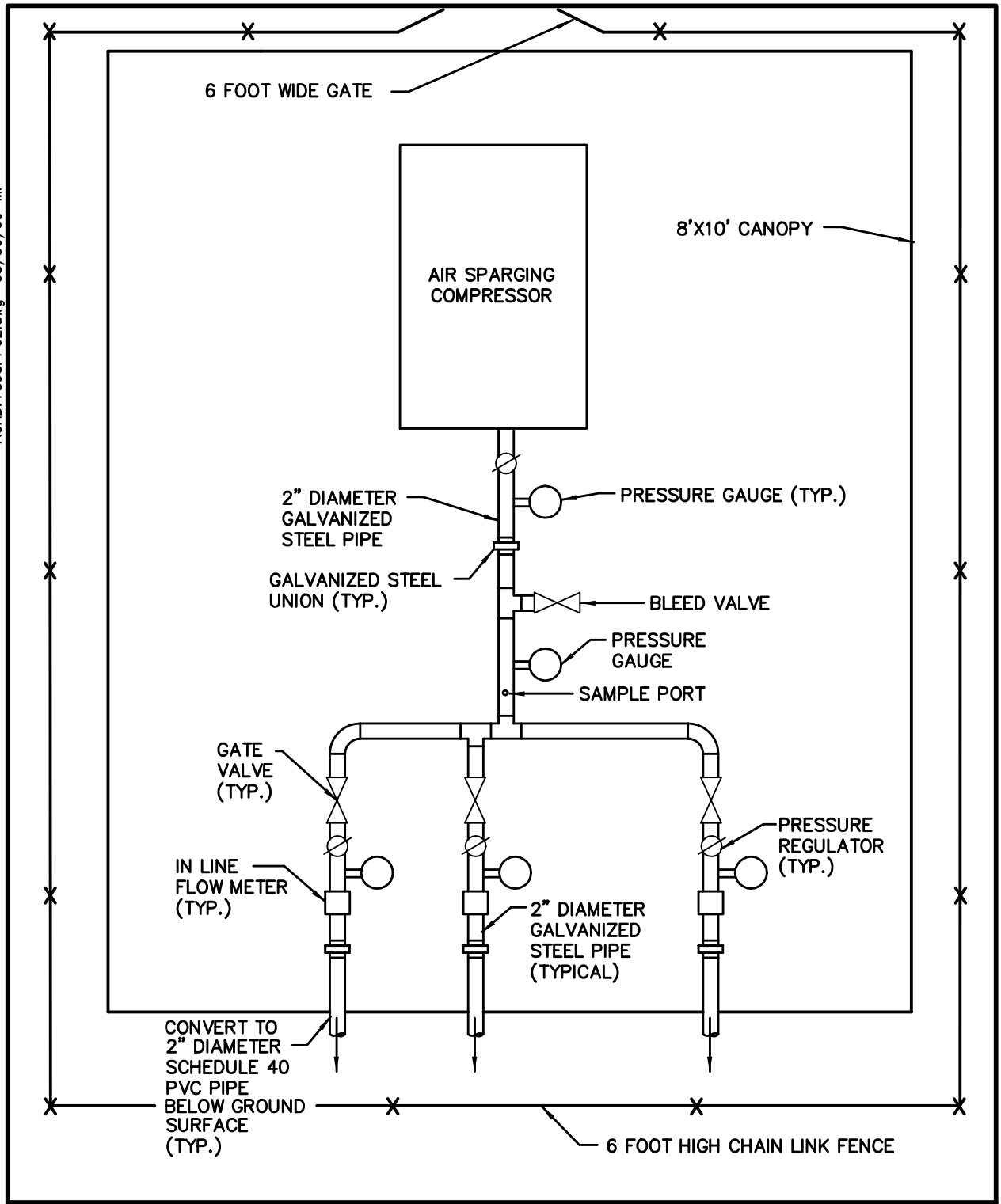

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COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-5 / REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

The review of these documents indicates the Navy is meeting the requirements of the ROD. The frequency of the monitoring specified in the groundwater-monitoring program appears to be adequate.

8.4.3 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs and site-specific action levels that have changed since the ROD was signed are shown in the table below. The ARAR changes are from the promulgation of FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC). The site-specific action level changes are from the development of an Inorganic Background Data Set at NAS Cecil Field,

Contaminant	ARAR		Source
GROUNDWATER			
2,4-Dichlorophenol	Previous	4 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	0.5 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
2-Methylnaphthalene	Previous	100 µg/L	Florida Drinking Water Standard
	New	20 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
4-Methylphenol	Previous	35 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	4 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
Naphthalene	Previous	6.8 µg/L	Florida Groundwater Guidance Concentrations, Chapter 6
	New	20 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule
Aluminum	Previous	8560 µg/L	Site Specific (OU 8) Background Standard
	New	13100 µg/L	NAS Cecil Field Inorganic Background Data Set
Antimony	Previous	6 µg/L	Primary Drinking Water Standard
	New	44.5 µg/L	NAS Cecil Field Inorganic Background Data Set
Iron	Previous	1250 µg/L	Site Specific (OU 8) Background Standard
	New	7750 µg/L	NAS Cecil Field Inorganic Background Data Set
Manganese	Previous	50 µg/L	Drinking Water Standard
	New	150 µg/L	NAS Cecil Field BCT Minutes of Meeting, Minutes No. 1032

The ARARs and the site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARARs for three of the COCs (2,4-dichlorophenol, 2-methylnaphthalene, and 4-methylphenol) have decreased since the ROD was signed. These new

contaminant cleanup target levels rely upon health-based risk assessments and have become more stringent since the signing of the ROD. However, this change will not affect the protectiveness of the remedial design but will require additional time and resources to complete the remedial action.

The ARARs and site-specific action levels for the other five COCs in the table increased and do not affect the protectiveness of the remedial action. These five COCs have not become more stringent since the signing of the ROD.

New chemical-specific ARARs have been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC), FDEP Approach to the Assessment of Sediment Quality in Florida Coastal Waters, and the U.S. EPA Region IV Ecological Screening Values for ecological risk evaluations. The ecological risk toxicity values developed in the new regulations and guidance manuals do not affect the protectiveness of the remedial action. The BRA results indicated that the ecological receptors were not likely to be at risk from exposure to the OU 8 surface soil, surface water, or sediment. Laboratory toxicity testing studies showed there was little toxicity ecological impacts in the test species with an approximate 20-fold dilution of groundwater.

The other federal and state ARARs (chemical-specific, action-specific, and location-specific) have not changed since the signing of the ROD.

8.5 DEFICIENCIES

No deficiencies were identified during the five-year review while the Navy owns the property. However, when OU 8, Site 3 is transferred to the Jacksonville Port Authority, institutional controls will need to be implemented, unless the remedial actions achieve cleanup levels that result in unlimited use and unrestricted exposure. Institutional controls are currently being developed through LUCIPs. These institutional controls are designed to ensure protection of human health and the environment. When the Navy transfers the property to the Jacksonville Port Authority, these LUCIPs, by way of deed restrictions, notices, or other agreements, must be adopted. The current and future land use at this site suggests that these controls should be effective.

8.6 RECOMMENDATIONS AND REQUIRED ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Jacksonville Port Authority are shown in the table below.

Recommendations/Required Actions	Responsible Party	Oversight Agency	Milestone Date
Continue Long-Term Monitoring Program.	Navy	U.S. EPA and FDEP	Quarterly in February, May, August, and November
Complete Documentation for AS System Construction.	Navy	U.S. EPA and FDEP	2002
Implement Institutional Controls.	Navy	U.S. EPA and FDEP	At time of transfer of the property
Issue Explanation of Significant Differences	Navy	U.S. EPA and FDEP	Before next five-year review

8.7 PROTECTIVENESS STATEMENT

The remedy at OU 8 is expected to be protective of human health and the environment upon completion. The implementation of the long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) will also provide a significant degree of protectiveness of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

The groundwater-monitoring program has been implemented as designed to reduce the risk related to exposure to groundwater. The results of this program indicate that the concentrations of contaminants have remained constant or slightly decreased over the monitoring period. The AS system has been installed and is in operation. The results of future groundwater monitoring will be used to evaluate the AS system.

The institutional controls will be implemented before the transfer of the property to the Jacksonville Port Authority in 1998. The Navy will temporarily retain control of OU 8, Site 3 and will transfer the property when it has determined that the remedial action is operating properly and successfully or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

Most of the remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that are currently in operation (AS system, groundwater monitoring) are operating as designed. Based on the activities that are underway or planned, the intent and goals of the ROD for OU 8 will be met.

9.0 BASEWIDE CONCLUSIONS AND RECOMMENDATIONS

The basewide conclusions and recommendations are presented below. These conclusions and recommendations are provided in the form of a basewide protectiveness statement and a summary of the requirements of the next five-year review.

9.1 PROTECTIVENESS STATEMENT

The remedial actions at the OUs at NAS Cecil Field are expected to be protective of human health and the environment. Remedial actions for immediate threats of exposure have been (OU 2, Sites 5 and 17 and OU 7, Site 16) or will be implemented by the year 2000 (OU 3, Sites 7 and 8; OU 4, Site 10; and OU 6, Site 11). However, many of the remedial actions currently being implemented will require more than 5 years to complete. The implementation of the long-term groundwater monitoring program for most of the OUs provides a degree of protection of human health and the environment. The planned implementation of the institutional controls (LUCIPs) at each of the OUs will also provide a significant degree of protectiveness of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Upon completion of the remedial actions (long-term groundwater monitoring and operation of the AS and AS/SVE system), the remedies are expected to be protective of human health and the environment.

This five-year review shows that the Navy is meeting or exceeding the requirements of the RODs for the OUs at NAS Cecil Field and is constantly re-evaluating to utilize permanent remedies and alternative treatment technologies to the maximum extent practical for each OU.

9.2 NEXT REVIEW

Five-year reviews are required by statute or as a matter of policy, depending on the RAOs and remedial actions defined in the ROD. NAS Cecil Field has OUs that require statutory or policy five-year reviews. This report represents the first five-year review conducted at NAS Cecil Field. The next five-year review will be required within 5 years of the signature date of this review, August 2005. A summary of the anticipated requirements for the next five-year review is provided below.

The five-year review should include a detailed review of the costs for implementing the remedial actions to confirm that the remedy is proceeding as planned. The review should also include a detailed review of sampling activities at OU 1, OU 2, OU 3, OU 6, OU 7, and OU 8 since the sampling activities (surface water, sediment, and/or groundwater) reviewed for this report have only occurred for approximately 1 to 2 years. The implementation of institutional controls was not completed during this review; therefore, a

review of the institutional controls (anticipated to be implemented before the next review when the Navy transfers the property to the city of Jacksonville, Jacksonville Economic Development Commission, and the Jacksonville Port Authority) will be required also.

9.2.1 Statutory Review

OU 1, Sites 1 and 2 will require a statutory review during the next five-year review for NAS Cecil Field. The next review for OU 1, Sites 1 and 2 will require the review of the annual long term monitoring reports. Five-year reviews will continue at OU 1, Sites 1 and 2 because hazardous substances, pollutants, and contaminants remain at this site that will not allow for unlimited use or unrestricted exposure.

9.2.2 Policy Review

OU 2, Sites 5 and 17; OU 3, Sites 7 and 8; OU 4, Site 10; OU 6, Site 11; OU 7, Site 16; and OU 8, Site 3 will require ongoing policy five-year reviews until cleanup levels are achieved, resulting in unlimited use and unrestricted exposure. Hazardous substances, pollutants or contaminants currently remain at these operable units and sites that will not allow for unlimited use or unrestricted exposure.

The next review for OU 2 will require the review of the annual groundwater monitoring reports. The next review for OU 3 and OU 6 will require the review of the annual groundwater monitoring reports and the review of Completion Reports for the soil excavation and disposal. The next five-year review for the OU 3 and OU 6 soil contamination will be the last review, since the remedy is permanent, unless there are significant changes. The next review for OU 4, Site 10 will require the review of the Construction Completion Report and Remedial Action Plan for the soil excavation activities and a review of changes in the ARARs for arsenic concentrations in soil. The next five-year review for OU 4, Site 10 will be the last review, unless there are significant changes. Since the remedy in the ROD and ESD for OU 4, Site 10 will be no further action after completion of the Interim Remedial Action, no additional five-year review will be required.

The next review for OU7 and OU8 will require the review of the annual groundwater monitoring reports and the records related to the operation of the AS/SVE and AS systems. The operation of these systems should be completed at the time of the next five-year review (anticipated operation time for OU 7 is 3 years and the anticipated operation time for OU 8 is 2.5 years).

These sites will require ongoing five-year reviews as a matter of policy until cleanup levels are achieved that result in unlimited use and unrestricted exposure. Hazardous substances, pollutants, or contaminants currently remain at these OUs that will not allow for unlimited use or unrestricted exposure.

9.2.3 Reviews for Sites with RODs Published Since This Five-Year Review

OU 5, Site 15 and OU 9, Sites 36 and 37 were not included in this five-year review because these sites are being investigated, no ROD has been prepared that identifies the selected remedial action, and no remedial actions have been conducted at these site. It is anticipated that the RODs for these sites will be completed and the remedial actions will be in process at the time of the next review. The next review will include these sites.

REFERENCES

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APPENDIX A

PHOTOGRAPHS