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NAS CECIL FIELD
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FINAL THIRD FIVE YEAR REVIEW WITH TRANSMITTAL LETTER NAS CECIL FIELD FL
(PUBLIC DOCUMENT)
04/12/2011
TETRA TECH NUS

TETRA TECH

PITT-04-11-028

April 12, 2011

Project 112G02267

BRAC PMO SE
Attn: Mr. Art Sanford
4130 Faber Place Drive
North Charleston, South Carolina 29405

Reference: CLEAN Contract No. N62470-08-D-1001
Contract Task Order JM09

Subject: Final Third Five-Year Review
Naval Air Station Cecil Field
Jacksonville, Florida

Dear Mr. Sanford:

Enclosed please find one copy of the subject deliverable. Copies have been sent to the members of the NAS Cecil Field Partnering Team as identified below. This document has been reviewed by FDEP and U. S. EPA regulators, along with U.S. EPA Headquarters, U.S. EPA Five-Year Review Coordinator, and U.S.EPA and Navy attorneys, and all comments have been addressed. This document has been signed and accepted by the Director of BRAC PMO SE. Final regulatory review and letter providing comments and/or approval of the subject document is requested.

If you have any questions, please call me at 412-921-8163 or Megan Boerio at 412-921-7271.

Sincerely,

Robert F. Simcik, P.E.
Task Order Manager

RFS/clm

Enclosure

cc: D. Vaughn-Wright, U.S. EPA (1 copy)
D. Grabka, FDEP (1 copy)
M. Davidson, BRAC PMO SE (electronic copy)
S. Martin, NAVFAC Atlantic (electronic copy)
M. Halil, CH2MHill (electronic copy)
J. Trepanowski, Tetra Tech NUS
S. Currie, Tetra Tech NUS File JM09 (1 copy unbound)

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

CONTRACT NUMBER N62470-08-D-1001

Third Five-Year Review Report

Naval Air Station Cecil Field
Jacksonville, Florida

Contract Task Order JM09

April 2011

BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

TETRA TECH NUS, Inc.

011008/P

FINAL
THIRD FIVE-YEAR REVIEW REPORT

FOR

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
BRAC Program Management Office Southeast
4130 Faber Place Drive
North Charleston, South Carolina, 29405

Submitted by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

CONTRACT NUMBER N62470-08-D-1001
CONTRACT TASK ORDER JM09

APRIL 2011

PREPARED UNDER THE DIRECTION OF:

ROBERT F. SIMCIK, P.E.
PROJECT MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH NUS, INC.
KING OF PRUSSIA, PENNSYLVANIA

CERTIFICATION OF TECHNICAL
DATA CONFORMITY

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. N62470-08-D-1001 are complete and accurate and comply with all requirements of this contract.

DATE: 4/7/2011

COMPANY CERTIFICATION AUTHORIZATION NUMBER: 7988
Tetra Tech NUS, Inc.
661 Andersen Drive
Pittsburgh, PA 15220

NAME AND TITLE OF CERTIFYING OFFICIAL: Robert F. Simcik, P.E.
Task Order Manager

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name ***(from WasteLAN)*****: Naval Air Station Cecil Field**		
EPA ID ***(from WasteLAN)*****: FL5170022474**		
Region: 4	**State: FL**	**City/County: Jacksonville/Duval and Clay**
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☒ Other (specify) – partial NPL deletion on 21 May 2003		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs?* ☒ YES ☐ NO	**Construction completion date:** 08/26/2009	
Has site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency -- United States Navy		
Author name: Mark Davidson		
Author title: BRAC Environmental Coordinator	**Author affiliation: BRAC Program Management Office SE**	
Review period**: 07/01/ 2004 to 06/30/2009 **		
Date(s) of site inspection: 06/2009		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐NPL-Removal only ☐Non-NPL Remedial Action Site ☐NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify) Interim ROD signature for OU 7, Site 16		
Triggering action date ***(from WasteLAN)*****:** 09/22/2005		
Due date ***(five years after triggering action date)*****:** 09/22/2010***		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.] – Additional review information was included for OU 1, Sites 1 and 2, and OU 5, Site 15, after the identified period to resolve questions raised during review of the draft submission.
*** Date identified is five years after the Second five-Year Review Report signature.

Five-Year Review Summary Form, cont'd.

Issues:

As of the time of this five-year review, the Navy is still conducting activities at sites that have contaminant concentrations greater than action levels. Properties that were transferred with contaminant concentrations greater than action levels were transferred with LUCs in place such that the contaminants did not pose an unacceptable risk to human health of the environment. The remedial actions being conducted at these sites have been reviewed and are being properly implemented.

Sites with issues that need to be addressed include the following:

- OU 3, Site 8: All cleanup goals were met at OU 3, Site 8 and NFA was determined to be appropriate; therefore, site closeout needs to be completed.

- OU 5, Site 15: Munitions and explosives of concern are potentially present on site; therefore, munitions response actions must be completed before Site 15 can be transferred.

- OU 11, Site 45: It was determined that soil cleanup goals had been met at OU 11, Site 45; therefore, soil sampling may be discontinued.

No other issues were identified during the five-year review.

Recommendations and Follow-Up Actions:

It is recommended that site closeout procedures be completed for OU 3, Site 8, because NFA was approved at the site. At OU 5, Site 15, the BCT will address the concern of munitions onsite. At OU 11, Site 45, soil monitoring will be discontinued on acceptance of this document because soil cleanup goals have been met at the site.

Protectiveness Statement(s):

The remedial actions (long-term groundwater monitoring and operation of AS, AS/VE, and in-situ bioremediation systems) at NAS Cecil Field OUs will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled through implementation of LUCs. Remedial actions for immediate threats of exposure have been implemented at OU 2, Sites 5 and 17; OU 3, Sites 7 and 8; OU 4, Site 10; OU 5, Site 15; OU 6, Site 11; OU 7, Site 16; OU 9, Sites 36, 37, and 59; OU 10, Sites 21 and 25; OU 11, Site 45, and OU 12, Site 32; 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 re-evaluating use of permanent remedies and alternative treatment technologies to the maximum extent practical for each OU.

Other Comments:

The flightline and the surrounding areas were transferred to the JAA in August 1999, September 2000, January 2003, June 2005, June 2007, and April 2010. The City of Jacksonville Economic Development Conveyance (EDC) Parcels were transferred in May 2000, September 2001, January and December 2003, October 2006, and August 2007 and the majority of the City of Jacksonville Parks and Recreation Commission Parcels were transferred in December 1999 and March 2002. The Navy retains ownership of the Site 15, OU5 property, which will be transferred to the City of Jacksonville Parks and Recreation Commission after munitions and explosives of concern (MEC) issues are addressed.

James E. Anderson 4/11/11

James E. Anderson
Director
Base Realignment and Closure
Program Management Office
Southeast

Date

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
AIMD	Aircraft Intermediate Maintenance Department
AOI	Area of Interest
ARAR	Applicable or Relevant and Appropriate Requirement
AS	Air sparging
AST	Aboveground storage tank
BaPEq	Benzo(a)pyrene equivalents
bgs	Below ground surface
BEHP	bis(2-Ethylhexyl) phthalate
BCT	BRAC Cleanup Team
BHC	Benzene hexachloride (also known as hexachlorocyclohexane)
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CA	Contamination Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of concern
CSM	Conceptual Site Model
CTO	Contract Task Order
DCA	Dichloroethane
DCB	Dichlorobenzene
DCE	Dichloroethene
DPT	Direct-Push Technology
DO	Dissolved oxygen
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
EC	Engineering Control
EE/CA	Engineering Evaluation/Cost Analysis
EEG	Ellis Environmental Group
EOD	Explosive Ordnance Disposal
ESD	Explanation of Significant Differences
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection

FFA	Federal Facility Agreement
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
FTMR	Field Task Modification Request
GCTL	Groundwater Cleanup Target Level
GIR	General Information Report
HASP	Health and Safety Plan
HLA	Harding Lawson Associates
IAS	Initial Assessment Study
IBDS	Inorganic Background Data Set
IR	Installation Restoration
IRA	Interim Removal Action
ISCO	In-Situ Chemical Oxidation
JAA	Jacksonville Airport Authority [formerly Jacksonville Port Authority (JPA)]
JETC	Jet Engine Test Cell
LEL	Lower explosive limit
LTM	Long-Term Monitoring
LTMP	Long-Term Monitoring Program
LUC	Land use control
MCL	Maximum Contaminant Level
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
NA	Natural Attenuation
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDI	Non-Destructive Inspection
NFA	No Further Action
NPL	National Priorities List
NPW	Net Present Worth
NTUs	Nephelometric Turbidity Units
O&M	Operation and maintenance
OPS	Operating properly and successfully
ORP	Oxidation-reduction potential
OU	Operable Unit
OVA	Organic vapor analyzer
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl

PCE	Tetrachloroethene
PQL	Practical quantitation limit
PRG	Preliminary Remedial Goal
PSC	Potential Source of Contamination
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RAC	Remedial Action Contractor
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDCP	Remedial Design and Closure Plan
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
ROI	Radius of influence
SAR	Sampling and Analysis Report
SCRAEEG	South Carolina Research Authority Environmental Enterprise Group
SCTL	Soil Cleanup Target Level
SFF	South Fuel Farm
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TBC	To Be Considered Criterion
TCA	Trichloroethane
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TCG	Target cleanup goal
TOC	Total organic carbon
TOR	Top of rock
TRPH	Total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper confidence limit
U.S. EPA	United States Environmental Protection Agency
UST	Underground storage tank
UXO	Unexploded ordnance

VE	Vapor extraction
VOC	Volatile organic compound

EXECUTIVE SUMMARY

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 completed through removal or treatment of contaminated media at: OU 2, Sites 5 and 17; OU 3, Site 8; OU 4, Site 10; OU 5, Site 15; OU 6, Site 11; OU 7, Site 16; OU 8, Site 3; OU 9, Sites 36, 37, and 59; OU 10, Sites 21 and 25; OU 11, Site 45; and OU 12, Site 32. 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 programs for most of the OUs provides a degree of protection of human health and the environment. Implementation of the LUCs will also provide a significant degree of protectiveness of human health and the environment until completion of the remedies is achieved to provide full protectiveness. Upon completion of the ongoing remedial actions (monitoring and operation of the AS, AS/VE, and in-situ bioremediation systems; and groundwater monitoring programs), the remedies are expected to be protective of human health and the environment. The following is a list of the sites that have been investigated at NAS Cecil Field, along with the recommendations made for each site, and a statement of the protectiveness of the remedy in place.

OU 1, Sites 1 and 2: Sediment and surface water samples are currently collected on an annual basis at three locations. Sediment toxicity, groundwater, and sediment and surface water samples are collected at eleven locations on a five-year basis. This Five-Year Review does not recommend any changes to the long-term monitoring program because the current program is being implemented as designed, provides effective containment of the wastes in the landfills, and includes measures that will prevent exposure.

OU 2, Site 5: Site 5 is currently being sampled annually at six wells. This Five-Year Review recommends that the current long-term monitoring plan at Site 5 be continued. The current remedy in place (monitored natural attenuation) continues to be effective in reducing concentrations of contaminants in groundwater, and the implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 2, Site 17: The remedy in place at Site 17 is monitored natural attenuation. This Five-Year Review does not recommend any changes to the current monitoring program, as the plan is being implemented as designed and results indicate progress in achieving cleanup goals. Natural attenuation continues to be effective in reducing concentrations of contaminants in groundwater, and the implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 3, Site 7: No further action (NFA) is required at Site 7 per the Final Remedial Action Completion Report, accepted by U.S. EPA on September 24, 2003 and FDEP on December 15, 2003.

OU 3, Site 8: Four wells at Site 8 were being sampled annually for natural attenuation monitoring, and two intermediate downgradient wells were being sampled every 5 years. Sampling was discontinued at the site after the July 2008 annual sampling event of the four wells, and after the June 2009 sampling of the two intermediate downgradient wells, because no COCs have exceeded GCTLs since 2006. A Final Remedial Action Completion Report is being prepared, and this Five-Year Review recommends NFA for the site. Natural attenuation results indicate that cleanup goals have been met.

OU 4, Site 10: NFA is required at Site 10 per the Final Remedial Action Completion Report, accepted by FDEP on May 15, 2000, and U.S. EPA on June 5, 2000.

OU 5, Site 14: NFA is required at Site 14, because it was the remedy selected in the ROD. The ROD was accepted October 7, 1998.

OU 5, Site 15: A total of 11,799 yd^3 of soil and a significant amount of munitions debris (MD) and munitions and explosives of concern (MEC) have been removed from Site 15. Soil excavation and disposal eliminated unacceptable risks from exposure to soil, and implementation of LUCs for low-intensity recreational use provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Post-excavation groundwater sampling identified that groundwater was not impacted by soil removal activities. MEC that remains onsite are being investigation and will be addressed prior to property transfer.

OU 5, Site 49: NFA is required at Site 49, because it was the remedy selected in the ROD. The ROD was accepted January 18, 2007.

OU 6, Site 11: NFA is required at Site 11 per the Final Remedial Action Completion Report, accepted by U.S. EPA on July 1, 2003 and FDEP on August 26, 2003.

OU 7, Site 16: Sampling is currently being conducted semi-annually at 17 wells at the site, with one deep well being sampled every 5 years. An air sparging (AS)/ vapor extraction (VE) system is also in place at the site. This Five-Year Review does not recommend any changes to the monitoring program at the site or the use of the AS/VE system, because the results indicate progress in achieving cleanup goals. AS/VE and natural attenuation continue to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 8, Site 3: Eleven wells and one surface water location are being sampled annually at Site 3, and the AS system at the site has been off-line since May 2003. This Five-Year Review does not recommend any changes to the monitoring program at the site, because the results indicate progress in achieving cleanup goals. AS and natural attenuation continues to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 9, Sites 36 and 37: Forty-nine wells are currently being sampled at the site on a semi-annual basis, and the source area is being sampled quarterly. The AS systems within the hot spots were turned on in 2002, turned off in 2006, and remained off until 2009. This Five-Year Review does not recommend any changes to the monitoring program at the site, because the results indicate progress in achieving cleanup goals. Hot spot AS and natural attenuation continue to make progress toward meeting remediation goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 9, Site 57: Twenty-three wells are currently being sampled at the site on a semi-annual basis. This Five-Year Review does not recommend any changes to the monitoring program at the site, as the results indicate progress in achieving cleanup goals. Natural attenuation continues to make progress toward meeting remediation goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 9, Site 58: Nine wells are currently being sampled annually at the site. This Five-Year Review does not recommend any changes to the monitoring program at the site, as the results indicate progress in achieving cleanup goals. Natural attenuation continues to make progress toward meeting remediation goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 9, Site 59: There are currently 33 wells being sampled on a quarterly basis at Site 59, and the biostimulation recirculation systems were started up in November 2008 and have been on-line since that time with only minor shut-downs for maintenance. Hot spot bioremediation and natural attenuation continue to make progress toward meeting remediation goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 10, Site 21: Four wells are currently being sampled annually at Site 21. This Five-Year Review does not recommend any changes to the monitoring program at the site, as the results indicate progress in achieving cleanup goals. Natural attenuation continues to make progress toward meeting remediation goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 10, Site 25: NFA is required at Site 25 per the Final Remedial Action Completion Report, accepted by U.S. EPA on May 29, 2008 and FDEP on February 3, 2009. Eight groundwater sampling events were conducted from July 2002 to February 2007, and the monitoring program was discontinued after February 2007 because there were two consecutive sampling events with no COC concentrations exceeding GCTLs.

OU 11, Site 45: Currently, two wells are being sampled at Site 45 annually, five wells are being sampled every five-years, and six surface soil samples are being collected every five years. This Five-Year Review does not recommend any changes to the groundwater monitoring program, but it does recommend the discontinuation of soil sampling, based on the results that indicate that the soil poses no future risk of migration of contaminants to groundwater. This decision is contingent on the approval of this five-year review. Natural attenuation continues to make progress toward meeting remedial goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness.

OU 12, Site 32: Two wells are currently sampled every 5 years at Site 32 to verify that the soil contaminants that remain under the asphalt cap are not leaching to groundwater. This Five-Year Review does not recommend any changes to the monitoring program at the site, because the results continue to verify that migration of soil contaminants to groundwater at unacceptable levels has not occurred. Because of the prevention of exposure provided by the LUCs and the continued maintenance of the asphalt pavement, the Site 32 remedy is protective of human health and the environment.

OU 12, Site 42: NFA is required at Site 42, as it was the remedy selected in the ROD. The ROD was accepted by U.S. EPA on September 26, 2002 and FDEP on January 10, 2003.

OU 12, Site 44: NFA is required at Site 44, as it was the remedy selected in the ROD. The ROD was accepted by U.S. EPA on September 26, 2002 and FDEP on January 10, 2003.

OU 12, Old Golf Course: NFA is required at the Old Golf Course, as it was the remedy selected in the ROD. The ROD was accepted by U.S. EPA on September 26, 2002 and FDEP on January 10, 2003.

This third 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 the status of the sites to utilize permanent remedies and alternative treatment technologies, and to optimize monitoring programs to the maximum extent practical for each OU.

1.0 INTRODUCTION

1.1 INTRODUCTION

The purpose of five-year reviews is to determine whether the remedies at the (Operable Units) OUs are protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in Five-Year Review Reports. In addition, the Five-Year Review Report identifies issues found during the review, if any, and identifies recommendations to address them.

The United States Environmental Protection Agency (U.S. EPA) is responsible for implementing statutory five-year reviews pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

> "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than every five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the president shall take or require such action. The President shall report to Congress a list of facilities at which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

The Agency interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

For federal facility sites under the jurisdiction, custody, or control of the Department of Defense, Executive Order 12580 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 Naval Air Station (NAS) Cecil Field. As the lead agency, the Navy is responsible for conducting the Five-Year Review, preparing the associated report, and ensuring that recommendations and follow-up actions identified during five-year reviews are completed. The U.S. EPA and the Florida Department of

Environmental Protection (FDEP) are supporting agencies that work with the Navy through the Federal Facility Agreement (FFA). The role of the support agencies is to participate in the review process as requested, and to review the Five-Year Review document. According to the Five-Year Review Guidance document, U. S. EPA retains authority to concur with the lead federal agency's protectiveness determinations to ensure protection of human health and the environment, consistent with U.S EPA's statutory and regulatory authorities, or U. S. EPA may provide independent findings.

This Five-Year Review has been prepared under Contract Task Order (CTO) JM09 as part of the Comprehensive Long-Term Environmental Action Navy (CLEAN) III Contract No N62470-08-D-1001 for the Base Realignment and Closure (BRAC) Program Management Office (PMO) Southeast (SE). Tetra Tech NUS, Inc. (TtNUS) conducted this five-year review of the pending, completed, and ongoing remedial actions implemented at all of the 12 OUs at NAS Cecil Field, located in southwestern Duval County within the limits of the city 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 September 30, 2009, unless otherwise noted in a particular section.

This is the third five-year review for the NAS Cecil Field operable units. The triggering action for the statutory and policy review was the date of the previous, second five-year review for NAS Cecil Field, as shown in the U.S. EPA's WasteLAN database. Because hazardous substances, pollutants, or contaminants remain at the OUs at NAS Cecil Field above levels that allow for unlimited use and unrestricted exposure, a five-year review is required at the following sites:

- OU 1, Sites 1 and 2.
- OU 2, Sites 5 and 17.
- OU 3, Site 8.
- OU 5, Site 15.
- OU 7, Site 16.
- OU 8, Site 3.
- OU 9, Sites 36 and 37, Sites 57, 58, and 59.
- OU 10, Sites 21 and 25.
- OU 11, Site 45.
- OU 12, Site 32.

This five-year review included most of the sites that were discussed in the Second Five-Year Review, with the exception of OU 4, Site 10; OU 3, Site 7; and OU 6, Site 11. A few additional sites were also included in this review that were not in the Second Five-Year Review, because at the time of that review they were

still being investigated, did not have a ROD that identified a selected remedial action, and had not undergone any remedial actions. These sites were: OU 5, Sites 15 and 49; OU 9, Sites 57, 58, and 59; OU 10, Sites 21 and 25; and OU 12, Site 32. This five-year review did not include OU 5, Sites 14 and 49; and OU 12, Sites 42, 44; or the Old Golf Course. This is because five-year reviews are not required when the selected remedial action in the ROD for a site is No Further Action, and when there have been no changes in the site conditions and the factors contributing to the assumptions underlying the No Further Action decision.

This report consists of 12 sections and 3 appendices, as follows:

- 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 11.0 are the five-year reviews for OU 1, OU 2, OU 3, OU 5, OU 7, OU 8, OU 9, OU 10, OU 11, and OU 12, 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 12.0 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 OUs.

- Appendix B contains the Five-Year Review Inspection Checklists.

- Appendix C contains concentration trends for select volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) at Sites 36, 37, and 59.

Administrative Components and Community Involvement

This Five-Year Review consisted of a review of relevant documents, interviews as needed, and site inspections conducted as part of the implementation of the land use controls (LUCs). The Cecil Field BRAC Cleanup Team (BCT), with members as follows, assisted in the preparation of the Five-Year Review:

- Art Sanford, Department of the Navy, BRAC PMO SE Remedial Project Manager.
- David Grabka, FDEP Remedial Project Manager.
- Greg Fraley, U.S. EPA Region 4 Remedial Project Manager.
- Mark Davidson, Department of the Navy, BRAC PMO SE, BRAC Environmental Coordinator.
- Michael Halil, CH2Mhill Project Manager.
- Robert Simcik, TtNUS Task Order Manager.

In addition, an announcement about the review will be provided to the Restoration Advisory Board (RAB), which is composed of concerned citizens and is supported by the BCT. The completed report will be available in the Information Repository located at NAS Cecil Field, Former Memorial Chapel, 6122 New World Avenue, Jacksonville, Florida.

The next five-year-review for NAS Cecil Field is required within 5 years from the date of U.S. EPA approval of this review.

1.2 SITE CHRONOLOGY

A list of important NAS Cecil Field historical events and relevant dates 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 two 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 (AIMD) and jet engine repair	1967
First environmental study for investigation of waste handling and disposal sites	1983 to 1985
Initial Assessment Study (IAS) completed	1985
Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) completed	1988
Placed on the National Priorities List (NPL)	1989

Event	Date
FFA signed	1990
Slated for closure by the BRAC Commission and start of the Environmental Baseline Survey (EBS)	1993
Ceased operations and closed as a result of the BRAC Commission recommendations	1999
First Five-Year Review finalized	August 2000
Second Five-Year Review finalized	September 2005

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 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. An RFI was completed in 1988 by Harding Lawson Associates (HLA). Additional monitoring well installation and analysis of groundwater, surface water, and sediment were completed.

All sites that were found to require investigation and consideration for remedial action have been investigated up to an approved ROD. RODs have been completed and approved for the following sites:

- OU 1, Sites 1 and 2, signed September 19, 1998.
- OU 2, Sites 5 and 17, signed September 27, 1995.
- OU 3, Sites 7 and 8, signed March 3, 1999 and September 2, 1997, respectively.
- OU 4, Site 10, signed September 2, 1997.
- OU 5, Site 14, 15, 49, signed September 14, 1998, September 11, 2008, and August 14, 2006, respectively.
- OU 6, Site 11, signed August 27, 1998.
- OU 7, Site 16, signed July 1, 1996.
- OU 8, Site 3, signed August 27, 1998.
- OU 9, Sites 36 and 37, Sites 57, 58, and 59, signed January 5, 2001, September 1, 2005, and March 12, 2008, respectively.

- OU 10, Site 21and 25, signed September 1, 2005 and September 29, 2004, respectively.

- OU 11, Site 45, signed October 9, 2003.

- OU 12, Site 32, and Sites 42, 44, and Old Golf Course, signed September 29, 2004, July 24, 2002, respectively.

Final amended RODs have been approved for OU 2, Site 5 on January 22, 2000, and OU 7, Site 16 on May 12, 1999. An Explanation of Significant Differences was issued for OU 4, Site 10 on July 12, 1999, and for OU 1, OU 2, OU 3, OU 7, OU 8, and OU 9 on November 24, 2003.

1.3 BACKGROUND

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 ceased operations on September 30, 1999.

Hazardous materials and petroleum products were used and temporarily stored at operation areas throughout NAS Cecil Field, primarily within maintenance complexes and along the flightline. Hazardous materials commonly used included solvents, corrosives, compressed gases, pesticides, paints, and thinners. Releases of hazardous materials and petroleum products to the environment were generally a result of spills and poor housekeeping practices.

1.3.1 Physical Characteristics

The former NAS Cecil Field is located in northeastern Florida, primarily in Duval County, with the southernmost part in Clay County. The former base occupies approximately 17,200 acres consisting of the following three distinct areas:

- The Main Base area, occupying approximately 8,500 acres.
- The Yellow Water Weapons Area, occupying approximately 7,900 acres.
- Jacksonville Heights, occupying approximately 800 acres.

1.3.2 Land and Resource Use

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 (GIR) [ABB Environmental Services, Inc. (ABB-ES), 1996].

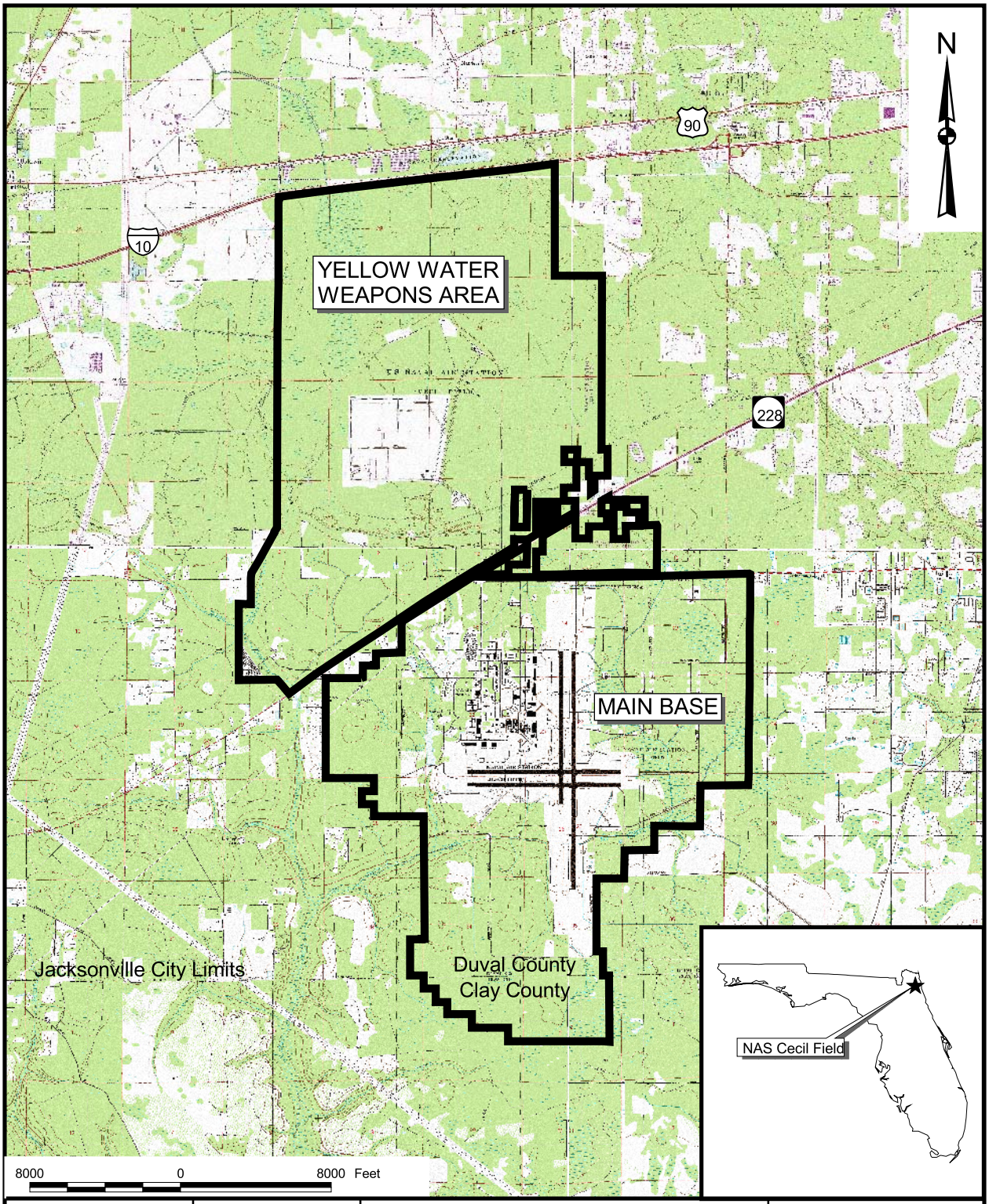
1.4 ARAR AND SITE-SPECIFIC ACTION LEVELS CHANGES

The ARARs identified in each of the RODs were reviewed, as were new federal and state regulations that have been promulgated. Since the second five-year review, new U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) were published in 2009, but these are generally used for screening purposes and not to establish cleanup goals. New Soil Cleanup Target Levels (SCTLs) and Groundwater Cleanup Target Levels (GCTLs) were published in April 2005 by the State of Florida in Florida Administrative Code (F.A.C.) Chapter 62-777. These changes in GCTLs and SCTLs affect several sites at NAS Cecil Field, and are addressed in their respective sections within this report. Changes from the first five-year review to the second five-year review included three differences; the arsenic Maximum Contaminant Level (MCL) for groundwater was changed from 50 µg/L to 10 µg/L effective February 22, 2002 and enforceable on January 23, 2006; new U.S. EPA Region 9 PRGs were published in 2002 are generally used for screening purposes and not to establish cleanup goals; and site-specific action level changes were determined based on the development of an Inorganic Background Data Set (IBDS) at NAS Cecil Field in July 1998.

1.5 ISSUES AND RECOMMENDATIONS SUMMARY

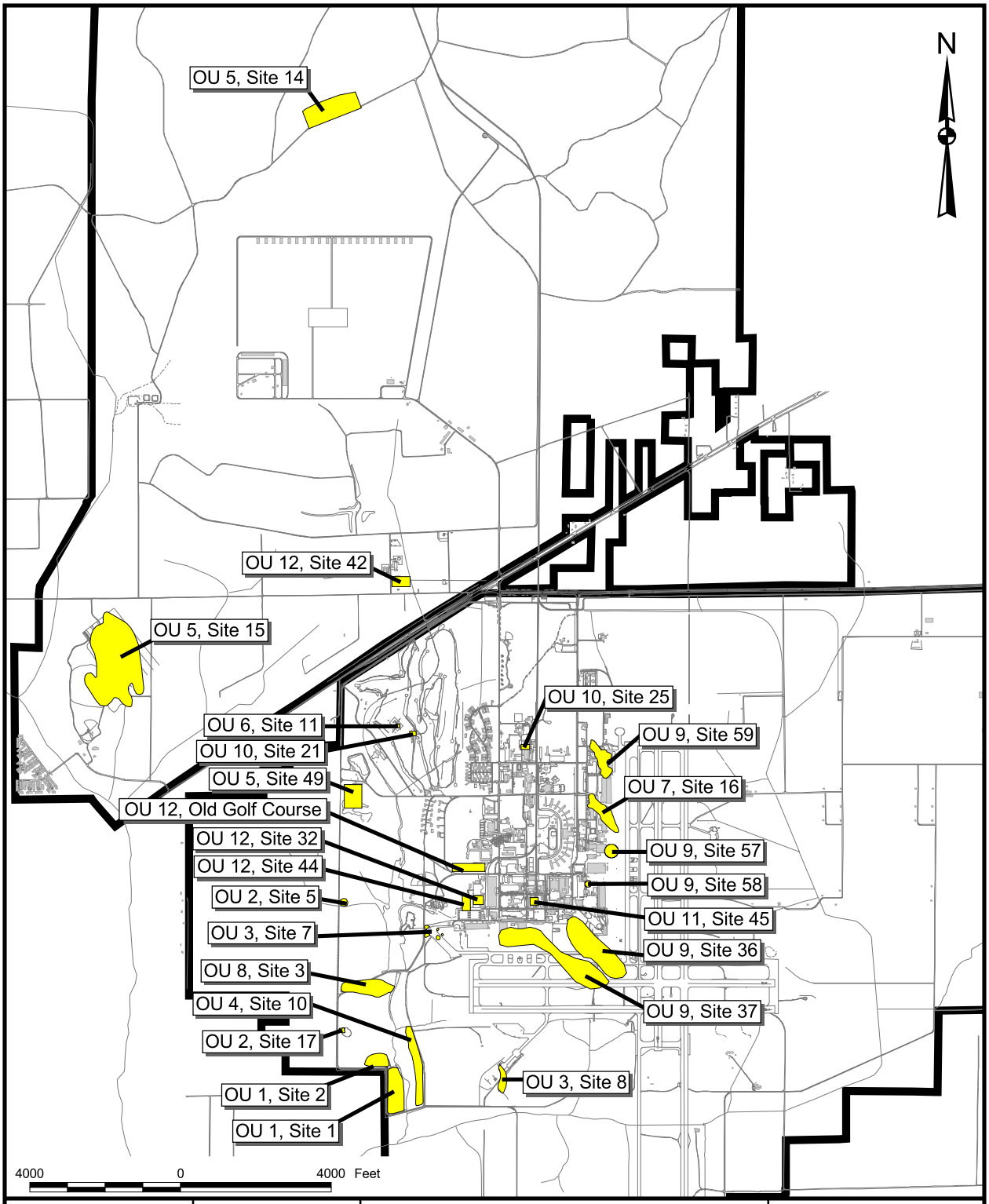
The following table presents the outstanding issues identified in the course of the five-year review and the required actions and milestone dates corresponding with each issue.

Issue	Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Site 8 Closeout	Complete Site Closeout Procedures for Site 8	Navy	U.S. EPA and FDEP	June 30, 2011	No	No
MEC and MD present at Site 15	Address MEC and MD issues to enable property transfer.	Navy	U.S. EPA and FDEP	December 30, 2012	No	No
Soil cleanup goals have been met at Site 45	Discontinue Soil Sampling	Navy	U.S. EPA and FDEP	April 29, 2011	No	No



DRAWN BY MJJ	DATE 09Aug99	GENERAL LOCATION MAP FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0989
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV 0

P:\GIS\CECIL\chapter-01.apr 12Jun015 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 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-2 / REV 0

P:\GIS\CECIL\chapter-01.apr 23Dec09 MJJ Figure 1-2

2.0 OPERABLE UNIT 1, SITES 1 AND 2

2.1 INTRODUCTION

Implementation of the remedial actions at OU 1 began in approximately 1997. This five-year review includes an evaluation of 13 years of data and provides a current status update for OU 1. This review is required by statute because landfill wastes are still contained on site above levels that 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 and the similarity of wastes and disposal practices.

The period of review for OU 1, Sites 1 and 2 was extended past the September 30, 2009 cutoff date because information was obtained that had a significant impact regarding protectiveness at this OU.

2.2 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
Remedial Investigation (RI)I/Feasibility Study (FS) complete	1994
ROD signature	September 1995
Remedial Design and Closure Plan (RDCP) complete	April 1996
Unexploded Ordnance (UXO) Survey	1996 and April 1997
Long-term monitoring program (LTMP) start	May 1997
Radiological survey start	October 1997
Non-Significant Post-ROD Change	November 1997
Rusted drum removal	October 1998
Annual groundwater monitoring/surface water, sediment, and macroinvertebrate sampling/toxicity testing	1997 to present (with modifications)
Debris and rusted drum removal	September 2001
Explanation of Significant Differences (ESD)	October 2003
LUC Remedial Design (RD) accepted	April 2005
Operating Properly and Successfully (OPS) Demonstration	April 2005
Sites 1 and 2 Finding of Suitability to Transfer (FOST)	June 2005

2.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 1. Sites 1 and 2 are in the southwestern portion of the former Main Base near the area where Rowell Creek flows into Sal Taylor Creek. A spring located in the northeastern corner of Site 2 is believed to have been caused by excavation associated with landfilling activities. Figure 2-1 shows 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. Site 1 occupies approximately 9 acres, and Site 2 occupies approximately 5 acres of OU 1.

Land and Resource Use

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 with waste, it was covered with excavated soil. 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.

History of Contamination

Detailed records of wastes placed in the landfill were not maintained. The majority of materials placed in the landfills are believed to have been solid wastes from facility operations and the billeting of troops. Wastes were routinely burned at Site 1 according to historical reports. Waste types at Site 2 are believed to have been similar to those landfilled at Site 1. Sites 1 and 2 were not lined, and both have native soil covers.

Initial Response and Basis for Taking Action

OU 1 was initially investigated in 1983 at the request of the State of Florida. The 1985 base-wide IAS conducted by Envirodyne Engineers, Inc. recommended further investigation of Sites 1 and 2 based on the types of wastes disposed at the sites, the potential for contaminant migration, and the presence of receptors. The RI, FS, and Baseline Risk Assessment (BRA) were finalized in 1994, and the Proposed Plan was finalized in 1995.

The BRA completed for OU 1 identified no risks to human health but did identify possible adverse effects to ecological receptors, including suppression of the benthic macroinvertebrate community and toxicity of sediment, in the Site 2 tributary stream and in Rowell Creek immediately downgradient of its confluence

with the Site 2 tributary. Several ecological chemicals of potential concern were identified, including aluminum, iron, and lead in surface water; and aluminum, cadmium, cyanide, iron, selenium, nickel, mercury, silver, and vanadium in sediment. Although no unacceptable human health risks were identified, physical conditions at the site (e.g., rusting surface debris) were identified as a potential health and safety risk.

2.4 REMEDIAL ACTIONS

2.4.1 Remedy Selection

The ROD for OU 1, Sites 1 and 2 was signed in September 1995. The purpose of remedial action at OU 1 was 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 based on an evaluation of site conditions, risks, and legal requirements.

The following 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, which was determined to provide 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, LUCs, installation of a fence, UXO survey, radiological survey, landfill gas survey, surface debris removal and disposal, and groundwater monitoring.

The following RAOs were identified in the ROD 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 also 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 on two species.

The chemical-specific ARARs (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.

2.4.2 Remedy Implementation

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

- Concrete debris would be left in place.
- The UXO survey would 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. UXO surveys were preformed by Bechtel Environmental, Inc. (site walkover) and the Navy's Mayport Explosive Ordnance Disposal (EOD) Unit (visual observations and magnetometer screening). The Mayport EOD Unit screened landfill gas survey locations with a magnetometer in April 1997 before the start of the long-term monitoring program. The long-term monitoring program, which included landfill gas surveying, groundwater monitoring, sampling and analysis of surface water and sediment, identification of bacteria, sampling of benthic macroinvertebrates, and toxicity testing of sediment began 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-Record of Decision Change for Operable Unit 1, dated November 3, 1997.

LUCs required at OU 1 to ensure protection of human health and the environment were documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit residential, recreational, or agricultural reuse of the sites.
- Prohibit disturbance of the morphological setting of the portion of the Site 2 tributary and Rowell Creek that is aiding in natural attenuation of contamination from the sites.
- Prohibit the disturbance of the landfill cover, adjacent wetlands, and concrete survey monuments.
- Prohibit the excavation of sediments and surface and subsurface soils from the sites.
- Prohibit all uses of the groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

An ESD for multiple sites was finalized in November 2003 that modified the OU 1 ROD to support implementation of the above LUC objectives by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements that went into effect upon finalization of the LUC RD for Sites 1 and 2 in March 2005 were applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the OU 1 property to Jacksonville Airport Authority (JAA) as required by FDEP, and, therefore, have remained applicable since conveyance of the property to JAA in July 2005, and will also apply to any subsequent owners.

2.4.3 System Operations/Operation and Maintenance

2.4.3.1 Long-Term Monitoring Program

Long-term monitoring is being conducted in accordance with the ROD and the OU 1 RDCP and is briefly summarized below. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed. Current sample locations are presented on Figure 2-1.

Surface Water Sampling

The RDCP identified 18 surface water sampling locations for quarterly sampling. Based on the results of the first two quarters of Year 1 sampling (May and September 1997), the number of locations was reduced to 10 for the next two quarters. These samples were analyzed for VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals, and cyanide.

Based on the results of the Year 1 sampling, the monitoring program was revised such that 11 surface water samples were collected annually in April or May from the Site 2 tributary and Rowell Creek. Based on the Year 1 results, the samples were analyzed for selected SVOCs, pesticides, and inorganics that exceeded ecological guidance values in order to identify the cause of the benthic macroinvertebrate community suppression. Then, based on the results of Years 2, 3, and 4 sampling, three surface water samples were collected annually during Years 5 and 6 and analyzed for selected SVOCs, pesticides, and inorganics. Fewer locations were sampled to focus on the sampling locations that had exceedances of ecological guidance values, and to provide upgradient and downgradient sampling locations to monitor the potential migration of contaminants into Rowell Creek. The analytical parameters were decreased to those that exceeded ecological guidelines during the first quarter of the first year of the long-term monitoring program. To provide data for a more comprehensive evaluation as part of the five-year review, Year 7 and 12 sampling events included the same 11 sampling locations and the same sample analyses performed as in Years 2, 3, and 4. Years 8, 9, 10, 11, and 13 annual sampling consisted of collection of surface water samples from three locations only.

Sediment Sampling

The RDCP identified 18 sediment sampling locations for quarterly sampling. Based on the results of the first two quarters of Year 1 sampling (May and September 1997), the number of locations was reduced to 10 for the next two quarters. These samples were analyzed for VOCs, SVOCs, pesticides, PCBs, TAL metals, and cyanide.

Based on the results of the Year 1 samples, the monitoring program was revised such that 11 sediment samples were collected annually in April or May from the same locations as the surface water samples from the Site 2 tributary and Rowell Creek. Based on the Year 1 results, the samples were analyzed for selected VOCs, SVOCs, pesticides, PCBs, inorganics, and polynuclear aromatic hydrocarbons (PAHs) that exceeded ecological guidance values in order to identify the cause of the benthic macroinvertebrate community suppression. Then based on the results of Years 2, 3, and 4 sampling, three sediment samples were collected annually during Years 5 and 6 and analyzed for selected SVOCs, pesticides, and inorganics. Fewer locations were sampled to focus on the sampling locations that had exceedances of ecological guidance values, and to provide upgradient and downgradient sampling locations to monitor the potential migration of contaminants into Rowell Creek. The analytical parameters were decreased to those that exceeded ecological guidelines during the first quarter of the first year of the long-term monitoring program. To provide data for a more comprehensive evaluation as part of the five-year review, Years 7 and 12 sampling events included the same 11 sampling locations and the same analyses performed as in Years 2, 3, and 4. Years 8, 9, 10, 11, and 13 annual sampling consisted of collection of sediment samples from three locations only.

Groundwater Sampling

The RDCP identified 10 wells for semi-annual sampling and analysis for VOCs, SVOCs, pesticides, PCBs, TAL inorganics, cyanide, and Radium-226 and -228. Based on the results of the Year 1 sampling, the number of wells was reduced to one for the April 1999 sampling event, and analyses were reduced to Radium-228 only. Based on the results of the April 1999 sampling, two wells were sampled and analyzed for Radium-226 and -228. In Year 4, radium concentrations in the two wells were less than the criterion, and groundwater sampling was discontinued in Year 5. During Years 7 and 12 sampling events, groundwater was collected and analyzed for Radium-226 and -228 from the two wells sampled in Year 4.

No plume of groundwater contamination was detected at either landfill during the RI; however, groundwater was initially monitored as part of the post-closure activities because rainwater infiltration recharges the groundwater through the landfills, and the groundwater from OU 1 eventually discharges into Rowell Creek.

Landfill Gas Survey

The RDCP identified 35 sample locations for quarterly sampling. The objective of the landfill gas monitoring as part of post-closure activities was to evaluate the combustible gas levels in the landfill as expressed by the lower explosive limit (LEL). The number of locations was decreased during the third and fourth quarterly sampling events based on the recommendations of the second-quarter sampling event because the LEL was less than 10 percent at 31 of the 35 sampling locations. The first annual long-term monitoring report recommended that the landfill gas sampling be continued at two sample locations annually. However, the landfill gas sampling was discontinued after the first year of the long-term monitoring program, in accordance with the criteria in the RDCP, because the LEL was less than 10 percent at all sample locations.

Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate sampling was conducted at 18 locations during the quarterly sampling events of the first year of the long-term monitoring program. The objective of this sampling was to assess the effects of the Site 2 tributary on the biological community of Rowell Creek. The number of locations was decreased during the third and fourth quarterly sampling events based on recommendations approved following the second quarter sampling event. The sampling locations included those at which exceedances of surface water or sediment ecological guidance values were detected, and those which provided upgradient and downgradient sampling locations.

Benthic macroinvertebrate sampling was discontinued after the first year of the long-term monitoring program because the population indices and composition values were too variable among the sample locations to provide useful data. The conclusions of the first-year annual report indicated that the results from the first year of the long-term monitoring program were similar to those from the RI, showing significant variability, with taxa richness generally being greater in Rowell Creek than in the tributary stream.

Sediment Toxicity Testing

This sampling was conducted to assess the effects of the Site 2 tributary on the biological community of Rowell Creek. The RDCP identified 18 sample locations, coincidental with the surface water and sediment sample locations, for toxicity tests on two species. The number of locations was reduced to 11 after the first year to be consistent with the surface water and sediment sampling. Also at that time, toxicity testing was reduced to one species because the results of the analysis with two species were sufficiently similar during the first year that the use of two species was deemed not necessary. *Chironomous tentans*, which was the most sensitive organism, was selected for the remainder of the tests. Based on the results of the toxicity tests for Years 1 through 4, toxicity testing frequency was reduced after Year 4 to every 5 years. During the Year 7 sampling event, samples were collected from 11 locations and tested on one species as in Year 4. During the Year 12 sampling event, samples were collected from 11 locations and tested for toxicity, as in Years 4 and 7. During Year 12 sediment toxicity testing, *Chironomous dilutus* was used rather than *Chironomus tentans*, but the change was in name only, as these larval midges are identical and now being referred to by a different name.

2.4.3.2 Cost

The Navy's original net present worth (NPW) cost estimate for implementation of closure of the landfills was approximately $261,500. The Navy's original NPW cost estimate for implementation of the long-term monitoring program (risk reduction) was approximately $266,400. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $42,000, including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

2.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 1 during the past review period.

The remedies implemented at OU 1 are expected to be protective of human health and the environment upon completion. These remedies will result in closure of the landfills to comply with ARARs and will reduce or eliminate environmental effects associated with physical and chemical conditions in the Site 2 tributary that may affect Rowell Creek.

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 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. In addition to the remedial actions to close the landfills and the long-term monitoring program that is performed to assess the affects of the Site 2 tributary on the biological community of Rowell Creek, the ROD required implementation of LUCs.

The area surrounding OU 1, Sites 1 and 2 was transferred to JAA in 1999; the Navy retained control of OU 1, Sites 1 and 2 after transfer of the surrounding property. Transfer of OU 1, Sites 1 and 2 is planned when it has been determined that the remedial action is operating properly and successfully (OPS). The LUCs will be implemented upon finalization of the LUC RD for OU 1. The goals of the LUCs are to be protective of human health and the environment by:

- Prohibiting residential, recreational, or agricultural reuse of the sites.
- Prohibiting disturbance of the morphological setting of the portion of the Site 2 tributary and Rowell Creek that is aiding in the natural attenuation of contamination from the sites.
- Prohibiting disturbance of the landfill cover, adjacent wetlands, and concrete survey monuments,
- Prohibiting the excavation of sediments and surface and subsurface soils from the sites.
- Prohibiting all uses of groundwater from the surficial aquifer underlying the sites.
- Maintaining the integrity of any existing or future monitoring or remediation system(s).

LUCs designated for Sites 1 and 2 will be required as long as waste remains in place at Sites 1 and 2.

Based on the completed activities and the activities that are underway, the intent and goals of the ROD for OU 1, as modified by the ESD, have been or will be met.

The following recommendations and required actions were developed by the BCT based on the previous five-year review for OU 1:

Previous Recommendation/ Required Action	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program	Annually in April or May	Annually in April or May, 11 annual sampling events to date
Implement Institutional Controls	Upon finalization of the LUC RD	LUC RD accepted and LUCs implemented April 2005

2.6 FIVE-YEAR REVIEW PROCESS

2.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 1, Sites 1 and 2 including the ROD, RDCP, RI/FS, and annual monitoring reports. Four quarterly long-term monitoring sampling events were conducted in 1997 and 1998, and eleven annual sampling events were conducted in April or May 1999 through 2009. Surface water and sediment data (exceedances only) from the last ten annual sampling events (Years 4 through 13) are shown on Figures 2-2 and 2-3, respectively. Results from the last three groundwater sampling events (Years 4, 7, and 12) are presented on Figure 2-4. Data from the first 13 years of the long-term monitoring program indicate that potential OU 1-related ecological impacts continue to be limited to the tributary stream that discharges from Site 2 into Rowell Creek. The upstream portions of this tributary stream (locations RR-01 through RR-04, and RR-07) have consistently been the locations where concentrations of analytes in surface water and sediment have exceeded ecological guidelines. Results from Year 12 sampling showed increases in chemical of concern (COC) concentrations at RR-10, which is also upstream of Sites 1 and 2 but is located in Rowell Creek; however, Year 13 results at RR-10 were all less than ecological guidelines. During the first year of the long-term monitoring program, the majority of exceedances at RR-01 through RR-04 and RR-07 consisted of inorganics in surface water; and inorganics, PAHs, and acetone in sediment. During Years 2 through 13 of the monitoring program, the analytes with exceedances consisted primarily of inorganics in surface water, and inorganics and a few organic compounds in sediment. The results of toxicity testing have continued to indicate that potential OU 1-related ecological impacts are limited to the upstream portions of the tributary stream.

An evaluation of the landfill gas survey and benthic macroinvertebrate sampling was provided in the first-year annual report, as stated above, and these remedial action activities have been discontinued. The landfill gas survey achieved the goals and objectives of the remedial design, with 1 year of LEL results less than 10 percent at the sampling locations. The first year of benthic macroinvertebrate sampling did not provide data that could be interpreted to assess the affects of the Site 2 tributary on the biological community of Rowell Creek, and therefore did not achieve the goals and objectives of the remedial design. Sediment toxicity analysis continued and trend data was obtained. The data was found to provide evidence that sediment toxicity was not adversely impacting benthic macroinvertebrate populations, as discussed in the subsequent section.

Surface Water Sampling

The results of surface water analyses during the RI identified five inorganic parameters that exceeded ecological guidance values: aluminum, cyanide, iron, lead, and manganese. In accordance with the RDCP, Year 1 surface water samples were analyzed for VOCs, SVOCs, pesticides, PCBs, TAL Metals, and cyanide. Based on data evaluation and a recommendation of the Year 1 annual monitoring report, subsequent surface water samples were analyzed only for those parameters that were detected in excess of criteria at least once during the first four quarterly sampling events. These parameters included the following:

- bis(2-Ethlyhexyl) phthalate (BEHP).
- Pesticides including 4,4'-DDT, aldrin, dieldrin, gamma-benzene hexachloride (BHC), and heptachlor.
- Inorganics including aluminum, cadmium, chromium, copper, cyanide, iron, lead, manganese, vanadium, and zinc.

Surface water analytes with concentrations exceeding ecological guidelines during Year 12 sampling were limited to inorganics at 6 of 11 locations sampled. There were no exceedances detected at RR-01, the spring which is the primary source to the tributary stream. Concentrations of iron and manganese exceeded criteria at locations RR-02, RR-03, RR-04, and RR-07 within the tributary streams, and in the duplicate sample taken at location RR-09 at the outlet of the tributary stream to Rowell Creek. Lead also exceeded the guidance criteria at RR-02. The only exceedance in surface water from a sample not collected from the tributary stream was from location RR-10, the location further upstream in Rowell Creek. RR-10 had an exceedance of iron. None of the concentrations of surface water analytes detected in other samples from Rowell Creek exceeded ecological criteria, and the upstream sample (RR-10) is not affected by the Sites 1 and 2 landfills.

Surface water was collected at three locations for Year 13 sampling (RR-10, RR-08, and RR-17). There were no analytes with concentrations exceeding ecological guidelines during Year 13 sampling, including at RR-10 where iron had exceeded ecological guidelines during Year 12. These results indicate that the exceedance at RR-10 may have been anomalous.

Sediment Sampling

The results of the sediment analyses during the RI identified acetone, PAHs, and inorganic parameters as exceeding ecological guidance values. In accordance with the RDCP, Year 1 sediment samples were analyzed for VOCs, SVOCs, pesticides, PCBs, TAL Metals, and cyanide. Based on data evaluation and a recommendation of the Year 1 annual monitoring report, subsequent sediment samples were analyzed only for those parameters that were detected in excess of criteria at least once during the first four quarterly sampling events. These parameters included the following:

- Acetone.
- bis(2-Ethlyhexyl) phthalate.
- PAHs.
- Pesticides including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endrin, chlordane, gamma-chlordane, gamma-BHC, and toxaphene.
- PCBs including Aroclor-1254 and Aroclor-1260.
- Inorganics including arsenic, barium, cadmium, chromium, copper, iron, lead, and zinc.

Sediment analytes with concentrations exceeding ecological guidelines during Year 12 sampling included organics at 3 of 11 locations and inorganics at 3 of 11 locations sampled. Organics detected at concentrations in excess of criteria during Year 12 sampling included the following:

- Acetone at RR-02, RR-03, and RR-07.
- Aroclor-1254 at RR-02.

Inorganics detected at concentrations in excess of criteria during Year 12 sampling included the following:

- Arsenic at RR-02.
- Barium at RR-02, RR-07, and RR-10.
- Iron at RR-02, RR-07, and RR-10.
- Zinc at RR-02 and RR-10.

Concentrations of sediment analytes detected in samples from Rowell Creek downstream of the confluence with the tributary stream did not exceed ecological criteria. The exceedances at RR-10 are most likely not due to influences from the Sites 1 and 2 landfills because it is located upstream from both landfills.

During Year 13, 2010 Annual sampling, there were no sediment analytes with concentrations exceeding ecological guidelines at any of the three locations sampled, including at RR-10, which had exceeded ecological guidelines for iron, barium, and zinc during Year 12. These results indicate that the exceedance at RR-10 may have been anomalous.

Groundwater Sampling

No plume of groundwater contamination was detected at either landfill during the RI. Groundwater analyses from the April 1999 sampling event indicated that concentrations of radium (Radium-226 and Radium-228) were increasing in one well (CEF-001-05S). Based on this increase in the radium activity in CEF-001-05S in April 1999, and because radium was also detected in this well in 1995, a nearby facility background well (CEF-BK-4S) was sampled in November 1999. The radium concentration in CEF-BK-4S also exceeded the regulatory criterion. The concentrations of radium in the background well and in CEF-001-05S decreased during subsequent annual sampling. By Year 4, the concentrations were less than the criterion, and the BCT agreed to discontinue annual groundwater sampling. Based on information in the RI and the conclusions in the Radiological Survey, the radium detected in the groundwater samples is not likely to be the result of activities at OU 1. Year 12 radium results at CEF-BK-4S wells were consistent with previously detected concentrations, and radium results at CEF-001-05S increased from the Year 7 concentrations. In Year 7, the CEF-001-05S sample and duplicate concentrations of combined Radium-226 and -228 were 9.6 pCi/L and 8.9 pCi/L, respectively. In Year 12, combined Radium-226 and -228 results for CEF-001-5S were 10.7 (+/-1.03) pCi/L, exceeding the radium FDEP GCTL of 5 pCi/L. Concentrations of combined radium have exceeded the FDEP groundwater cleanup target level (GCTL) at CEF-001-05S during all sampling events but one, in April 2001. The concentrations do not present a risk to human health or the environment because LUCs in the form of the recorded Deed are in place to prohibit use of groundwater at the site. Combined radium concentrations at CEF-BK-4S have been less than the GCTL since November 1999. Groundwater sampling of these two wells will continue to be conducted every 5 years. Monitoring will continue at this well until total radium concentrations are less than the GCTL for two consecutive monitoring events, at which point the Navy may request discontinuing sampling.

Sediment Toxicity Testing

The results of the sediment toxicity testing during the RI were similar to the results of the first 3 years of the long-term monitoring program. The Year 4 toxicity tests indicated no sediment toxicity at any of the sample locations, and annual toxicity tests were thus discontinued. Year 7 comprehensive sampling included toxicity testing at 11 locations within and downgradient of OU 1, and Year 7 results continued to indicate no OU 1-related impacts to the growth or survival of test organisms. Year 12 comprehensive sampling also included 11 locations within and downgradient of OU 1. The toxicity results indicate that there are no OU 1-related impacts to growth of test organisms, and that the growth and survival rates have not decreased noticeably compared to the control and reference samples in any locations during the Years 4, 7, and 12 events. The last locations to show a decrease in growth and/or survival rates of *chironomus tentans* in Year 3 (April 2000) were all upstream locations in the tributary stream (RR-02, RR-03, RR-04). Downstream samples appear to be unaffected based on these results. Sediment toxicity results are show in Table 2-1. These sediment toxicity results are compared against the decision rules for biomonitoring presented in the RDCP which state that, generally: if biologically suppressed conditions are recovering in the tributary stream and creek, then toxicity testing will continue; if biologically suppressed conditions have recovered in the tributary stream and creek, then sediment toxicity testing will be discontinued; and if biologically suppressed conditions were continuing, then active restoration activities would be conducted. The Year 12 results show that conditions in the Site 2 tributary and Rowell Creek are recovering, and the past three rounds of sediment toxicity data have demonstrated no significant reduction in growth and survival rates. Prior to the fourth five-year review, the BCT will discuss whether or not biologically suppressed conditions in the Site 2 tributary stream and Rowell Creek can be said to have recovered, and, therefore, if sediment toxicity testing can be discontinued at OU 1.

UXO Survey

Bechtel Environmental conducted a UXO Survey in late 1996 and discovered four or five potential UXO items. The Navy's 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, which was removed. No other signs of UXO were noted during the site walkover.

Summary

The review of these documents indicates that the Navy is meeting the requirements of the ROD. Quarterly and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater

reports are adequate for evaluating the concentration trends of COCs at the site. The Navy is routinely re-evaluating the status of the sites to optimize the monitoring for OU1.

The sampling network is providing adequate data to evaluate remedy performance and it is being sampled on a regular basis. Sample locations are at appropriate locations to provide an indication of concentrations within the landfills and impacts downgradient of the landfills (within the Site 2 tributary and Rowell Creek). The annual monitoring frequency for Years 14 through 17 based on recommendations from the first 13 years of monitoring appears to be adequate.

2.6.2 Site Inspection

The site inspection for OU 1 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at OU 1, Sites 1 and 2 included visual observations of the landfill cover, surface water and sediment sampling locations, and groundwater monitoring wells. The landfill cover was wooded/forested, typical of a 30-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. Signs of many wildlife species typical of the area were observed. The inspection identified that the implementation of the remedy and monitoring program were operating as designed and are protective of human health and the environment.

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 in the tributary stream and in Rowell Creek. The sediment in the Site 2 tributary contains the orange flocculent material observed during the previous investigations.

Site visits conducted as part of the long-term monitoring program from 1998 to 2009 included a soil gas survey (Year 1 only), groundwater, surface water, and sediment sampling, and a site walkover. No unusual observations other than previously identified (rusted drums) were documented during these site visits.

The land use for the site has remained unchanged. The site and surrounding property were transferred to JAA per the FOST, dated June 17, 2005. OU 1 is located within a natural and recreational corridor. These plans reflect an anticipated undeveloped land use for OU 1.

Sites 1 and 2 LUC inspections have been completed annually by JAA since the transfer of the property, and no issues were discovered, as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RD. The five-year review field inspection confirmed the LUC compliance.

2.6.3 Interviews

There were no interviews conducted in the course of the five year review.

2.7 TECHNICAL ASSESSMENT

2.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspection indicate that the remedy is functioning as intended by the ROD, as modified by the ESD. 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 prevent 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, and Rowell Creek is not being affected. Continued monitoring of sediment toxicity has shown that the flocculent is not affecting organisms in Rowell Creek, and sampling results from the long-term monitoring program indicated a reduction in unacceptable exposure of ecological receptors to inorganics in sediment and surface water, as specified in the RAOs. The implementation of LUCs also provides a significant degree of protection of human health and the environment to suffice until completion of the remedy is achieved and provides full protectiveness. Based on the completed and ongoing activities, the intent and goals of the ROD for OU 1 have been met for the source control portion of the remedy, and are being met for the risk reduction portion of the remedy.

2.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

2.7.2.1 Changes in Standards and To Be Considered Criteria (TBCs)

Chemical-specific ARARs and site-specific action levels that have changed since the OU 1 ROD was signed are shown in the table below. The ARAR changes are from the promulgation of revised Florida Surface Water Quality Standards (Chapter 62-302, FAC).

SURFACE WATER			
Contaminant	**ARAR**		**Source**
Aluminum	Original	*	--
	Current	13 µg/L	Florida SWCTL

* No numerical cleanup levels were presented in the 1995 ROD.

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. Because the OU 1 risk assessment did not identify any unacceptable human health risks, these regulations do not affect the protectiveness. These new contaminant cleanup target level relies upon health-based risk assessments, and the cleanup target level should remain within the risk range calculated in the risk assessment.

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

2.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the BRA. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them are warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 1, with ecological impacts continuing to be limited to the upstream portions of the Site 2 Tributary.

2.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

2.7.4 Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

2.8 ISSUES

No deficiencies were identified during this five-year review. However, when OU 1, Sites 1 and 2 were transferred to JAA, LUCs as defined in the LUC RD for OU 1 needed to be implemented. These LUCs are designed to ensure protection of human health and the environment. When the Navy transferred the property to JAA, these LUCs, by way of deed restrictions, notices, or other agreements, needed to be, and were adopted. The current and projected future land use at these sites suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

Several discrepancies were identified between the selected remedial action described in the FS, ROD, and RDCP and what was implemented in the remedial action. These discrepancies are not sufficient enough to warrant a finding of not protective for the sites. These discrepancies included the requirement of conducting a 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 (RAC) and one by the Navy EOD Unit Six Detachment, were considered sufficient by the BCT. The BCT required the removal of surface debris of concern, such as drums, but not the removal of construction debris such as concrete.

2.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 1, as no deficiencies were identified during the five-year review.

2.10 PROTECTIVENESS STATEMENT

The remedies implemented at OU 1, including source control, risk reduction, and LUCs, are expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. These remedies will achieve ARARs and reduce or eliminate environmental effects associated with physical and chemical conditions in the Site 2 tributary that may affect Rowell Creek. The source control remedial actions are being implemented as designed, provide effective containment of the wastes in the landfills, and are measures that will prevent exposure. As part of the risk reduction portion of the remedy, the long-term monitoring program has been implemented as designed, and results indicate that potential OU 1-related ecological impacts are limited to the upstream portions of the Site 2 tributary. Toxicity testing of sediment in Rowell Creek has indicated no adverse biological and toxicological effects in the samples near or down stream of the Site 2 tributary outlet. LUCs were implemented by the Navy upon finalization of the LUC RD for OU 1 in March 2005, and in accordance with provisions in the LUC RD, are being continued after transfer of the

OU 1 property to JAA per the FOST dated June 2005. LUCs will be required for OU 1 as long as waste remains in place at Sites 1 and 2. Based on the completed and ongoing remedial activities, the intent and goals of the ROD for OU 1 have been or will be met.

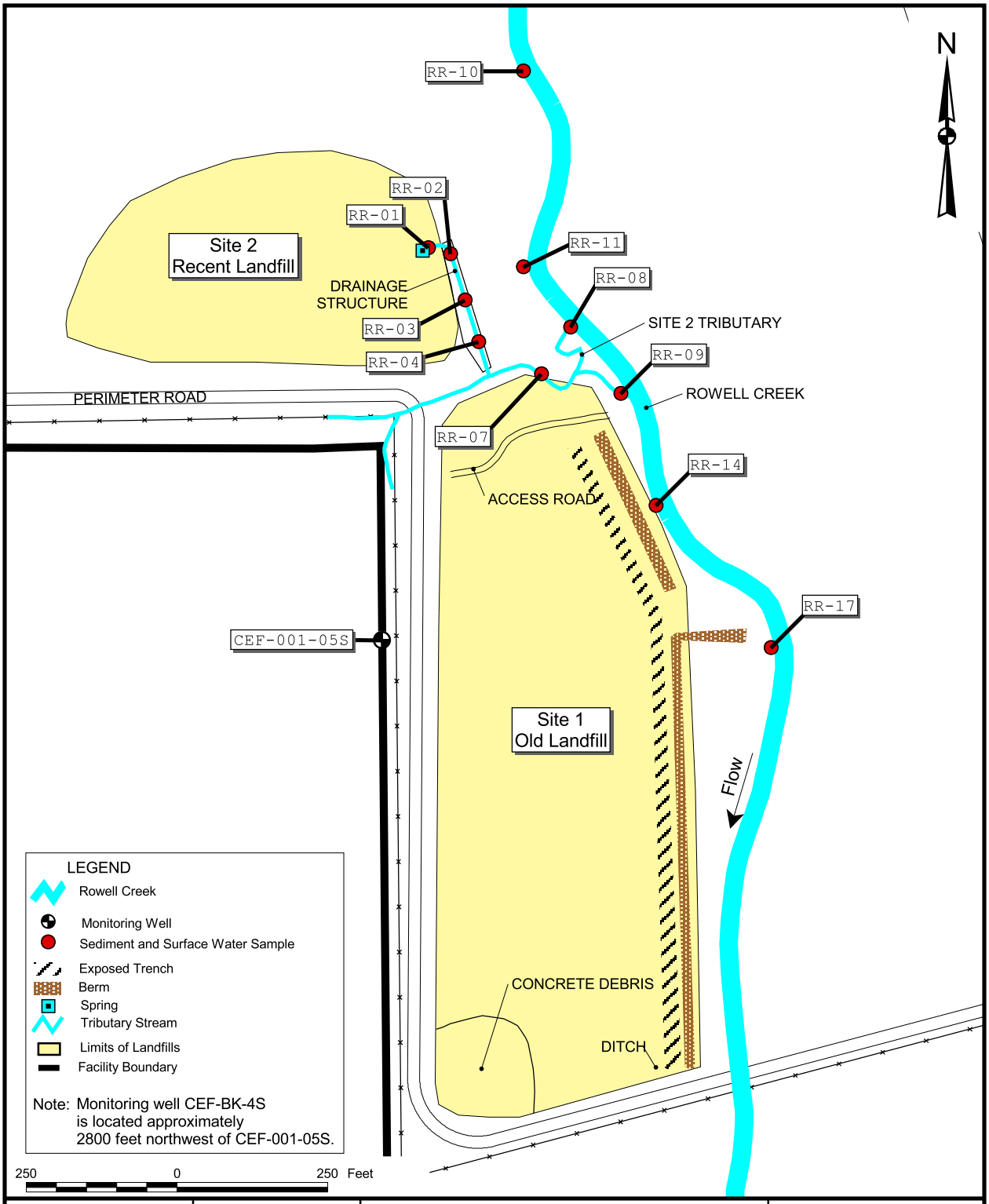
TABLE 2-1

SUMMARY OF 10-DAY SEDIMENT TOXICITY TESTS
OPERABLE UNIT 1, SITES 1 AND 2
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample Location	Survival of Chironomus									Growth of Chironomus								
	Year 1				Year 2	Year 3	Year 4	Year 7	Year 12	Year 1				Year 2	Year 3	Year 4	Year 7	Year 12
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.						1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.					
RR-1	-	-	-	-	-	-	-	-	-	Reduced	Reduced	Reduced	Reduced	-	-	-	-	-
RR-2	-	-	-	-	-	-	-	-	-	Reduced	-	Reduced	Reduced	-	Reduced	-	-	-
RR-3	-	Reduced	-	Reduced	Reduced	Reduced	-	-	-	Reduced	Reduced	Reduced	Reduced	Reduced	-	-	-	-
RR-4	Reduced	-	-	-	-	-	-	-	-	Reduced	Reduced	Reduced	Reduced	-	Reduced	-	-	-
RR-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RR-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RR-9	-	-	-	-	-	-	-	-	-	-	-	-	Reduced	-	-	-	-	-
RR-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RR-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RR-14	-	-	N/A	N/A	-	-	-	-	-	-	-	N/A	N/A	-	-	-	-	-
RR-17	-	-	-	-	-	-	-	-	-	-	-	-	Reduced	-	-	-	-	-

Test species consisted of the midge *Chironomus tentans through Year 7, and Chironomous dilutus in Year 12* .
Survival and growth of test organisms were statistically similar to reference organisms except where noted.

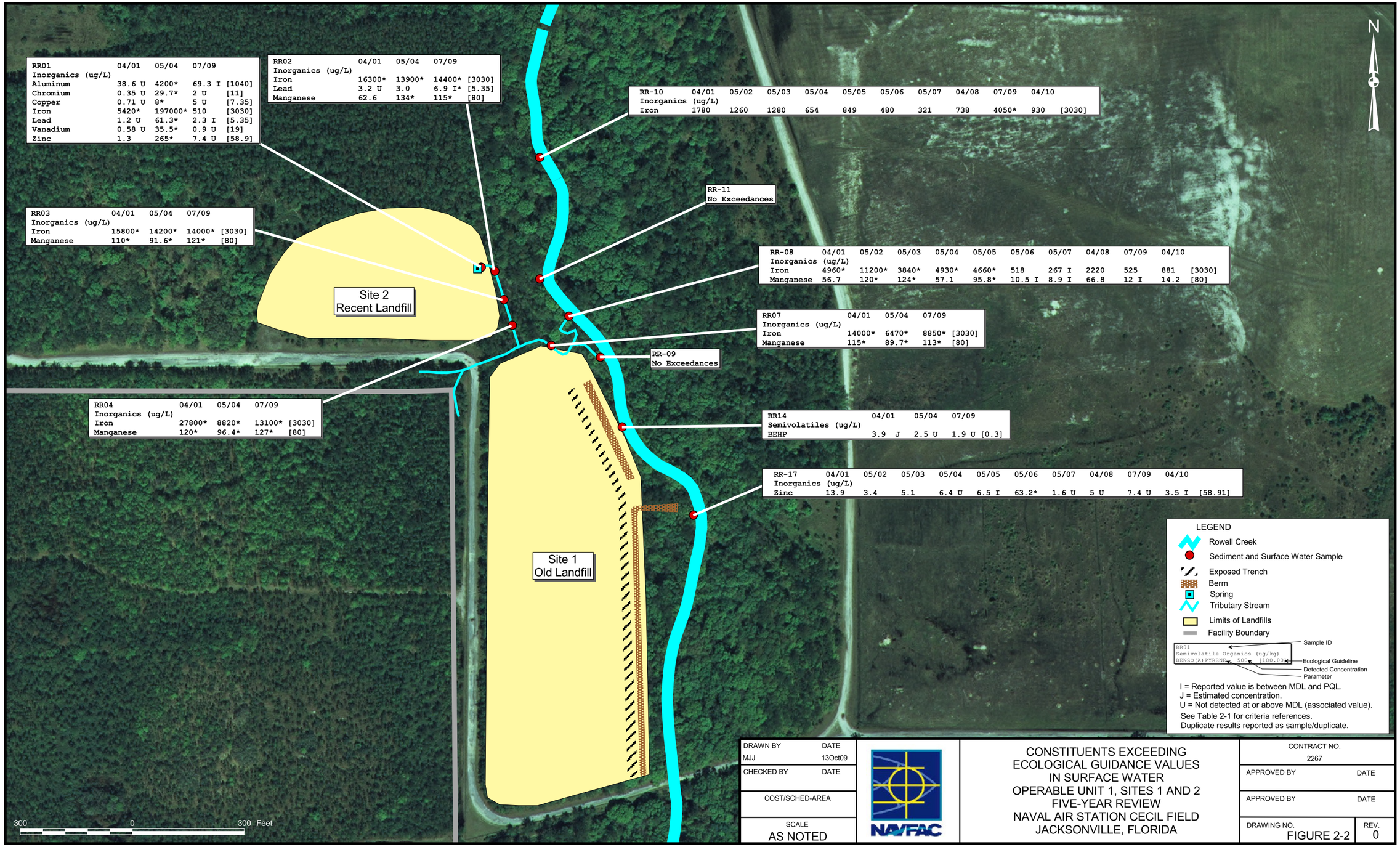
N/A = Not applicable; sampling was not conducted at this location during the third and fourth quarters.
Reduced = Significant reduction compared to reference location (RR-10).



DRAWN BY MJJ	DATE 26Jun01	SAMPLE LOCATION MAP OPERABLE UNIT 1, SITES 1 AND 2 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0989
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

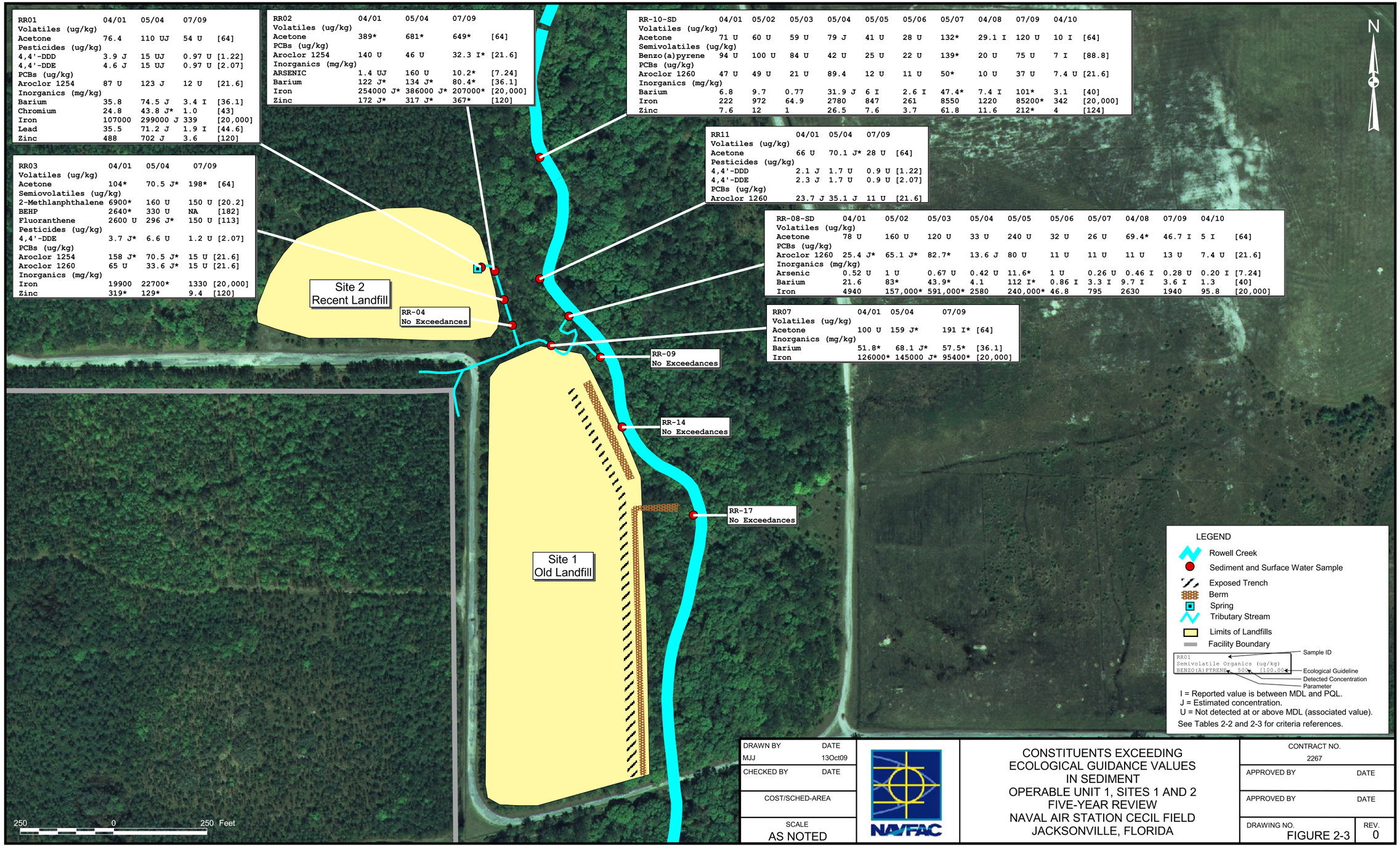
P:\GIS\NAS_CecilField\Chapter-02.apr 20Dec04 MJJ Layout 2-1

site-0102_20091013.apr 17Mar11 2-2 Layout

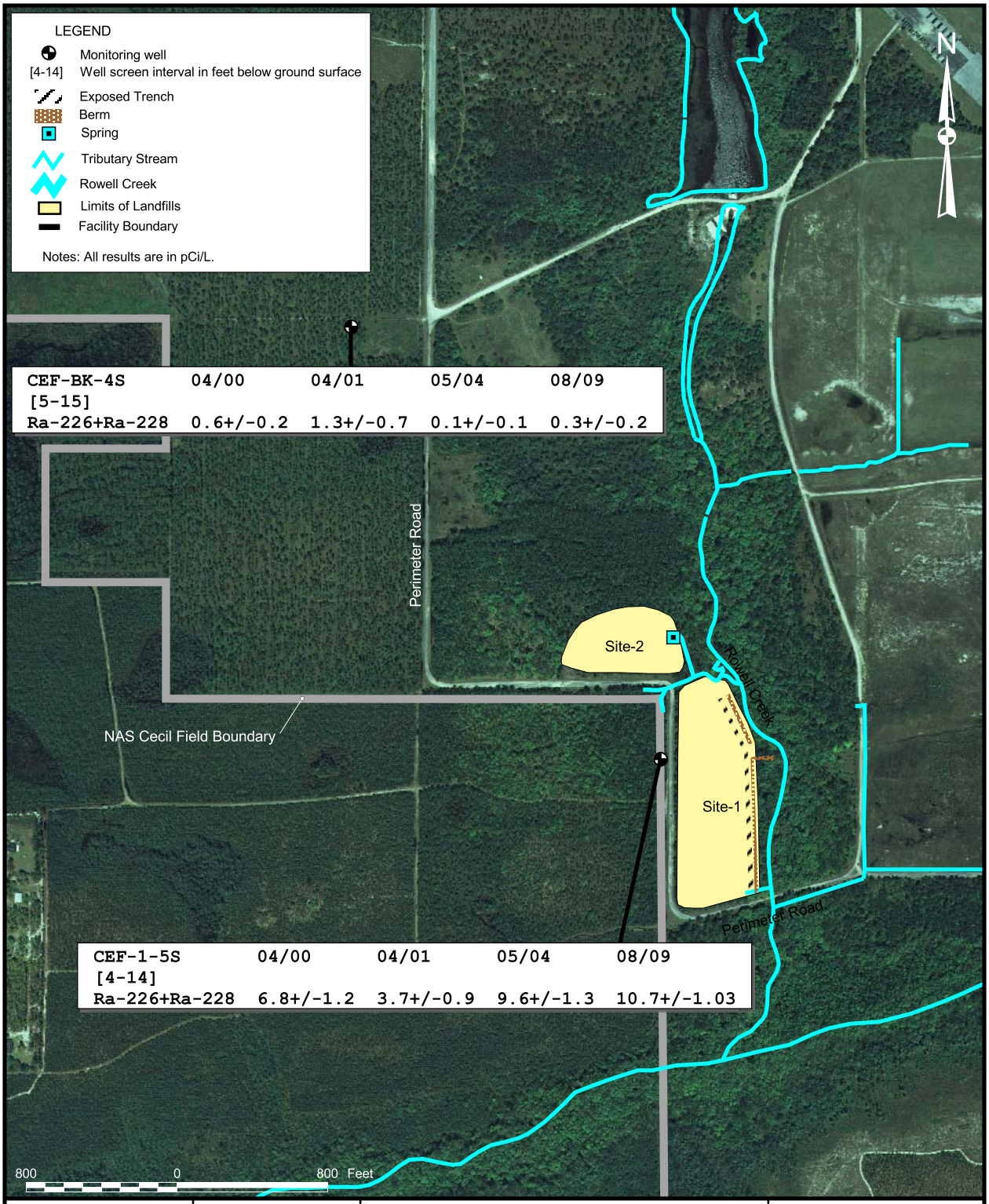


DRAWN BY MJJ	DATE 13Oct09	CONSTITUENTS EXCEEDING ECOLOGICAL GUIDANCE VALUES IN SURFACE WATER OPERABLE UNIT 1, SITES 1 AND 2 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED		NAVFAC	DRAWING NO. FIGURE 2-2 / REV. 0

site-0102_20091013.apr 17Mar11 2-3 Layout



DRAWN BY MJJ	DATE 13Oct09	CONSTITUENTS EXCEEDING ECOLOGICAL GUIDANCE VALUES IN SEDIMENT OPERABLE UNIT 1, SITES 1 AND 2 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED		NAVFAC	DRAWING NO. FIGURE 2-3 / REV. 0



DRAWN BY MJJ	DATE 13Oct09	GROUNDWATER RADIUM SAMPLING DATA OPERABLE UNIT 1, SITES 1 AND 2 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 / REV 0

site-0102_20091013.apr 13Oct09 2-1 Layout

3.0 OPERABLE UNIT 2, SITES 5 AND 17

3.1 INTRODUCTION

Implementation of the remedial actions at OU 2 began in 1995. This five-year review provides a detailed review of the soil and groundwater remedial actions and includes a 15-year period of data for the remedial action for soil and an 11-year period of data for the remedial action for groundwater. This five-year review is being conducted for OU 2, Sites 5 as a statutory review, and for OU 2, Site 17 as a matter of policy until the cleanup levels are achieved, allowing 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 close proximity to each other, and their similarity as waste oil and fuel disposal sites.

3.2 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
RI for soil	1991
Focused FS for soil	1994
Interim ROD for soil signed	September 1994
RI/FS for Groundwater and Sediment	1995
Interim Removal Action for soil – Site 17	January 1995 to October 1995
Interim Removal Action for soil – Site 5	September 1995 to August 1998
ROD for groundwater and sediment signed	September 1995
Site 17 Remedial Design Work Plan	January 1997
Site 5 Sediment Design	May 1997
Site 5 Air Sparging (AS) Pilot Test	November 1997
Site 5 Groundwater Design	May 1998
Semi-annual groundwater monitoring for Sites 5 and 17 began	August 1998
Revised Proposed Plan for groundwater – Site 5	September 1999
Amended ROD – Site 5, including amendments to the Interim ROD (1994) and ROD (1995)	January 2000
ESD from January 2000 Amended ROD	November 2003
Site 17 LUC RD	April 2005

Event	Date
Site 17 FOST	June 17, 2005
Site 5 LUC RD	May 2006
Site 5 OPS Demonstration	May 2006
Site 5 FOST	October 30, 2006

3.3 BACKGROUND

Physical Characteristics

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. Figure 3-1 shows the Site 5 former pit area, Perimeter Road, and the drainage ditch south of the site. Site 5 occupies approximately 0.5 acres, and the disposal pit itself occupies 0.2 acres. Figure 3-2 shows the OU 2, Site 17 former waste disposal pit area and Perimeter Road. The Site 17 disposal pit occupies about 0.4 acres. The entire area of investigation is approximately 3 acres.

Land and Resource Use/History of Contamination

Site 5 operated as an oil disposal area for approximately two decades from the 1950s until the 1970s. The specific sources and quantities of the oil disposed at the site remain unknown. Waste solvents, paints, and strippers may have been mixed with the oil prior to disposal because this was common practice at the time. Petroleum odors and oil-stained soils, some of them void of vegetation, were noted 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, AIMD, squadrons, and the public works department. When disposal activities ceased at the site, the pit was backfilled and covered with native soils.

Initial Response and Basis for Action

The 1985 base-wide IAS conducted by Envirodyne Engineers, Inc. recommended further investigation for Sites 5 and 17 based on the types of wastes disposed at the sites, the potential for contaminant migration, and the presence of receptors. In the 1988 base-wide RFI conducted by HLA, hazardous constituents

were detected in Site 5 samples at concentrations greater than criteria in soil, sediment, and groundwater, and further study was recommended. At Site 17, criteria exceedances were not detected, and no further action was recommended. However, Site 17 was included in the subsequent OU 2 RI/FS Work Plan.

3.4 REMEDIAL ACTIONS

3.4.1 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 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 sediment and groundwater contamination were defined in the ROD for OU 2 and the subsequent Amended ROD for Site 5. The Site 17 remedial action for source control was defined in the Interim ROD, and the remedial actions to reduce the risk from groundwater contamination were defined in the ROD for OU 2.

3.4.1.1 OU 2, Site 5

The Site 5 Interim ROD identified the following 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 (i.e., saturated with free product) soil, and backfilling with the treated soil.

The ROD for OU 2 identified the following 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 greater than drinking water-based ARARs or risk assessment RAOs.

- Protect ecological receptors from exposure to sediment that contains concentrations of PCBs and total recoverable petroleum hydrocarbons (TRPH) greater than guidance concentrations 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 versus 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. Based on this evaluation, the BCT decided to revise the Site 5 groundwater remedial action. The Amended ROD issued in January 2000 identified natural attenuation as the selected remedial action for Site 5 groundwater.

The Amended ROD identified the following RAO to reduce the risk to human health and the environment from contaminated groundwater: Protect humans from exposure from potable water use of groundwater at Site 5 that contains concentrations of VOCs, SVOCs, pesticides, and metals greater than drinking water-based ARARs or risk assessment remedial goal options.

The interim remedial action for contaminated soil was 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 sediment is protective of human health and the environment and complies with the federal and state ARARs. 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.

3.4.1.2 OU 2, Site 17

The Interim ROD identified the following 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 the following 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 greater than drinking water-based ARARs or risk assessment RAOs.

The selected remedy for the contaminated groundwater was natural attenuation.

The interim remedial action for contaminated soil was protective of human health and the environment and complied 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.

3.4.2 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.

3.4.2.1 OU 2, Site 5

Soil

The Final Design and the Remediation Work Plan for contaminated soil were prepared in 1995. The Interim Remedial Action for soil was conducted, and consisted of excavating and treating the contaminated soil on a constructed biological treatment pad, disposing free product and highly contaminated soil (saturated with free product) off-site, and backfilling with the treated soil. In 1995 and 1996, approximately 5,000 cubic yards of contaminated soil were excavated and treated in biopiles; however, this was not successful in reducing TRPH concentrations to acceptable levels. Most of the partially treated soil was returned to the excavation and covered with 2 feet of soil with TRPH concentrations that met the residential criterion, thus allowing residential and industrial uses of the site as long as subsurface soils are not exposed. Soil with TRPH concentrations greater than the site-specific leachability criterion was disposed off site in 1998. Changes in the implementation of the interim remedial action were documented in an Action Memorandum for Soil and Sediment Removal. Figure 3-3 shows the areas of excavation.

The selected remedy for sediment was excavation and biological treatment, and the Site 5 Sediment Design was completed in 1997. However, based on the results of the soil biological treatment, only

excavation was conducted. In May 1998, approximately 330 cubic yards of contaminated sediment in the ditch along the southern side of the site were excavated (Area E in Figure 3-3) and disposed along with excavated soil from within the Site 5 soil excavation. The remedial action was completed based on the Action Memorandum for Soil and Sediment Removal. The Navy's RAC, Bechtel Environmental, Inc., performed the contaminated soil and sediment remedial actions.

Groundwater

A pilot-scale 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 that the groundwater monitoring program should be continued.

Land Use Controls

LUCs required at Site 5 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit agricultural reuse of the site.
- Prohibit excavation, disturbance, or removal of the surface soil cover to a depth of 2 feet below ground surface.
- Prohibit excavation and uncontrolled removal of soils from the site.
- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

An ESD for multiple sites was finalized in November 2003 that modified the Amended ROD for Site 5 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements went into effect upon finalization of the LUC RD for Site 5 in May 2006 and remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 5 property to JEDC as

required by FDEP, and, therefore, have remained applicable since conveyance of the property to the City of Jacksonville per the FOST dated October 2006. Any subsequent owners will also be responsible for maintaining LUCs as long as they are necessary.

3.4.2.2 OU 2, Site 17

The interim remedial action for 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 RAC, Bechtel Environmental, Inc., performed the contaminated soil remedial action.

ABB-ES prepared the Final Remedial Design Work Plan for groundwater in 1997. Quarterly groundwater monitoring events began in April 1997. Semi-annual groundwater monitoring events began in July 1998.

LUCs required at Site 17 to ensure protection of human health and the environment are documented in a LUC RD which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

An ESD for multiple sites was finalized in November 2003 that modified the ROD for Site 17 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements took effect upon finalization of the LUC RD for Site 17 in April 2005 and remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 17 property to JAA, as required by FDEP, and, therefore, have remained applicable since conveyance of the property to JAA in June 2005, and will also apply to any subsequent owners.

3.4.3 System Operations/Operation and Maintenance

The long-term groundwater monitoring programs at Sites 5 and 17 are being conducted in accordance with the RODs and the sampling and analysis plans.

3.4.3.1 OU 2, Site 5

Twenty-two groundwater sampling events have been conducted since August 1998. The first four sampling events were quarterly. Based on the results of the annual report for the quarterly sampling events, semi-annual sampling began with the fifth sampling event. Sampling continued on a semi-annual basis from August 1999 through July 2007. At the September 2008 BCT meeting, the BCT decided that sampling frequency would be changed to annual. Years 11 and 12 (2008 and 2009) were sampled on an annual basis. Monitoring wells within the plume, upgradient of the plume (background), downgradient of the plume, and a well point within the drainage ditch south of the site were sampled and analyzed for select VOCs, select SVOCs, select inorganics, TRPH, and natural attenuation parameters from 1998 through 2003. After January 2003, natural attenuation parameters were discontinued from the LTMP. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

3.4.3.2 OU 2, Site 17

Twenty-four groundwater sampling events have been conducted since April 1997. The first four sampling events were quarterly; the subsequent sampling events were conducted as semi-annual sampling events based on the annual report for the quarterly sampling events. After the first semi-annual Year 11 sampling in July 2007, sampling frequency was adjusted from semi-annual to annual, with the same number of wells being analyzed for the same parameters. 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. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

3.4.3.3 Cost

<u>Site 5</u>

The Navy's original cost estimate for implementation of the Interim Removal Action (IRA) at Site 5 was $1,600,000. The Navy's original cost estimate for the capital and operation and maintenance (O&M) costs of excavation and treatment of the Site 5 contaminated sediment was $236,000. The RAC completed the excavation, treatment, disposal, and backfilling of the soil and sediment for Site 5 for approximately $2,636,000. The increase in actual cost over the estimated cost was because of problems (e.g., significant rainfall) associated with the biopile treatment technology and changes in volume, resulting in changing of the remedial technology to off-site disposal. The Navy's original NPW cost estimate for implementation of AS and institutional controls for the groundwater at Site 5 was approximately $816,000. The Navy's NPW cost estimate for the revised selected alternative of natural attenuation and institutional controls for groundwater was $216,000. The cost for the implementation of the remedy over the five years

encompassed in this five-year review is approximately $41,000, including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

Site 17

The Navy's original cost estimate for implementation of the Interim Removal Action at Site 17 was $1,400,000. The RAC completed the excavation and treatment of soil for Site 17 for approximately $1,946,000. The Navy's original NPW cost estimate for implementation of natural attenuation and institutional controls for the groundwater at Site 17 was approximately $232,000. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $16,500, including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

3.5 PROGRESS SINCE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 2 during the past review period.

> 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 programs provide a degree of protection of human health and the environment, and the implementation of LUCs 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 removal/control were implemented. The soil excavation and treatment or disposal remedies, as measures that would reduce exposure, have been completed at OU 2, were effective, and met the RAOs identified in the ROD. No additional excavation is required at either site.
>
> 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 concentrations of contaminants have decreased since the RI; however, some concentrations still exceed cleanup levels (FDEP GCTLs and IBDS values).
>
> LUCs will be implemented upon finalization of the LUC RDs before the transfer of Site 5 to the City of Jacksonville and the transfer of Site 17 to JAA. 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 OPS 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 at Site 5 and soil excavation and treatment at Site 17) and that are currently in operation (groundwater monitoring at both sites) are operating as designed, and the data indicate progress is evident in meeting the RAOs.

The following recommendations and required actions were developed by the BCT based on the previous five-year review for OU 2:

Previous Recommendation/ Required Action	Completion Date	Current Status
Continue Long-Term Monitoring Program at Sites 5 and 17	Semi-annually, changed to annually at both sites after July 2007 sampling event	Long-term monitoring has been completed semi-annually at both sites from the last five-year review through July 2007, and annually since
Implement LUCs at Sites 5 and 17	May 5, 2006 at Site 5, April 22, 2005 at Site 17	The LUC RDs have been finalized and LUCs are in place at their respective Sites in the form of recorded Deeds.
Prepare Subsurface Soil Monitoring Plan for Site 5	To be determined	This was discussed at various BCT meetings, and it was decided that subsurface soil monitoring is not necessary.

3.6 FIVE-YEAR REVIEW PROCESS

3.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 2, Sites 5 and 17 including the RODs, soil, sediment, and groundwater remedial work plans and designs, soil removal completion reports, and long-term groundwater monitoring reports. Soil and sediment removal actions have been completed at Site 5, and a soil removal action has been completed at Site 17. No further action is required for soils at Site 17, and LUCs are in place for soils at Site 5. The following sections summarize groundwater results for Sites 5 and 17 based on a review of associated documents.

3.6.1.1 OU 2, Site 5 Groundwater Data Review

Twenty-two groundwater sampling events have been conducted since August 1998. Four quarterly monitoring events were conducted during Year 1 between August 1998 and May 1999. The fifth sampling event, conducted in August 1999, began the semi-annual sampling based on the results of the Year 1 annual report and BCT approval. Monitoring frequency was changed to annual upon BCT approval at the September 2008 meeting, and with FDEP and U.S. EPA concurrence. Year 11 and Year 12 monitoring were completed on an annual basis. Monitoring wells within the plume and upgradient and 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. Pesticides were also sampled during the first four quarters of sampling, but were removed from the program with Year 2 sampling. The maximum concentrations of the COCs identified in the RI are shown in Table 3-1.

The quarterly, semi-annual, and annual monitoring reports were provided to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 5 are adequate for evaluating the concentration trends of COCs at the site. The Navy is routinely re-evaluating the status of the site to optimize the monitoring for Site 5.

The monitoring system is providing adequate data to evaluate remedy performance and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source and at downgradient locations. Monitoring of groundwater at the well point within the drainage ditch south of the site provides data to evaluate if the potential exists for adverse surface water impacts.

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, pesticide, and inorganic COCs have decreased significantly since the RI (see Table 3-1). Several COCs (acetone, ethylbenzene, toluene, 2,4-dimethlyphenol, BEHP, alpha-chlordane, beta-BHC, antimony, arsenic, beryllium, cadmium, chromium, and manganese) were not detected in excess of FDEP GCTLs during quarterly monitoring, and consequently were not analyzed for in the semi-annual or annual events. Concentrations of the remaining COCs have remained relatively consistent or have decreased during groundwater monitoring at the site until September 2009, Year 12 sampling. In this, the most recent sampling event, TCE concentrations increased slightly (from 2.5 µg/ to 9.6 µg/) after decreasing from Year 10 to Year 11 (from 54.4 µg/L to 2.5 µg/), and cis-1,2-DCE concentrations increased (from 157 µg/L to 190 µg/L) at CEF-005-LTM01, indicating TCE degradation. 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-005-WP). The well point had one exceedance of vanadium, but the turbidity in the sample was very high. There

were also no exceedances in downgradient well CEF-005-LTM03. Benzene and vanadium concentrations did increase at CEF-005-WP during the September 2009, but they remained within the range of previous detections at upgradient wells during Year 12 sampling. VOCs, SVOCs, TRPH, and vanadium concentrations detected during the last five groundwater monitoring events are shown on Figure 3-5.

The constituents with maximum detected concentrations exceeding their corresponding GCTLs are cis-1,2-DCE, benzene, 4-methylphenol, vinyl chloride, total xylenes, TCE, and naphthalene. TCE concentrations did not exceed the GCTL during the Year 11 event, but the concentration at CEF-005-LTM01 rebounded from 2.5 µg/L to 9.6 µg/L.

Since 1998, a suite of natural attenuation parameters has regularly been analyzed for at the site to determine the extent to which natural attenuation processes (especially biological) are active at the site and impacting contaminant concentrations. The following discussion focuses on selected natural attenuation sampling results for wells located upgradient of the site (CEF-5-7S), within the source area (CEF-005-LTM04), mid-plume (CEF-005-LTM05), and downgradient of the plume (CEF-005-WP).

The trends of concentrations of COCs and geochemical parameters across the site are consistent with anaerobic degradation of organic compounds based on the following conclusions:

- TCE concentrations in the source have been decreasing over time to the point of being not detected in the most recent sampling event.

- Degradation products (cis-1,2-DCE and vinyl chloride) are detected in source and mid-plume samples.

- Concentrations of carbon dioxide, ferrous iron, and methane are significantly greater at the source compared to upgradient; concentrations are lower downgradient.

- Levels of dissolved oxygen (DO), sulfate, and oxidation-reduction potential (ORP) are significantly lower at the source compared to upgradient. ORP and DO are greater downgradient. However, during recent sampling events, the DO concentrations have been greater than 1 mg/L, suggesting a change from anaerobic to aerobic conditions in the source area.

The absence of organic carbon in the mid-plume area may be limiting anaerobic reductive dechlorination. In this area, natural attenuation may be primarily through physical processes such as sorption and dispersion.

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 site. The annual frequency of the monitoring as determined by the BCT appears to be adequate.

3.6.1.2 OU 2, Site 17 Groundwater Data Review

Groundwater monitoring conducted during the RI identified several VOCs (predominantly benzene and TCE), SVOCs, TRPH, and inorganics as COCs. It was determined that the plume was not discharging to a surface water body or any other receptor and was not expected to discharge in the near future at the time of the ROD. The maximum concentrations of the COCs identified in the RI are shown in Table 3-2.

The original sampling plan identified seven monitoring wells for quarterly sampling. Based on the results of the first four quarters, the number of wells was reduced to six in July 1999. Then, based on additional results, the number of wells was reduced to four for the January 2001 event and events that followed.

Twenty-four groundwater sampling events have been conducted at Site 17, beginning in April 1997. Four of the sampling events were quarterly monitoring events during Year 1 conducted from April 1997 to March 1998. The next 18 sampling events were conducted from July 1998 to January 2007 as semi-annual events based on the Year 1 annual report and BCT approval. After the first Year 11 sampling event in July 2007, the BCT determined that sampling frequency would be decreased to annual; thus, Year 12 sampling was the next event, in October 2008, and the most recent event was the Year 13, September 2009 event. Monitoring wells within the plume, upgradient of the plume, and downgradient of the plume were sampled and analyzed for select VOCs, select SVOCs, select inorganics, and natural attenuation parameters.

Quarterly, semi-annual, and annual groundwater reports were provided to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 17 are adequate for evaluating the concentration trends of COCs at the site. The Navy is routinely re-evaluating the status of the site to optimize the monitoring for Site 17.

The monitoring system is providing adequate data to evaluate remedy performance, and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source and at downgradient locations.

The concentrations and numbers of VOCs and SVOCs detected at the site have decreased significantly since the RI. Concentrations of VOCs have decreased since the RI such that benzene and vinyl chloride are the only VOCs which continue to exceed GCTLs. Concentrations of SVOCs have decreased since the RI such that the analyses were discontinued in July 2000. Concentrations of inorganic COCs

(aluminum, arsenic, and vanadium) have decreased significantly since the RI, and these inorganic COCs were no longer analyzed after January 1999. Concentrations of TCE, methylene chloride, and most of the inorganics have decreased to less than FDEP GCTLs. Benzene and manganese were detected at concentrations greater than GCTLs during the September 2009 sampling event. VOC and manganese results from the last five rounds of groundwater monitoring are presented on Figure 3-6.

Although some constituent concentrations have not decreased to levels less than GCTLs, the risks associated with the wells that have exceedances still fall within U.S. EPA's target risk range (10^{-4} to 10^{-6}). The concentrations of manganese in wells CEF-017-LTM-2S and CEF-017-LTM-3S did not exceed the NAS Cecil Field site-specific IBDS value of 150 µg/L during the Year 12 sampling event, which was the first time since the long-term monitoring (LTM) began that there were no manganese exceedances. However, the manganese concentration in well CEF-017-LTM-2S increased to 172 µg/L, exceeding the IBDS value in September 2009.

Since 1997, a suite of natural attenuation parameters has regularly been analyzed to determine the extent to which natural attenuation processes (especially biological) are active at the site and impacting contaminant concentrations. The following discussion focuses on selected natural attenuation sampling results for wells located upgradient of the site (CEF-17-1), within the source area (CEF-017-LTM-2S), within the plume (CEF-017-LTM-3S), and downgradient of the plume (CEF-017-LTM-4S and POC-2S).

The trends of the concentrations of COCs and geochemical parameters through the site are consistent with anaerobic biological activity. ORP measurements are lower at the source, and are slightly greater away from the source, indicating reducing conditions in the source area. Organic COC concentrations have also been decreasing with time.

Manganese concentrations in the source and mid-plume wells have decreased slightly with time. No significant increase in manganese concentrations has been observed in the downgradient wells. The results suggest that there is no manganese migration and that natural processes (primarily dilution) are attenuating the manganese.

3.6.2 Site Inspection

The site inspection for OU 2 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at Sites 5 and 17 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 inspection identified that the implementation of the remedy and monitoring program were operating as designed and are protective of human health and the environment. The site appeared to be well maintained and no tampering with the monitoring wells was observed.

The proposed land use for the sites has remained unchanged. The Navy has transferred Site 5 to the City of Jacksonville per the FOST dated October 30, 2006, and Site 17 to JAA per the FOST dated June 17, 2005. The sites are currently vacant, relatively featureless areas with no residential, commercial, or industrial functions. LUC objectives and use restrictions outlined in the LUC RD were included in the Deed.

Site 5 LUC inspections have been completed annually by JEDC since 2007. The LUC inspections indicate that Site 5 groundwater is not being used, monitoring wells are not being disturbed, the land is not being used for residential use, the land is not being used for agricultural use, the surface soils have not been disturbed, and subsurface soils have not been disturbed.

Site 17 LUC inspections have been completed by JAA since the transfer of the property, and no issues were discovered, as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RD. The five-year review field inspection confirmed the LUC compliance.

3.6.3 Interviews

There were no interviews conducted in the course of the five year review.

3.7 TECHNICAL ASSESSMENT

3.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspection indicate that the remedy is functioning as intended by the ROD, as modified by ROD Amendment and the ESD.

Site 5

The implementation of the source control portion of the remedy was completed in December 1998. The implementation of the long-term groundwater monitoring program is ongoing and indicates that natural attenuation is working at the site. Implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated subsurface soil and groundwater that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil and sediment excavation) and that are currently in operation (long-term groundwater monitoring) are operating as designed, and the data indicate progress toward meeting the RAOs. Based on the completed and ongoing activities, the intent and goals of the ROD for OU2 and the Amended ROD for Site 5 have been for soil and sediment, and are being met for groundwater.

Site 17

The implementation of the source control portion of the remedy was completed in October 1995. The implementation of the long-term groundwater monitoring program is ongoing and indicates that natural attenuation is working at the site. Implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil excavation and treatment) and that are currently in operation (long-term groundwater monitoring) are operating as designed, and the data indicate progress toward meeting the RAOs.

Based on the completed and ongoing activities, the intent and goals of the ROD for OU 2 have been met for soil and are being met for groundwater.

3.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

3.7.2.1 Changes in Standards and TBCs

Chemical-specific ARARs and site-specific action levels that have changed since the 1995 ROD for OU 2 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 revised Florida Surface Water Quality Standards (Chapter 62-302, FAC). The site-specific action level changes are from the development of IBDS values for NAS Cecil Field.

Contaminant	ARAR/Site-Specific Level		Source
GROUNDWATER			
2,4-Dimethylphenol	Previous	700 µg/L	Target Cleanup Level for OU 2
	Previous	400 µg/L	FL Groundwater Guidance Concentrations, Chapter 6 (1994)
	New	140 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (1999)
2-Methylphenol	Previous	1,000 µg/L	Target Cleanup Level for OU 2
	Previous	350 µg/L	FL Groundwater Guidance Concentrations, Chapter 6 (1994)
	New	35 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (2005)
4-Methylphenol	Previous	100 µg/L	Target Cleanup Level for OU 2
	Previous	35 µg/L	FL Groundwater Guidance Concentrations, Chapter 6 (1994)
	New	4 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (2005)
Phenol	Previous	20,000 µg/L	Target Cleanup Level for OU 2
	Previous	10 µg/L	FL Groundwater Guidance Concentrations, Chapter 6 (1994)
	New	10 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (1999)
Aluminum	Previous	36,000 µg/L	Target Cleanup Level for OU 2
	New	13,101 µg/L	NAS Cecil Field IBDS value
Manganese	Previous	100 µg/L	Secondary Drinking Water Standard
	New	150 µg/L	Target Cleanup Level (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 (2005)
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 (2005)
SEDIMENT			
Aroclor	Previous	1 mg/kg	U.S. 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 (1998)

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. The changes for 2,4-dimethylphenol and 2-methylphenol will not affect the site, because they are no longer COCs and are no longer analyzed. The new 4-methylphenol cleanup target level relies 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 soil and sediment have become less stringent since the ROD was signed and do not affect the protectiveness of the remedial action.

New chemical-specific ARARs have also been developed in the revised Florida Surface Water Quality Standards regulations (Chapter 62-302, FAC, 2008), FDEP Approach to the Assessment of Sediment Quality in Florida Coastal Waters (1994), and the U.S. EPA Region 4 Ecological Screening Values (1999). 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 surface water in the drainage ditch south of the site 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.

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

3.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RIs. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies. The remedies are progressing as expected for OU 2.

3.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedies. No other information has been identified that calls into question the protectiveness of the remedies.

3.7.4 Technical Assessment Summary

According to the data reviewed and the site inspection, the remedies at Sites 5 and 17 are functioning as intended by the RODs. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedies. There is no other information that calls into question the protectiveness of the remedies.

3.8 ISSUES

No issues were identified during the five-year review while the Navy owned the property. However, when Site 5 was transferred to the City of Jacksonville and Site 17 was transferred to JAA, LUCs needed to be continued. These LUCs are designed to ensure protection of human health and the environment. When the Navy transferred Sites 5 and 17, these LUCs, by way of deed restrictions, notices, or other agreements, were adopted. The current and future land use at these sites suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

3.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 2, as no deficiencies were identified during the five-year review.

3.10 PROTECTIVENESS STATEMENT

Site 5

The Site 5 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Soil and sediment remedial removal eliminated unacceptable risks from exposure to surface soil and sediment, natural attenuation continues to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Although the original soil and sediment remedial action was not implemented, the remedy in the Amended ROD was

implemented as designed, achieved an equivalent level of protection, and attained RAOs. The natural attenuation and associated groundwater monitoring program was implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in May 2006, and in accordance with the LUC RD, are being continued after transfer of Site 5 to the City of Jacksonville per the FOST dated October 2006. LUCs will be required until soil and groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Subsurface soil monitoring may be required to document reductions in subsurface soil concentrations at the site. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on the remedial activities that have been completed (soil and sediment excavation) and that are ongoing (natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 5 have been or will be met.

Site 17

The Site 17 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Soil treatment eliminated unacceptable risks from exposure to soil, natural attenuation continues to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Soil ex-situ treatment was implemented as designed and achieved RAOs. The natural attenuation and associated groundwater monitoring program was implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in April 2005, and in accordance with the LUC RD, are being continued after transfer of Site 17 to JAA per the FOST dated June 2005. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Subsurface soil monitoring would be required to document reductions in subsurface soil concentrations at the site. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on the remedial activities that have been completed (soil treatment) and that are ongoing (natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 17 have been or will be met.

TABLE 3-1

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 2, SITE 5
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Contaminant of Concern	Current Regulatory Criteria			Remedial Investigation		January 2004		September 2009	
	FDEP GCTL	U.S. EPA MCL	IBDS Value	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (µg/L)									
Acetone[1]	700	NC	NC	14 / 28	1,100	NA	-	NA	-
Benzene	1	5	NC	3 / 28	16	2 / 7	0.87 J	5 / 6	4.6
Trichloroethene	3	5	NC	3 / 9[2]	4.3	5 / 7	32.2	2 / 6	9.6
1,1-Dichloroethene[3]	7	7	NC	0 / 28	-	0 / 7	-	ND	-
cis-1,2-Dicholroethene[3]	70	70	NC	0 / 28	-	5 / 7	232	5 / 6	190
trans-1,2-Dichloroethene[3]	100	100	NC	0 / 28	-	0 / 7	-	ND	-
Ethylbenzene[1]	30	700	NC	5 / 28	41	NA	-	NA	-
Toluene[1]	40	1,000	NC	9 / 28	180	NA	-	NA	-
Total Xylenes	20	10,000	NC	8 / 28	200	5 / 7	17.3	4 / 6	22.2
Vinyl chloride[3]	1	2	NC	0 / 28	-	1 / 7	20.9	2 / 6	2.0
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)									
4-Methylphenol	35[4]	NC	NC	4 / 28	820 J	1 / 7	13	1 / 2	10.2
bis(2-Ethylhexyl) phthalate[1]	6	6	NC	4 / 28	130 J	NA	-	NA	-
Naphthalene	20	NC	NC	4 / 28	270	5 / 7	30.4	2 / 2	35.2
2,4-Dimethylphenol[1]	140	NC	NC	4 / 28	110	NA	-	NA	-
1-Methylnaphthalene[3]	20	NC	NC	0 / 28	-	5 / 7	22.3	1 / 2	19.1
2-Methylnaphthalene[3]	20	NC	NC	5 / 28	120	5 / 7	28.8	1 / 2	21.7
PESTICIDES (µg/L)									
alpha-Chlordane[1]	2[5]	2[5]	NC	1 / 28	0.15	NA	-	NA	-
beta-BHC[1]	0.02	NC	NC	2 / 28	0.18	NA	-	NA	-
METALS (µg/L)									
Antimony[1]	6	6	44.5	2 / 28	29.4 J	NA	-	NA	-
Arsenic[1]	50	50	7.1	21 / 28	79 J	NA	-	NA	-
Beryllium[1]	4	4	3.5	4 / 28	12.5	NA	-	NA	-
Cadmium[1]	5	5	6	4 / 28	5.9	NA	-	NA	-
Chromium[1]	100	100	18	27 / 28	583 J	NA	-	NA	-
Manganese[1]	50	NC	150	23 / 28	263	NA	-	NA	-
Vanadium	49	NC	20.2	27 / 28	489	NA	-	4 / 4	101
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)									
TRPH	5	NC	NC	5 / 28	21 J	2 / 4	3.52	NA	-

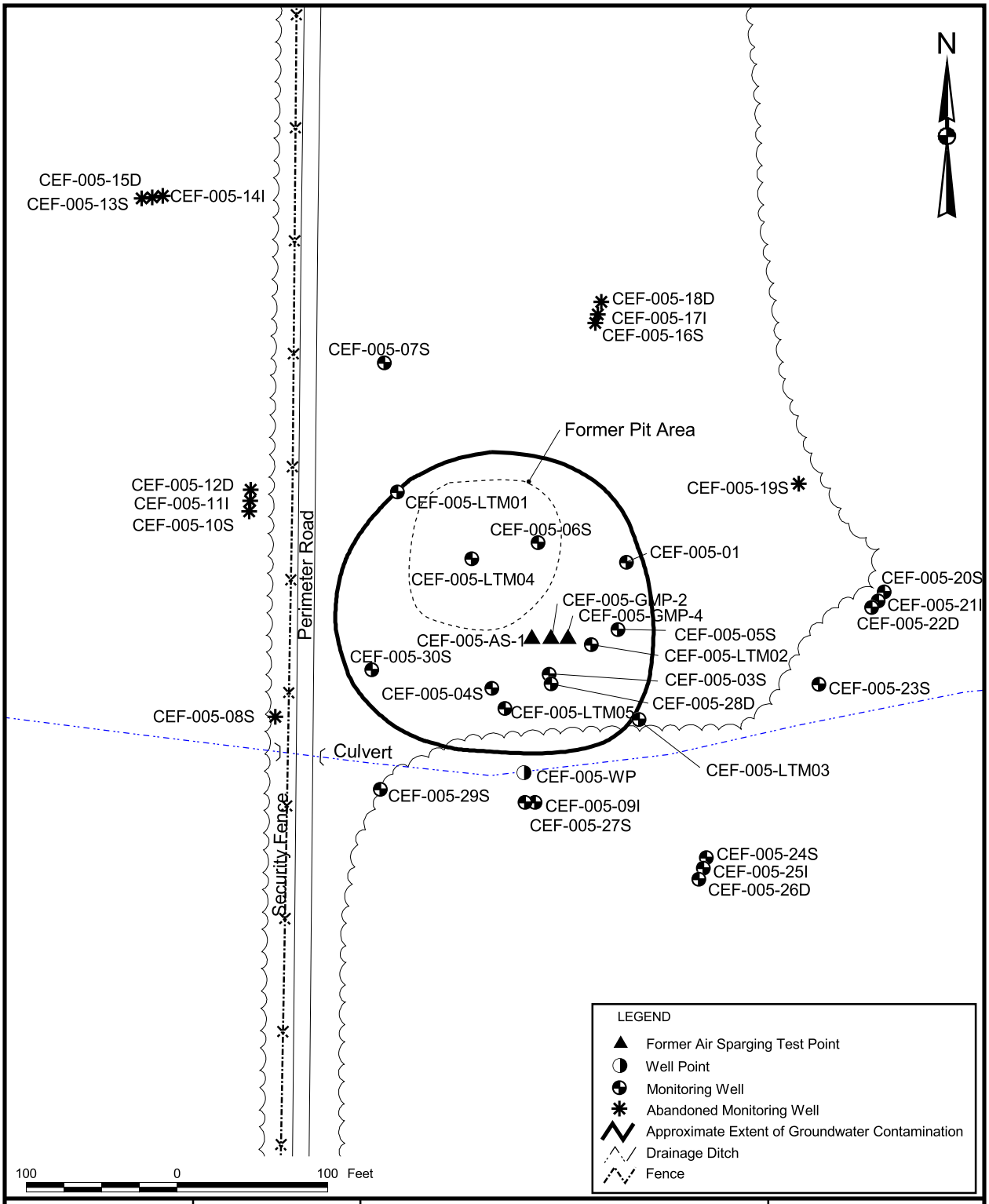
1 Deleted from the list of chemicals of concern based on long-term monitoring results.
2 Trichloroethene was detected in the air sparging pilot-scale test but not during the RI.
3 Criterion is for 3- & 4-methylphenol.
4 Added to long-term monitoring program after Year 1.
5 Criterion is for total chlordane.
FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level.
U.S. EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
IBDS = NAS Cecil Field site-specific Inorganic Background Data Set.
NA = Not analyzed.
NC = No criterion.
ND = Not Detected.
J = Estimated concentration.

TABLE 3-2

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 2, SITE 17
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Contaminant of Concern	Current Regulatory Criteria			Remedial Investigation		January 2004		September 2009	
	FDEP GCTL	U.S. EPA MCL	IBDS Value	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (µg/L)									
Benzene	1	5	NC	7 / 33	170	3 / 4	6.1	2 / 4	6.3
Methylene chloride	5	NC	NC	24 / 33	24,000	NA	-	NA	-
Trichloroethene	3	5	NC	6 / 33	140	NA	-	NA	-
Vinyl chloride[(1)]	1	2	NC	2 / 21	3	2 / 4	2.4	1/ 4	0.49
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)									
4-Methylphenol	35[(2)]	NC	NC	4 / 12	19,000	NA	-	NA	-
2,4-Dimethylphenol	140	NC	NC	4 / 12	3,750	NA	-	NA	-
2-Methylphenol	35	NC	NC	4 / 12	22,000	NA	-	NA	-
Phenol	10	NC	NC	4 / 12	5,550	NA	-	NA	-
METALS (µg/L)									
Aluminum	200	NC	13,100	6 / 12	201,000	NA	-	NA	-
Arsenic	50	50	7.1	6 / 12	22.3	NA	-	NA	-
Manganese	50	NC	150	8 / 12	5,660	4 / 4	292	3 / 4	172
Vanadium	49	NC	20.2	7 / 12	169	NA	-	NA	-

1 Vinyl chloride was added to the list of COCs in January 1998 after it was detected in two consecutive sampling events.
2 Criterion is for 3- & 4-methylphenol.
FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level.
U.S. EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
IBDS = NAS Cecil Field site-specific Inorganic Background Data Set.
NA = Not analyzed.
NC = No criterion.
J = Estimated concentration.



DRAWN BY MJJ	DATE 23Dec04	SITE LOCATION MAP OPERABLE UNIT 2, SITE 5 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0989
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-1 / REV 0

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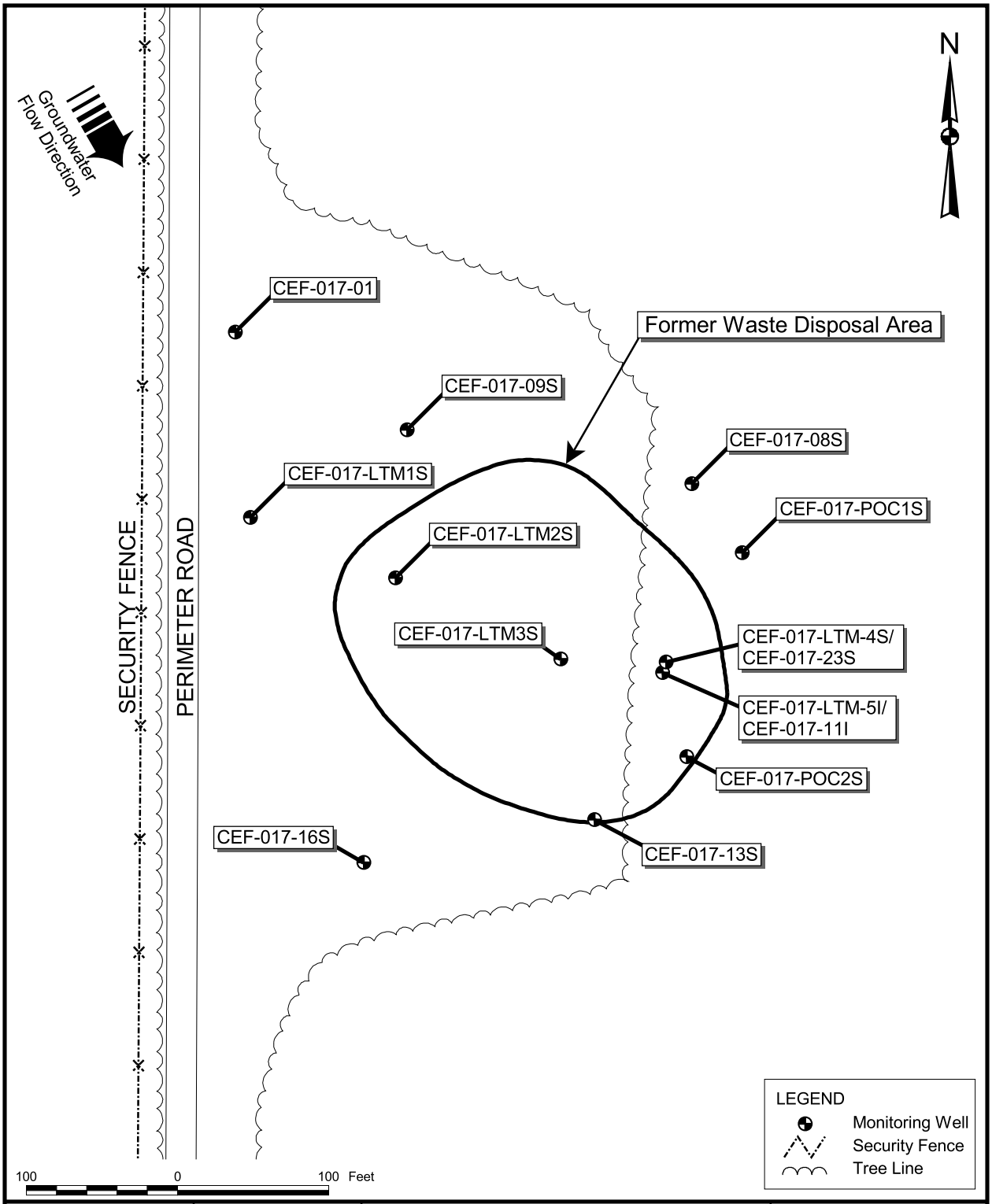

DRAWN BY MJJ	DATE 23Dec04	SITE LOCATION MAP OPERABLE UNIT 2, SITE 17 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0989
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-2 / REV 0

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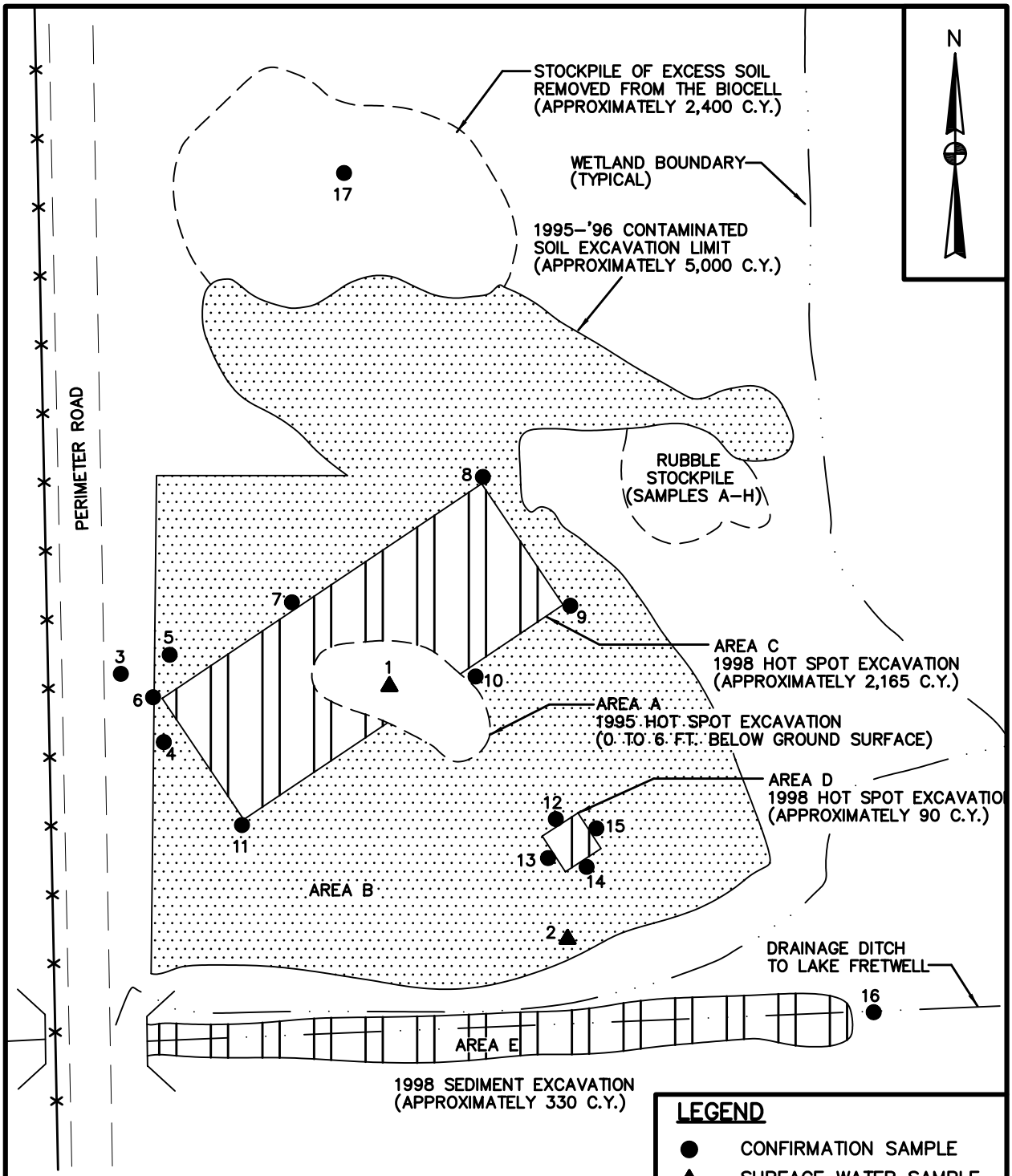

REFERENCE: BECHTEL, 1999. PROJECT COMPLETION REPORT FOR SITE 5, FIGURE 2–1.

DRAWN BY DM	DATE 5/27/05	AREAS OF EXCAVATION FOR INTERIM REMOVAL ACTION OPERABLE UNIT 2, SITE 5 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 3-3 / REV. 0

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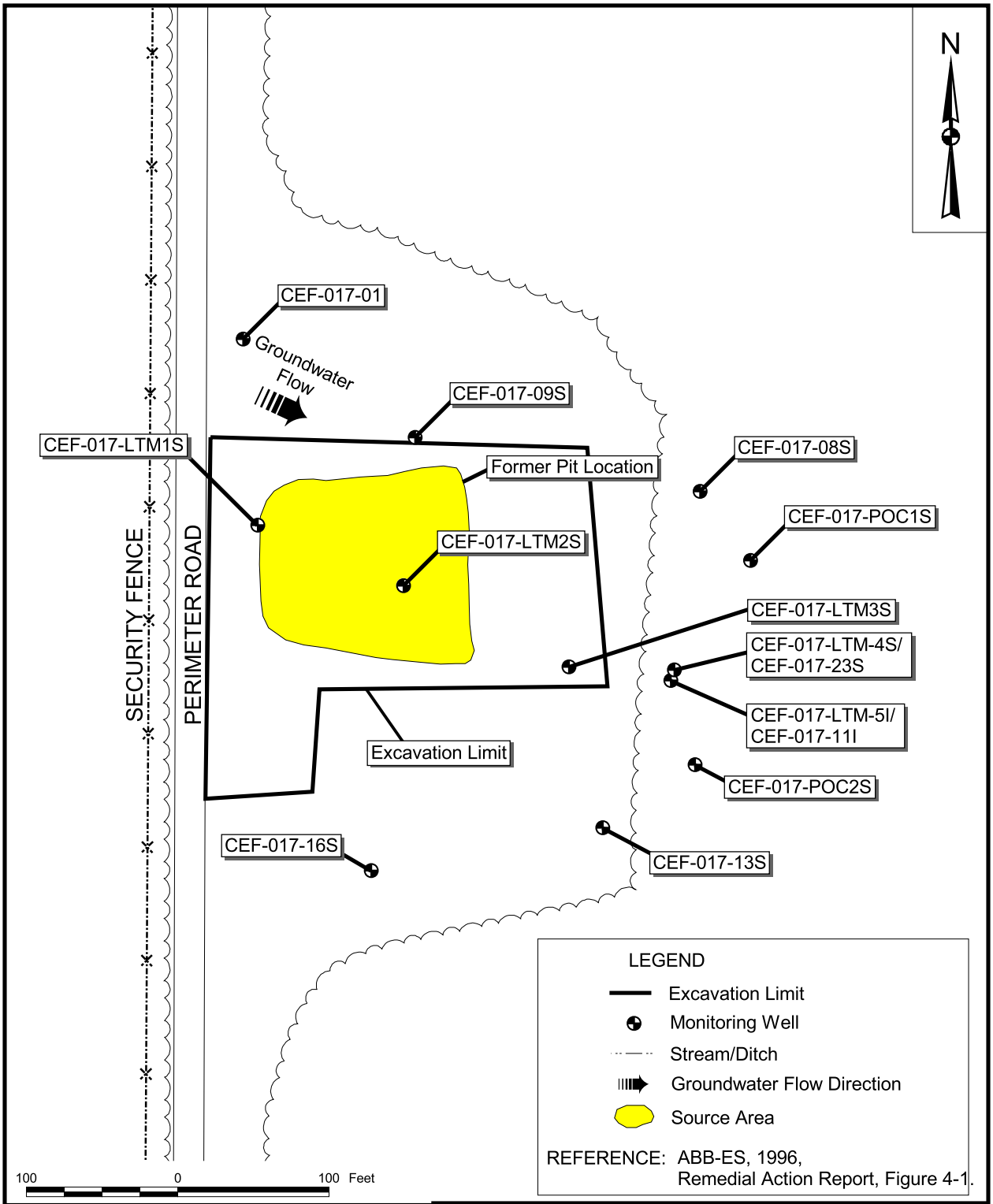
FORM CADD NO. SDIV–AV.DWG – REV 1 – 9/10/98



DRAWN BY MJJ	DATE 23Dec04	AREA OF EXCAVATION FOR INTERIM REMOVAL ACTION OPERABLE UNIT 2, SITE 17 FIVE - YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0989
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-4 REV 0

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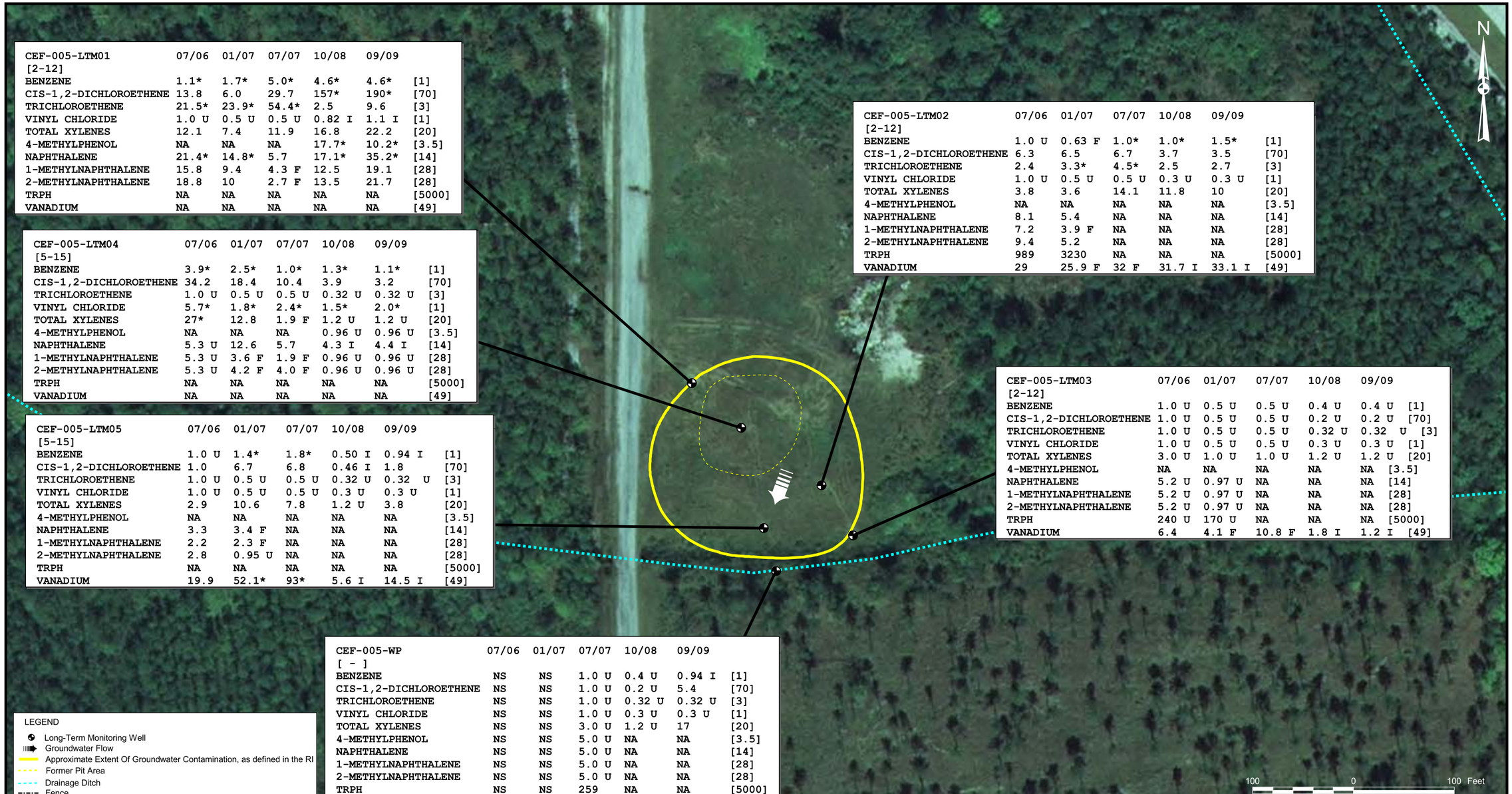


CEF-005-LTM01	07/06	01/07	07/07	10/08	09/09	
[2-12]						
BENZENE	1.1*	1.7*	5.0*	4.6*	4.6*	[1]
CIS-1,2-DICHLOROETHENE	13.8	6.0	29.7	157*	190*	[70]
TRICHLOROETHENE	21.5*	23.9*	54.4*	2.5	9.6	[3]
VINYL CHLORIDE	1.0 U	0.5 U	0.5 U	0.82 I	1.1 I	[1]
TOTAL XYLENES	12.1	7.4	11.9	16.8	22.2	[20]
4-METHYLPHENOL	NA	NA	NA	17.7*	10.2*	[3.5]
NAPHTHALENE	21.4*	14.8*	5.7	17.1*	35.2*	[14]
1-METHYLNAPHTHALENE	15.8	9.4	4.3 F	12.5	19.1	[28]
2-METHYLNAPHTHALENE	18.8	10	2.7 F	13.5	21.7	[28]
TRPH	NA	NA	NA	NA	NA	[5000]
VANADIUM	NA	NA	NA	NA	NA	[49]

CEF-005-LTM02	07/06	01/07	07/07	10/08	09/09	
[2-12]						
BENZENE	1.0 U	0.63 F	1.0*	1.0*	1.5*	[1]
CIS-1,2-DICHLOROETHENE	6.3	6.5	6.7	3.7	3.5	[70]
TRICHLOROETHENE	2.4	3.3*	4.5*	2.5	2.7	[3]
VINYL CHLORIDE	1.0 U	0.5 U	0.5 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	3.8	3.6	14.1	11.8	10	[20]
4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	8.1	5.4	NA	NA	NA	[14]
1-METHYLNAPHTHALENE	7.2	3.9 F	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	9.4	5.2	NA	NA	NA	[28]
TRPH	989	3230	NA	NA	NA	[5000]
VANADIUM	29	25.9 F	32 F	31.7 I	33.1 I	[49]

CEF-005-LTM04	07/06	01/07	07/07	10/08	09/09	
[5-15]						
BENZENE	3.9*	2.5*	1.0*	1.3*	1.1*	[1]
CIS-1,2-DICHLOROETHENE	34.2	18.4	10.4	3.9	3.2	[70]
TRICHLOROETHENE	1.0 U	0.5 U	0.5 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	5.7*	1.8*	2.4*	1.5*	2.0*	[1]
TOTAL XYLENES	27*	12.8	1.9 F	1.2 U	1.2 U	[20]
4-METHYLPHENOL	NA	NA	NA	0.96 U	0.96 U	[3.5]
NAPHTHALENE	5.3 U	12.6	5.7	4.3 I	4.4 I	[14]
1-METHYLNAPHTHALENE	5.3 U	3.6 F	1.9 F	0.96 U	0.96 U	[28]
2-METHYLNAPHTHALENE	5.3 U	4.2 F	4.0 F	0.96 U	0.96 U	[28]
TRPH	NA	NA	NA	NA	NA	[5000]
VANADIUM	NA	NA	NA	NA	NA	[49]

CEF-005-LTM03	07/06	01/07	07/07	10/08	09/09	
[2-12]						
BENZENE	1.0 U	0.5 U	0.5 U	0.4 U	0.4 U	[1]
CIS-1,2-DICHLOROETHENE	1.0 U	0.5 U	0.5 U	0.2 U	0.2 U	[70]
TRICHLOROETHENE	1.0 U	0.5 U	0.5 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	1.0 U	0.5 U	0.5 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	3.0 U	1.0 U	1.0 U	1.2 U	1.2 U	[20]
4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	5.2 U	0.97 U	NA	NA	NA	[14]
1-METHYLNAPHTHALENE	5.2 U	0.97 U	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	5.2 U	0.97 U	NA	NA	NA	[28]
TRPH	240 U	170 U	NA	NA	NA	[5000]
VANADIUM	6.4	4.1 F	10.8 F	1.8 I	1.2 I	[49]

CEF-005-LTM05	07/06	01/07	07/07	10/08	09/09	
[5-15]						
BENZENE	1.0 U	1.4*	1.8*	0.50 I	0.94 I	[1]
CIS-1,2-DICHLOROETHENE	1.0	6.7	6.8	0.46 I	1.8	[70]
TRICHLOROETHENE	1.0 U	0.5 U	0.5 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	1.0 U	0.5 U	0.5 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	2.9	10.6	7.8	1.2 U	3.8	[20]
4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	3.3	3.4 F	NA	NA	NA	[14]
1-METHYLNAPHTHALENE	2.2	2.3 F	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	2.8	0.95 U	NA	NA	NA	[28]
TRPH	NA	NA	NA	NA	NA	[5000]
VANADIUM	19.9	52.1*	93*	5.6 I	14.5 I	[49]

CEF-005-WP	07/06	01/07	07/07	10/08	09/09	
[-]						
BENZENE	NS	NS	1.0 U	0.4 U	0.94 I	[1]
CIS-1,2-DICHLOROETHENE	NS	NS	1.0 U	0.2 U	5.4	[70]
TRICHLOROETHENE	NS	NS	1.0 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	NS	NS	1.0 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	NS	NS	3.0 U	1.2 U	17	[20]
4-METHYLPHENOL	NS	NS	5.0 U	NA	NA	[3.5]
NAPHTHALENE	NS	NS	5.0 U	NA	NA	[14]
1-METHYLNAPHTHALENE	NS	NS	5.0 U	NA	NA	[28]
2-METHYLNAPHTHALENE	NS	NS	5.0 U	NA	NA	[28]
TRPH	NS	NS	259	NA	NA	[5000]
VANADIUM	NS	NS	28	1.5 I	101*	[49]

LEGEND

- Long-Term Monitoring Well
- Groundwater Flow
- Approximate Extent Of Groundwater Contamination, as defined in the RI
- Former Pit Area
- Drainage Ditch
- Fence

CEF-824A-21I
[35-40]
Volatiles (ug/L)
BENZENE 1.9 * [1]

Sample ID
Well Screen Interval, feet below ground surface
Groundwater Cleanup Target Level (GCTL)
Detected Concentration in ug/L
* indicates GCTL exceedance
Parameter

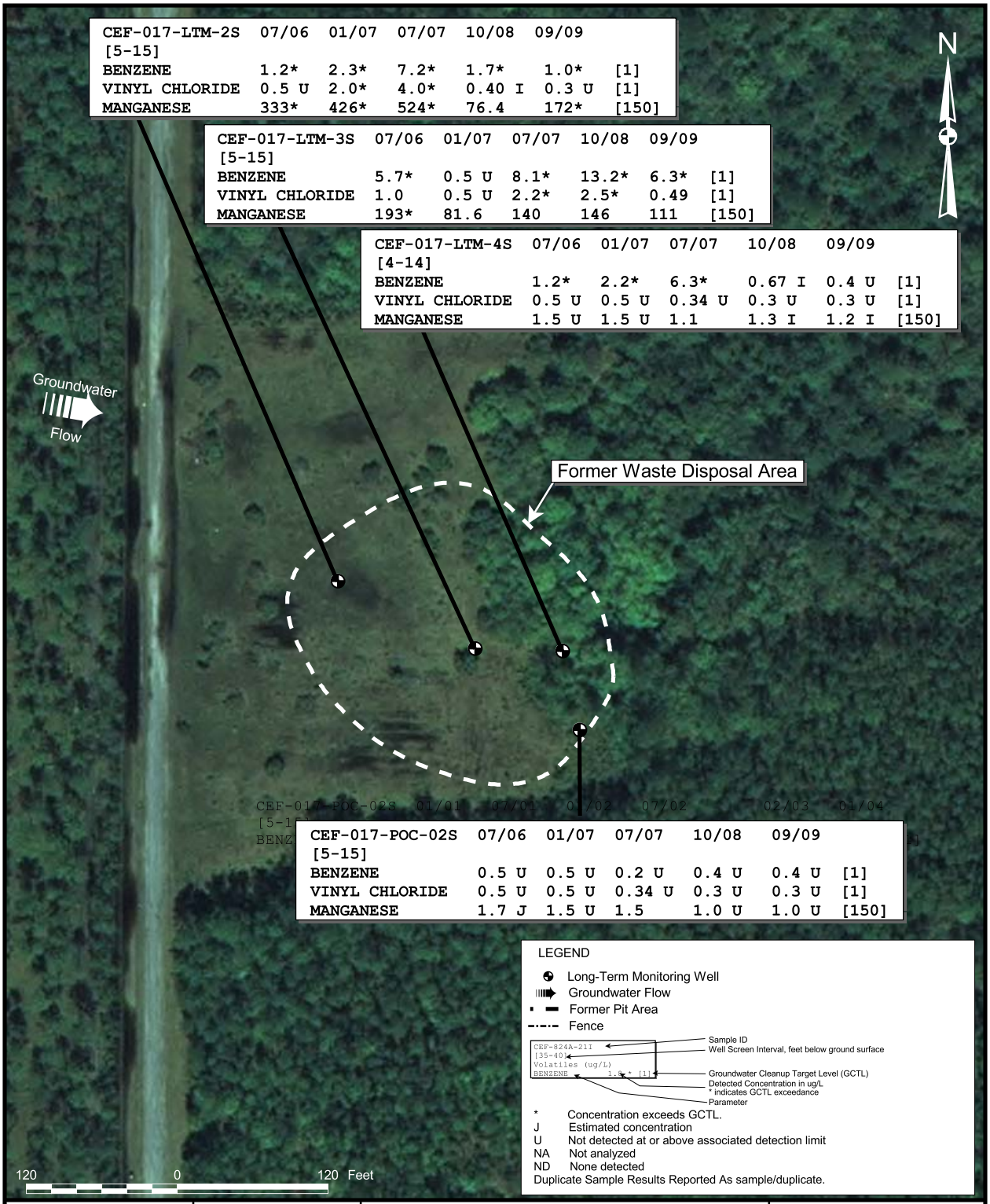
* Concentration exceeds GCTL.
J Estimated concentration
U Not detected at or above associated detection limit
NA Not analyzed
ND None detected
Duplicate Sample Results Reported As sample/duplicate.

DRAWN BY MJJ	DATE 15Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

GROUNDWATER RESULTS
OPERABLE UNIT 2, SITE 5
FIVE - YEAR REVIEW
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3-5	REV. 0



CEF-017-LTM-2S [5-15]	07/06	01/07	07/07	10/08	09/09	
BENZENE	1.2*	2.3*	7.2*	1.7*	1.0*	[1]
VINYL CHLORIDE	0.5 U	2.0*	4.0*	0.40 I	0.3 U	[1]
MANGANESE	333*	426*	524*	76.4	172*	[150]

CEF-017-LTM-3S [5-15]	07/06	01/07	07/07	10/08	09/09	
BENZENE	5.7*	0.5 U	8.1*	13.2*	6.3*	[1]
VINYL CHLORIDE	1.0	0.5 U	2.2*	2.5*	0.49	[1]
MANGANESE	193*	81.6	140	146	111	[150]

CEF-017-LTM-4S [4-14]	07/06	01/07	07/07	10/08	09/09	
BENZENE	1.2*	2.2*	6.3*	0.67 I	0.4 U	[1]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
MANGANESE	1.5 U	1.5 U	1.1	1.3 I	1.2 I	[150]

CEF-017-POC-02S [5-15]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	0.4 U	0.4 U	[1]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
MANGANESE	1.7 J	1.5 U	1.5	1.0 U	1.0 U	[150]

DRAWN BY	DATE	VOLATILE ORGANIC COMPOUNDS AND MANGANESE IN GROUNDWATER OPERABLE UNIT 2, SITE 17 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267	
MJJ	15Oct09		APPROVED BY	DATE
CHECKED BY	DATE		APPROVED BY	DATE
COST/SCHEDULE-AREA			DRAWING NO. FIGURE 3-6	REV 0
SCALE AS NOTED				

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4.0 OPERABLE UNIT 3, SITE 8

4.1 INTRODUCTION

Implementation of the remedial actions at OU 3 began in late 1998. This five-year review is being conducted as a statutory review until the cleanup levels are achieved, allowing 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 were 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 their wastes and activities conducted. Site 7 was approved for no further action (NFA) prior to the previous Five-Year Review and is not discussed in this report.

4.2 SITE CHRONOLOGY

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

Event	Date
Site 8 Boresite Range/Hazardous Waste Storage/Firefighter Training Area operation	1975 to 1984
RI/FS complete	1997
FS Addendum	February 1998
Site 8 ROD signed	March 1998
Groundwater Remedial Design Work Plan, Site 8	June 1998
Remedial Design for Soils, Site 8	November 1998
Technical Memorandum for Soil Remediation, Site 8	December 1998
Site 8 source removal	July 1999 to August 1999
ESD for Site 8	October 2003
Quality Assurance Project Plan (QAPP) for Site 8, 21, 25, and 27	June 2004
LUC RD for Site 8	April 2005
Site 8 OPS demonstration report	April 2005
Site 8 FOST	June 17, 2005
LUC compliance certificate site 8	June 2006
Groundwater monitoring, Site 8	Ongoing semi-annually
Draft Remedial Action Completion Report (RACR), Site 8	August 2009

4.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 3. The OU 3, Site 8 unlined firefighting training pits and the hazardous waste storage area are presented on Figure 4-1. Site 8 occupies approximately 13 acres of OU 3.

Land and Resource Use

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.

History of Contamination

At Site 8, aircraft would taxi to the concrete pad and "sight in" their guns by firing at targets located in front of a backstop. Site 8 was also a firefighting training area in which drummed liquid wastes 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.

Initial Response and Basis for Taking Action

The IAS recommended further investigation at Site 8 based on the types of liquid wastes disposed, its use as a firefighting training area, hazardous wastes spilled at the sites, the potential for migration of contaminants, and the presence of receptors. In the 1988 base-wide RFI conducted by HLA, hazardous constituents were detected in soil at Site 8, and further study was recommended.

4.4 REMEDIAL ACTIONS

4.4.1 Remedy Selection

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

Site 8. One RAO was developed for OU 3, Site 8 based on 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. This RAO was also based on an evaluation of site conditions and legal requirements (ARARs), and was stated and published in the ROD for Site 8, OU 3 in March 1998 as follows: Prevent exposure to groundwater at Site 8 that contains 1,1-DCE at concentrations greater than the State of Florida guidance criterion 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.

Contaminant concentrations in sediment from Site 8 were reviewed in the ROD. The No Action alternative was selected for sediment because contaminant concentrations were less than the State of Florida probable effect level criteria, and remedial action was not required. This selected alternative is considered protective of human health and the environment and does not result in habitat loss or wetland destruction.

The ROD also included information about remediating the contaminated surface soil based on decisions reached by the BCT. The ROD states that "all future remedial actions related to soils contaminated with TRPH will be addressed under Chapter 62-770, Florida Administrative Code." A confirmatory sampling program for soil at Site 8 identified the presence of TRPH at concentrations greater than State of Florida cleanup levels and the FDEP cancer risk threshold of 1.0×10^{-6}.

A remedial design and technical memorandum were prepared by TtNUS for excavation and disposal of contaminated surface soil at OU 3, Site 8. These documents established the following goal: To 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.

A remedial action was conducted by South Carolina Research Authority Environmental Enterprise Group (SCRAEEG), Environmental Detachment Charleston according to this remedial design in July and August 1999 (see Figure 4-2). During this remedial action, approximately 3,949 cubic yards of contaminated soil were excavated and disposed in a permitted off-site facility.

The remedial action for soil at Site 8 has been carried out in compliance with FAC Section 62-770 to satisfy the state surface soil cleanup standard of 350 mg/kg for TRPH, and complied with chemical- and action-specific ARARs.

4.4.2 Remedy Implementation

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

The remedial design for groundwater for OU 3, Site 8 was completed in 1998 by TtNUS (then Brown and Root Environmental, Inc.). The objective of the monitoring program is to evaluate the performance, progress, and effectiveness of natural attenuation in reducing contaminants and retarding their migration. Nineteen groundwater sampling events have been conducted since August 1998 in support of the OU 3, Site 8 groundwater remedial design.

LUCs are required at Site 8 to ensure protection of human health and the environment as documented in the LUC RD which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

An ESD for multiple sites was issued in November 2003 that modified the ROD for Site 8 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements went into effect upon finalization of the LUC RD for Site 8 and remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 5 property, as required by FDEP. Therefore, the LUCs remained applicable upon conveyance of the property to JAA per the FOST dated June 2005. Any subsequent owners will also be responsible for maintaining LUCs as long as they are necessary.

A Remedial Design for Soils for OU 3, Site 8 was prepared in 1998 by TtNUS to meet the RAO and was approved by the BCT. The BCT subsequently decided to compare excavation of surface soil with TRPH concentrations greater than Brownfield residential (350 mg/kg) and industrial (2,500 mg/kg) criteria, and this comparison was documented in a technical memorandum. As a result of this comparison, the BCT confirmed the Brownfield residential criterion of 350 mg/kg as the TRPH cleanup goal for surface soil, and it was estimated that approximately 2,215 cubic yards of contaminated surface soil would be excavated and disposed off site.

During remediation by SCRAEEG, approximately 3,949 cubic yards of contaminated soil were excavated and disposed at the Soil Remediation Inc. facility in Ray City, Georgia from July 28, 1999 through August 8, 1999. The volume of contaminated soil increased from that estimated in the remedial design

because the area of excavation was expanded from a depth of 12 inches to 72 inches based on confirmation sampling results. Figure 4-2 shows the areas of excavation.

Confirmation sampling was conducted after the contaminated soil was excavated. The concentrations of TRPH along the final excavation boundaries were less than 350 mg/kg, except in sample CEF-008-CS-004-05 in Excavation Area 1. This sample was located underneath the concrete runway slab. The soil associated with this sample could not be removed because the runway slab could have become unstable and potentially collapsed. The TRPH concentration of this sample was 520 mg/kg.

A statistically-based approach was used to determine if there would be a need for additional excavation because the exceedance of a criterion by an individual sample does not necessarily indicate a significant exceedance of a risk level. Exposure to TRPH in soil is a result of exposure to an area, not an individual sampling location. The statistically-based approach used the entire data set, including the confirmation samples, to determine a post-excavation exposure concentration or upper confidence limit (UCL). The exposure point concentration is the concentration used to evaluate risk in a human health risk assessment. The exposure concentration for the site is 46 mg/kg, based on a geometric mean concentration of 21 mg/kg. These concentrations are less than the FDEP Brownfield residential criterion of 350 mg/kg. Therefore, no further excavation at Site 8 is required.

This source removal action was effective and met the goals identified in the remedial design, and no further soil excavation is required.

4.4.3 System Operations/Operation and Maintenance

The long-term natural attenuation groundwater monitoring program at Site 8 is being conducted in accordance with the ROD and the Groundwater Remedial Design Work Plan for OU 3, Site 8.

Nineteen groundwater sampling events have been conducted since August 1998. Four of the sampling events were quarterly, and based on the results from the annual report for the quarterly sampling events, semi-annual sampling began with the fifth event. After the Year 6, second semi-annual event, sampling frequency was changed to annual. Sampling was conducted annually from July 2004 through July 2008. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for select VOCs, select SVOCs, and select inorganics, and natural attenuation parameters were sampled until 2006. Sampling was discontinued in 2008 after two or more consecutive rounds of sampling with no exceedances.

Cost

The Navy's original NPW cost estimate for implementation of natural attenuation for groundwater at Site 8 was approximately $465,000 over a 30-year period. The groundwater monitoring wells were installed as part of the Site 8 RI. Nineteen rounds of groundwater sampling were conducted over a period of approximately twelve years and involved the sampling of 15 wells and analysis of samples for 1,1-DCE, benzene, toluene, xylenes, 2-methylnaphthalene, naphthalene, BEHP, and aluminum at an estimated cost of $17,000 per year. Total capital, O&M, long-term monitoring, and reporting costs over the time of the remedy were approximately $670,000. The RACR for Site 8 includes more comprehensive cost information.

4.5 PROGRESS SINCE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 3 during the past review period. NFA was approved at Site 7; therefore, it was included in the second five-year review, but not in this review.

> 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. Implementation of LUCs at Site 8 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.
>
> Remedial actions involving excavation and disposal of contaminated soils at Sites 7 and Site 8 have been completed. The remedial actions were effective and met the RAOs identified in the ROD. No additional excavation is required at Sites 7 or 8.
>
> The long-term groundwater monitoring programs were implemented as designed to reduce the risks related to exposure to groundwater. The groundwater monitoring program is complete at Site 7 because benzene concentrations were confirmed to have decreased to less than the GCTL. Results at Site 8 indicate significant progress although some COC concentrations are still greater than cleanup criteria.
>
> The LUC portion of the remedial action at Site 8 will be implemented before the transfer of the property to JAA. No LUCs are required at Site 7. The Navy temporarily retains control of OU 3, Sites 7 and 8 and will transfer the property when it has been determined that the remedial action at Site 8 is OPS or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure (as is the case for Site 7).

The remedial actions completed at Site 7 (soil excavation and groundwater monitoring) were implemented as designed and were measures that prevented exposure. Based upon completion of these remedial actions, the intent and goals of the ROD for Site 7 have been met.

The remedial actions at Site 8 have been implemented as designed, and they 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, and data indicate progress in meeting the RAOs. Upon completion of these remedial actions, the intent and goals of the ROD for OU 3 will have been met.

The following recommendations and required actions were developed by the BCT based on the previous five-year review for OU 3, Site 8:

Previous Recommendation/ Required Action	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program	Semi-annually	Long-term monitoring continued semi-annually at Site 8 until January 2004, and annually after that through July 2008. Sampling at Site 8 was discontinued with the issuance of the draft RACR.
Implement LUCs at Site 8	Upon finalization of the LUC RD	The LUC RD was finalized April 22, 2005 and LUCs are in place in the form of the deed for Site 8.

4.6 FIVE-YEAR REVIEW PROCESS

4.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 3, Site 8 including the ROD, soil and groundwater remedial designs, soil removal technical memoranda and completion reports, long-term groundwater monitoring reports, and the Site 8 Draft RACR. Soil removal actions have been completed at Site 8, and LUCs are required for groundwater. The following sections summarize groundwater results for Site 8 based on review of associated documents. Groundwater monitoring is complete at Site 8.

Groundwater sampling conducted during the RI identified the extents of the petroleum hydrocarbon and chlorinated VOC contaminant plumes. The COCs identified in the ROD included 1,1-dichloroethane (DCA), 1,1-DCE, benzene, toluene, xylenes, 2-methylnaphthalene, naphthalene, and aluminum. The maximum concentrations of the COCs detected during the RI are shown in Table 4-1. VOC and SVOC concentrations for the last five sampling events at Site 8 are presented on Figure 4-3.

Nineteen groundwater monitoring events were conducted from August 1998 to July 2008. Four quarterly monitoring events were conducted during Year 1 of long-term monitoring. The monitoring frequency was decreased to semi-annual, based on the results of Year 1 sampling and with the approval of the BCT, beginning with the fifth monitoring event conducted in August 1999. Frequency was decreased to annual based on the results of the Year 6, second semi-annual event. Monitoring wells within the plumes, upgradient of the plumes, and downgradient of the plumes were sampled and analyzed for select VOCs, SVOCs, and inorganic chemicals and for natural attenuation parameters.

The review of the groundwater monitoring data through July 2008 indicates that the 19 groundwater sampling events were conducted in accordance with the remedial design work plan. The quarterly, semi-annual, and annual monitoring reports were provided to U.S. EPA and FDEP for review and comment.

Concentration trends over time for selected COCs at individual wells are illustrated on Figures 4-4 through 4-10. In general, a trend of decreasing concentrations over time is evident for the monitoring wells over the past eleven years of monitoring, with the most recent COC exceedance occurring in 2006. All COC concentrations have been less than target cleanup levels since 2007; therefore, a draft RACR has been completed, and is currently in review, to document the NFA recommendation for Site 8 and the LTMP.

Based on the recommendations of the Year 1 Annual Groundwater Monitoring Report, two intermediate wells (CEF-008-2I and CEF-008-8I) are to be sampled every 5 years to evaluate potential downward migration from the plume area to the intermediate zone of the surficial aquifer. These wells were sampled in June 2009 for VOCs, 2-methylnaphthalene, and naphthalene, and all results were less than detection limits.

As shown in Table 4-1, maximum detected concentrations of volatile COCs declined significantly between August 1998 and January 2004. The decrease continued through July 2008, with the last exceedances at the site detected in 2006. Inorganic COCs were not detected at concentrations greater than target cleanup goals during the first four monitoring events and were not analyzed in subsequent semi-annual events. Thus, there were two (or more) consecutive rounds of sampling with no exceedances of COCs.

From 1998 through July 2005, a suite of natural attenuation parameters was regularly analyzed at the site to determine the extent to which natural attenuation processes (especially biological) were active at the site and impacting contaminant concentrations. Natural attenuation parameters were discontinued from the monitoring program with the Year 9 event in 2006. Site data have suggested that both destructive and non-destructive natural attenuation processes are occurring at the site. Geochemical data have indicated that anaerobic biodegradation of petroleum-related and chlorinated compounds is taking place. The following conclusions summarize the natural attenuation evaluation of OU 3, Site 8:

- Geochemical conditions within the source area and downgradient are indicative of anaerobic biological activity, biodegradation, and reductive dechlorination. Contaminant concentrations have generally declined over time and daughter products of 1,1,1-trichloroethane (TCA) have been detected, providing further evidence of contaminant degradation.

- COCs concentrations in the source zone show stable to decreasing concentrations over time, and are no longer greater than target cleanup levels in any well. Wells CEF-008-10S and CEF-008-13S were the final well to have COC concentrations greater than cleanup levels (July 2006), and COCs in the other site wells have been less than cleanup target levels for several rounds.

Quarterly, semi-annual, and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 8 are adequate for evaluating the concentration trends of COCs at the site. The Navy routinely re-evaluated the status of the site to optimize the monitoring for Site 8, and determined that it was appropriate to begin steps toward site closeout after the Year 11, July 2008 sampling.

The monitoring system provided adequate data to evaluate remedy performance and it was sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source and at the downgradient locations.

4.6.2 Site Inspection

The site inspection for OU 3 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at OU 3, Site 8 included visual observations of the area, surface water/drainage ditches, sediment, and groundwater monitoring wells. The vegetative cover at Site 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 inspection identified that the implementation of the remedy and monitoring program were operating as designed and are protective of human health and the environment.

TtNUS conducted several site visits at Site 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. Inspections of monitoring wells were completed during each groundwater sampling event, and no issues were reported concerning the condition of the wells or health and safety issues.

The proposed land use for the site has remained unchanged. The Navy transferred Site 8 to JAA along with the surrounding properties, and JAA intends to use the area as a civilian airport. OU 3 is located near the ends of taxiways within the flightline of the airport. Site 8 is near flightlines 9 and 27. The site was transferred to JAA per the FOST, dated June 17, 2005.

Site 8 LUC inspections have been completed annually by JAA since the transfer of the property, and no issues were discovered, as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RD. The five-year review field inspection confirmed the LUC compliance.

4.6.3 Interviews

There were no interviews conducted in the course of the five year review.

4.7 TECHNICAL ASSESSMENT

4.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the ROD, as modified by the ESD for Site 8.

The implementation of the source control portion of the remedy was completed in August 1999. The implementation of the long-term groundwater monitoring program is ongoing and indicates that natural attenuation is working at the site. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk.

The remedial actions have been implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil excavation and long-term groundwater monitoring program) are operating as designed, and the data indicate that the RAO has been met. LUCs at Site 8 will no longer be required once the RACR for Site 8 has been approved by FDEP and USEPA.

4.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedies.

4.7.2.1 ARAR and Site-Specific Action Level Changes

No chemical-specific ARARs or site-specific action levels have changed since the ROD was signed. There have been no changes in the site-specific action levels developed in the IBDS for NAS Cecil Field.

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 3, Site 8. Other federal and State ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

4.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RIs. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies. The remedies are progressing as expected for OU 3.

4.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedies. No other information has been identified that calls into question the protectiveness of the remedies.

4.7.4 Technical Assessment Summary

According to the data reviewed and the site inspections, the remedies are functioning as intended by the ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedies. There is no other information that calls into question the protectiveness of the remedies.

4.8 ISSUES

It has been identified, based on long-term monitoring results and site inspections, that NFA is appropriate at Site 8. All cleanup goals have been attained at the site.

4.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and required actions developed by the BCT based on the inspection, five-year review, and the transfer of Site 8 to JAA are shown in the table below.

Issue	Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Site 8 Closeout	Complete Site Closeout Procedures for Site 8	Navy	U.S. EPA and FDEP	June 30, 2011	No	No

4.10 PROTECTIVENESS STATEMENT

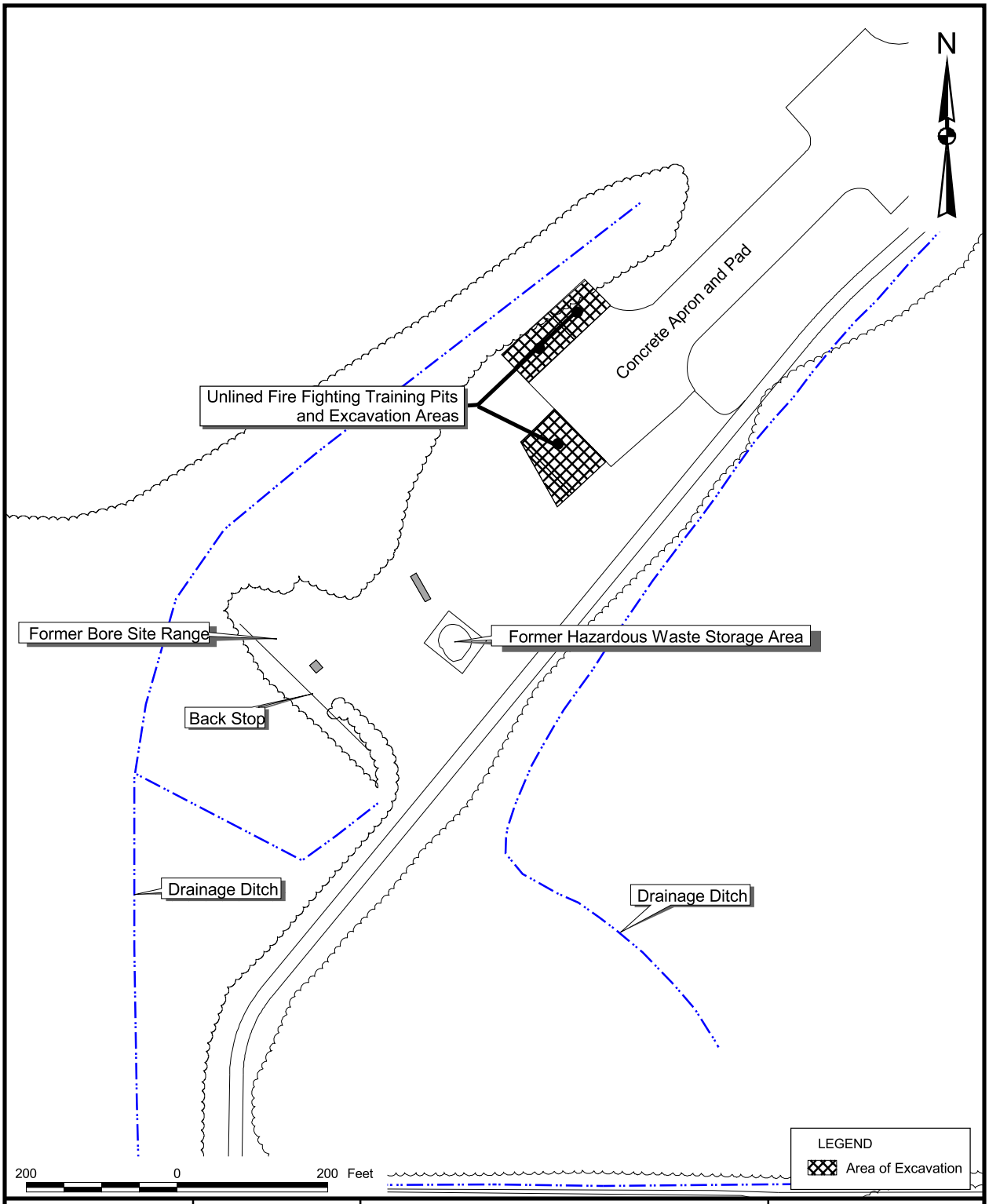
The Site 8 remedy is protective of human health and the environment. Soil excavation and off-site disposal eliminated unacceptable risks from exposure to soil, natural attenuation was effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment. Soil excavation and disposal activities were implemented as designed and achieved the soil RAO. The natural attenuation and associated groundwater monitoring program was implemented as designed, and results indicate that cleanup goals have been met. Because groundwater COC concentrations have been less than cleanup goals for two consecutive monitoring events, site close-out activities are underway. LUCs were implemented by the Navy upon finalization of the LUC RD in March 2005, and in accordance with the LUC RD, are being continued after transfer of Site 8 to JAA per the FOST dated June 2005. LUCs will be required until groundwater COC concentrations have decreased to levels that allow for unlimited use and unrestricted exposure, thus LUCs at Site 8 will be removed according to the LUC RD. Based on the remedial activities that have been completed (soil excavation and disposal, natural attenuation, groundwater monitoring, and LUCs)), the intent and goals for the ROD for Site 8 have been met.

TABLE 4-1

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 3, SITE 8
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Contaminant of Concern	Current Regulatory Criteria			Remedial Investigation		January 2004		July 2008	
	FDEP GCTL	U.S. EPA MCL	IBDS Value	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (µg/L)									
Benzene	1	5	NC	2 / 17	3.5	2 / 4	1.6	0 / 4	--
1,1-Dichloroethene	7	7	NC	4 / 17	95	3 / 4	9.1	2 / 4	6.6
Toluene	40	1,000	NC	4 / 17	48	1 / 4	7.8	1 / 4	0.58 I
Total Xylenes	20	10,000	NC	3 / 17	23	1 / 4	14.4	0 / 4	--
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)									
Naphthalene	20	NC	NC	5 / 17	37	2 / 4	60.7	2 / 4	7.5
2-Methylnaphthalene	20	NC	NC	4 / 17	25	1 / 4	51.3	2 / 4	4.9
bis(2-Ethylhexyl) phthalate	6	6	NC	10 / 17	8 J	NA	NA	NA	NA
METALS (µg/L)									
Aluminum	200	NC	13,100	7 / 17	15,300 J	NA	NA	NA	NA

Data are from the shallow surficial aquifer.
I = Estimated concentration.
NC = No criterion.
NA = Not analyzed.
Aluminum and bis(2-ethylhexyl) phthalate were eliminated as contaminants of concern based on long-term monitoring data.



DRAWN BY MJJ	DATE 27Dec04	SITE LOCATION MAP OPERABLE UNIT 3, SITE 8 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-1 / REV 0

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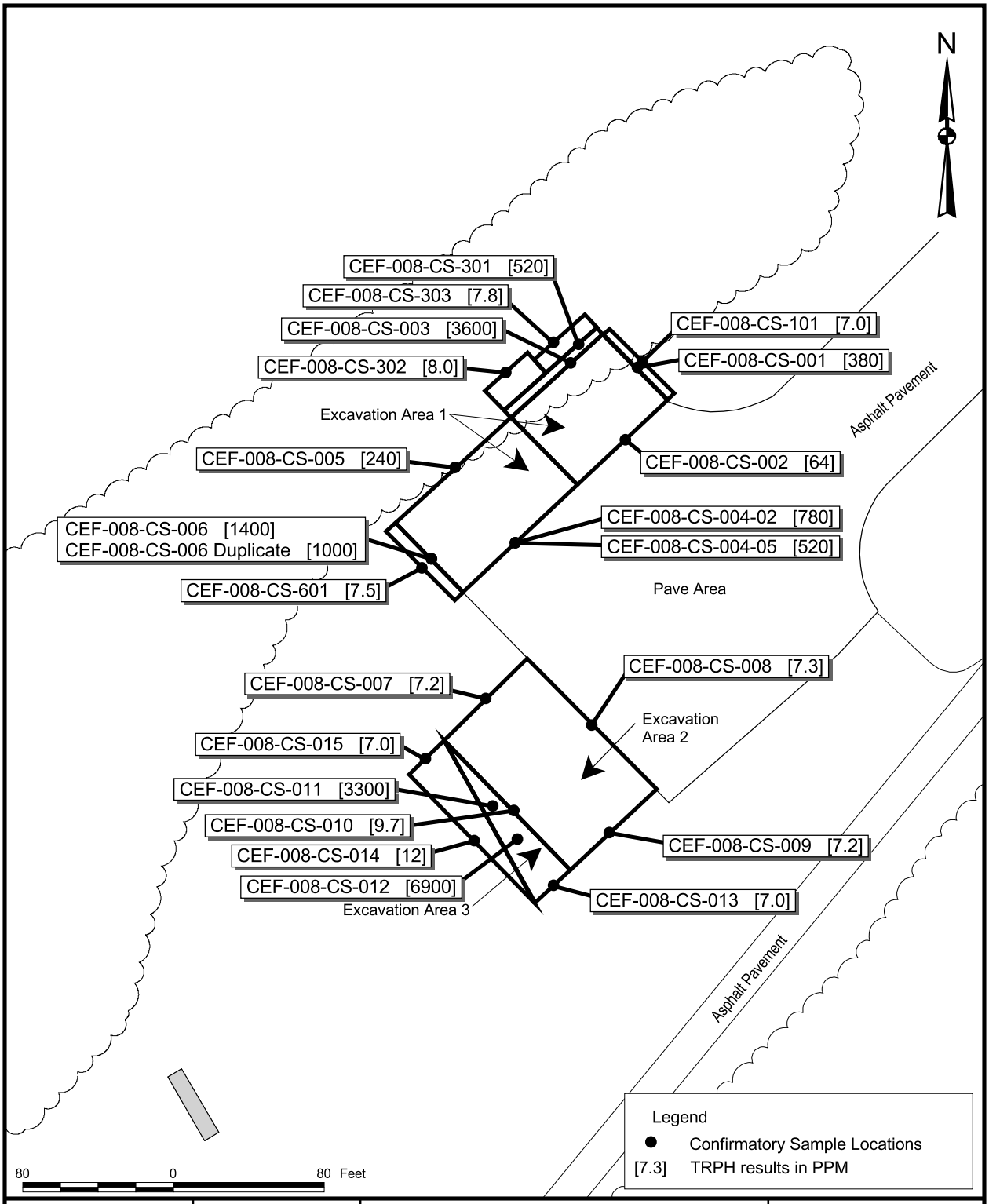

DRAWN BY MJJ DATE 27Dec04	EXCAVATION LIMITS OPERABLE UNIT 3, SITE 8 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267	
CHECKED BY DATE		APPROVED BY DATE	
COST/SCHEDULE-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 4-2	REV 0

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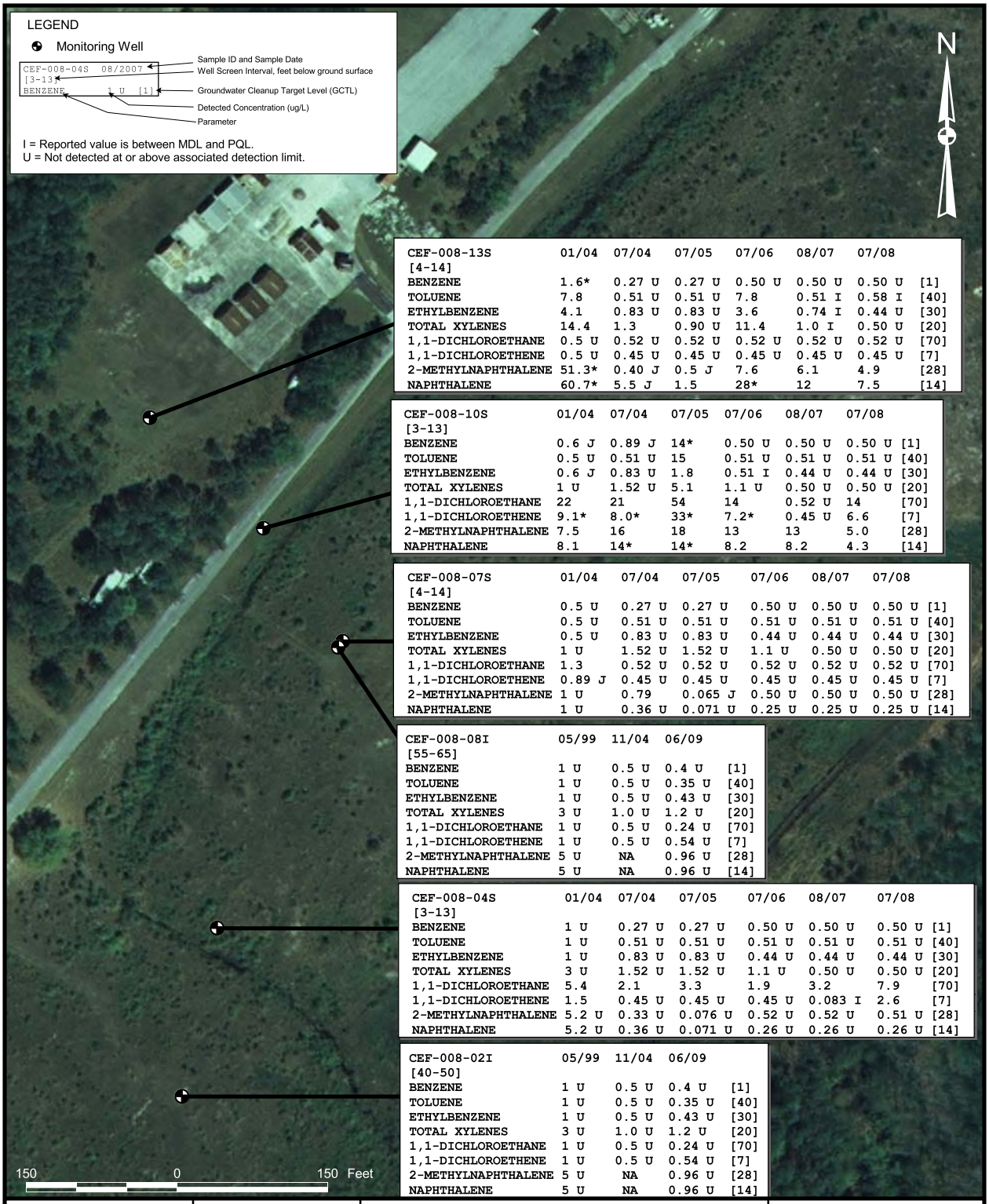

CEF-008-13S [4-14]	01/04	07/04	07/05	07/06	08/07	07/08	
BENZENE	1.6*	0.27 U	0.27 U	0.50 U	0.50 U	0.50 U	[1]
TOLUENE	7.8	0.51 U	0.51 U	7.8	0.51 I	0.58 I	[40]
ETHYLBENZENE	4.1	0.83 U	0.83 U	3.6	0.74 I	0.44 U	[30]
TOTAL XYLENES	14.4	1.3	0.90 U	11.4	1.0 I	0.50 U	[20]
1,1-DICHLOROETHANE	0.5 U	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	[7]
2-METHYLNAPHTHALENE	51.3*	0.40 J	0.5 J	7.6	6.1	4.9	[28]
NAPHTHALENE	60.7*	5.5 J	1.5	28*	12	7.5	[14]

CEF-008-10S [3-13]	01/04	07/04	07/05	07/06	08/07	07/08	
BENZENE	0.6 J	0.89 J	14*	0.50 U	0.50 U	0.50 U	[1]
TOLUENE	0.5 U	0.51 U	15	0.51 U	0.51 U	0.51 U	[40]
ETHYLBENZENE	0.6 J	0.83 U	1.8	0.51 I	0.44 U	0.44 U	[30]
TOTAL XYLENES	1 U	1.52 U	5.1	1.1 U	0.50 U	0.50 U	[20]
1,1-DICHLOROETHANE	22	21	54	14	0.52 U	14	[70]
1,1-DICHLOROETHENE	9.1*	8.0*	33*	7.2*	0.45 U	6.6	[7]
2-METHYLNAPHTHALENE	7.5	16	18	13	13	5.0	[28]
NAPHTHALENE	8.1	14*	14*	8.2	8.2	4.3	[14]

CEF-008-07S [4-14]	01/04	07/04	07/05	07/06	08/07	07/08	
BENZENE	0.5 U	0.27 U	0.27 U	0.50 U	0.50 U	0.50 U	[1]
TOLUENE	0.5 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	[40]
ETHYLBENZENE	0.5 U	0.83 U	0.83 U	0.44 U	0.44 U	0.44 U	[30]
TOTAL XYLENES	1 U	1.52 U	1.52 U	1.1 U	0.50 U	0.50 U	[20]
1,1-DICHLOROETHANE	1.3	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	[70]
1,1-DICHLOROETHENE	0.89 J	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	[7]
2-METHYLNAPHTHALENE	1 U	0.79	0.065 J	0.50 U	0.50 U	0.50 U	[28]
NAPHTHALENE	1 U	0.36 U	0.071 U	0.25 U	0.25 U	0.25 U	[14]

CEF-008-08I [55-65]	05/99	11/04	06/09	
BENZENE	1 U	0.5 U	0.4 U	[1]
TOLUENE	1 U	0.5 U	0.35 U	[40]
ETHYLBENZENE	1 U	0.5 U	0.43 U	[30]
TOTAL XYLENES	3 U	1.0 U	1.2 U	[20]
1,1-DICHLOROETHANE	1 U	0.5 U	0.24 U	[70]
1,1-DICHLOROETHENE	1 U	0.5 U	0.54 U	[7]
2-METHYLNAPHTHALENE	5 U	NA	0.96 U	[28]
NAPHTHALENE	5 U	NA	0.96 U	[14]

CEF-008-04S [3-13]	01/04	07/04	07/05	07/06	08/07	07/08	
BENZENE	1 U	0.27 U	0.27 U	0.50 U	0.50 U	0.50 U	[1]
TOLUENE	1 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	[40]
ETHYLBENZENE	1 U	0.83 U	0.83 U	0.44 U	0.44 U	0.44 U	[30]
TOTAL XYLENES	3 U	1.52 U	1.52 U	1.1 U	0.50 U	0.50 U	[20]
1,1-DICHLOROETHANE	5.4	2.1	3.3	1.9	3.2	7.9	[70]
1,1-DICHLOROETHENE	1.5	0.45 U	0.45 U	0.45 U	0.083 I	2.6	[7]
2-METHYLNAPHTHALENE	5.2 U	0.33 U	0.076 U	0.52 U	0.52 U	0.51 U	[28]
NAPHTHALENE	5.2 U	0.36 U	0.071 U	0.26 U	0.26 U	0.26 U	[14]

CEF-008-02I [40-50]	05/99	11/04	06/09	
BENZENE	1 U	0.5 U	0.4 U	[1]
TOLUENE	1 U	0.5 U	0.35 U	[40]
ETHYLBENZENE	1 U	0.5 U	0.43 U	[30]
TOTAL XYLENES	3 U	1.0 U	1.2 U	[20]
1,1-DICHLOROETHANE	1 U	0.5 U	0.24 U	[70]
1,1-DICHLOROETHENE	1 U	0.5 U	0.54 U	[7]
2-METHYLNAPHTHALENE	5 U	NA	0.96 U	[28]
NAPHTHALENE	5 U	NA	0.96 U	[14]

DRAWN BY MJJ	DATE 14Oct09	GROUNDWATER RESULTS MAP OPERABLE UNIT 3, SITE 8 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-3 REV 0

NAVFAC

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FIGURE 4-4

CHLORINATED VOCs AND DISSOLVED OXYGEN IN CEF-008-10S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

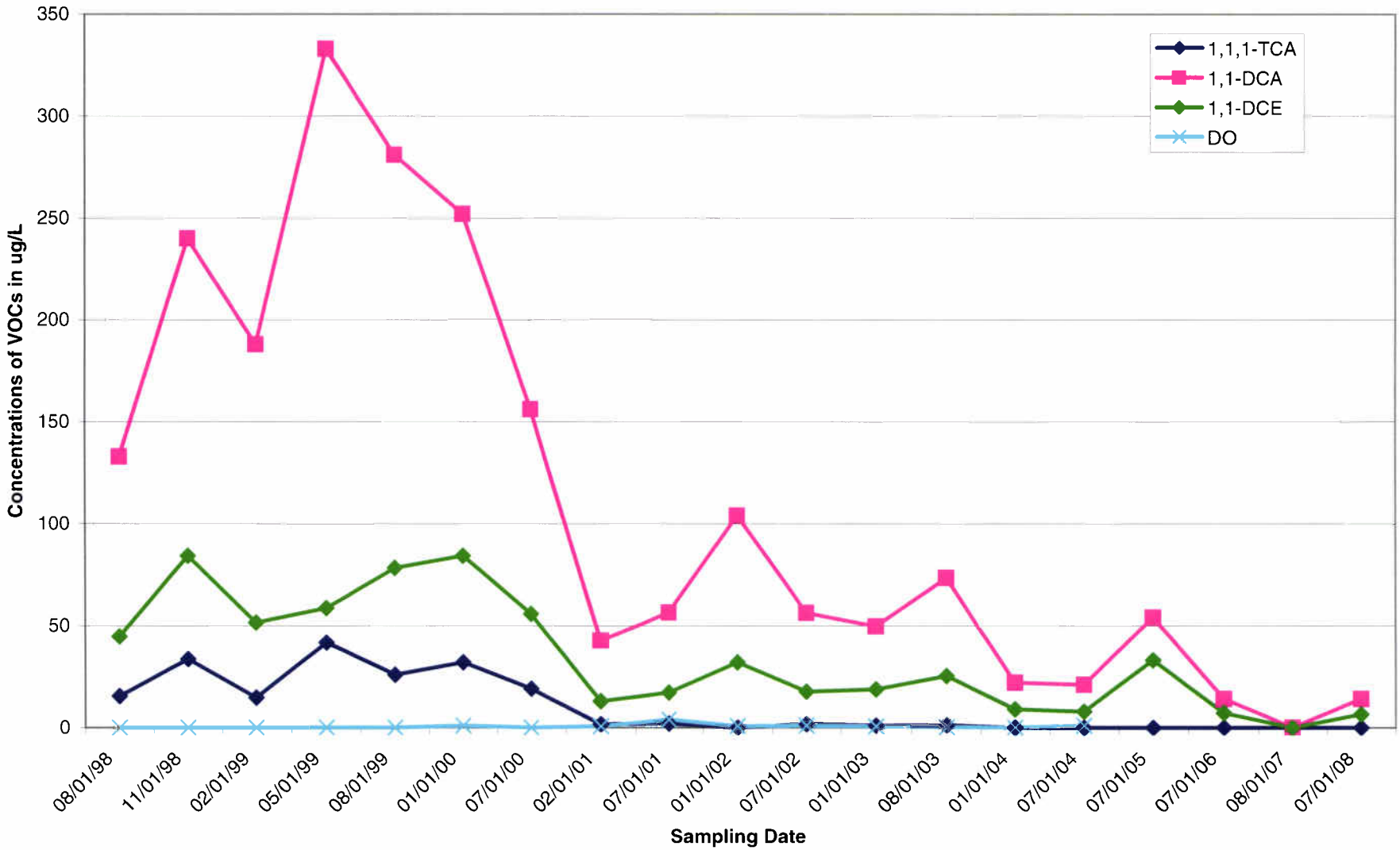


FIGURE 4-5

CHLORINATED VOCs AND DISSOLVED OXYGEN IN CEF-008-07S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD

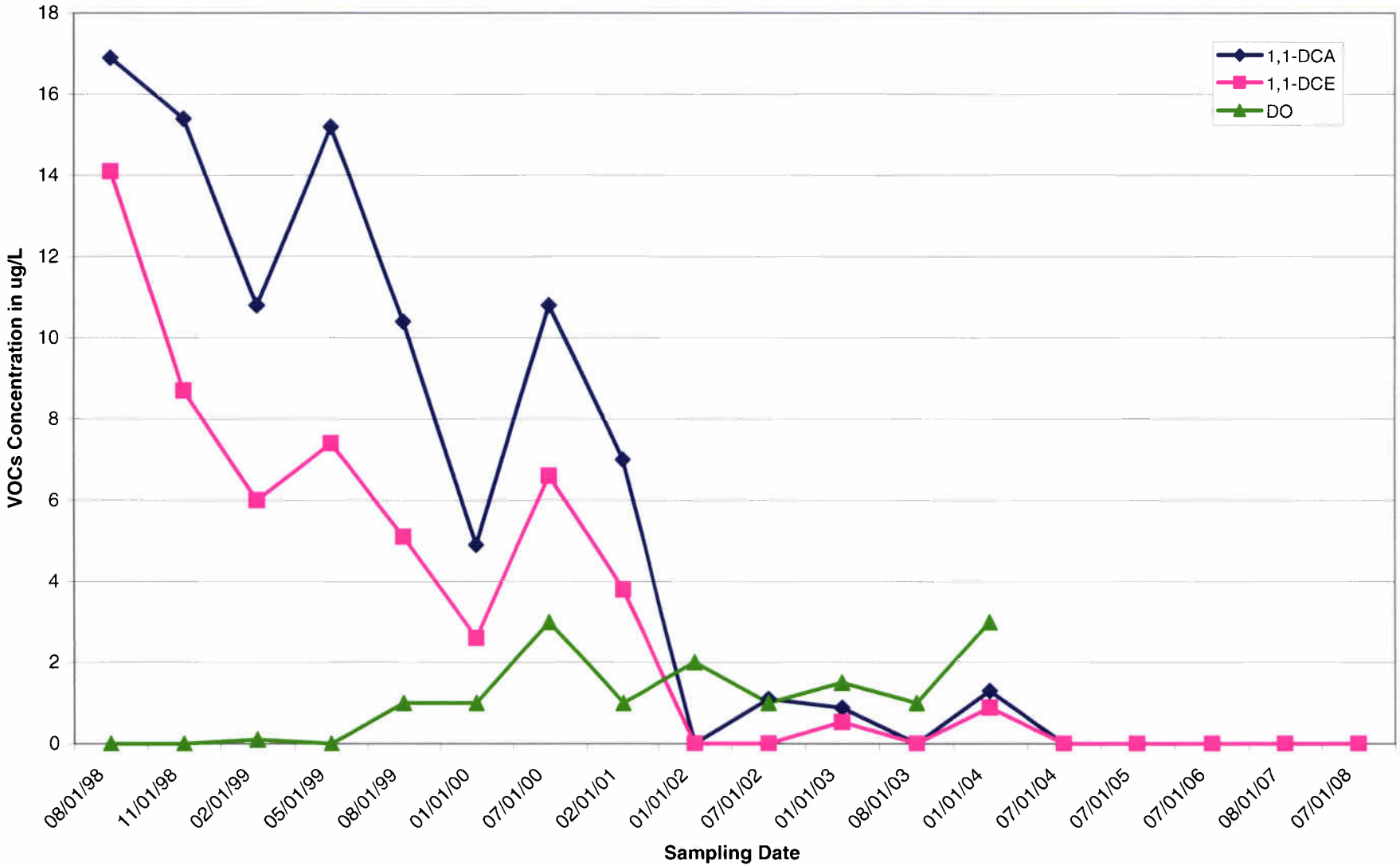


FIGURE 4-6

CHLORINATED VOCs AND DISSOLVED OXYGEN IN CEF-008-04S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

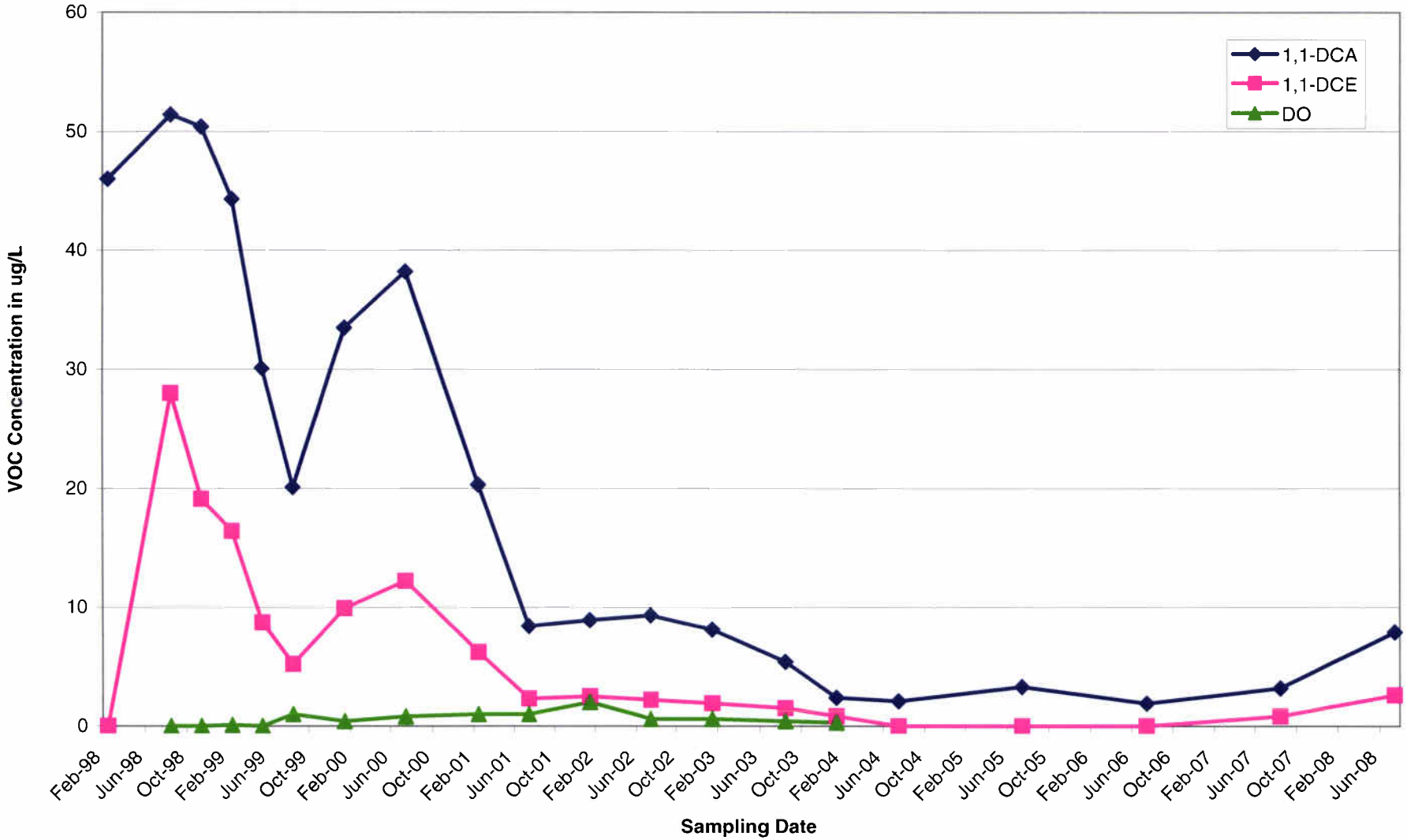


FIGURE 4-7

BTEX AND DISSOLVED OXYGEN IN CEF-008-10S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

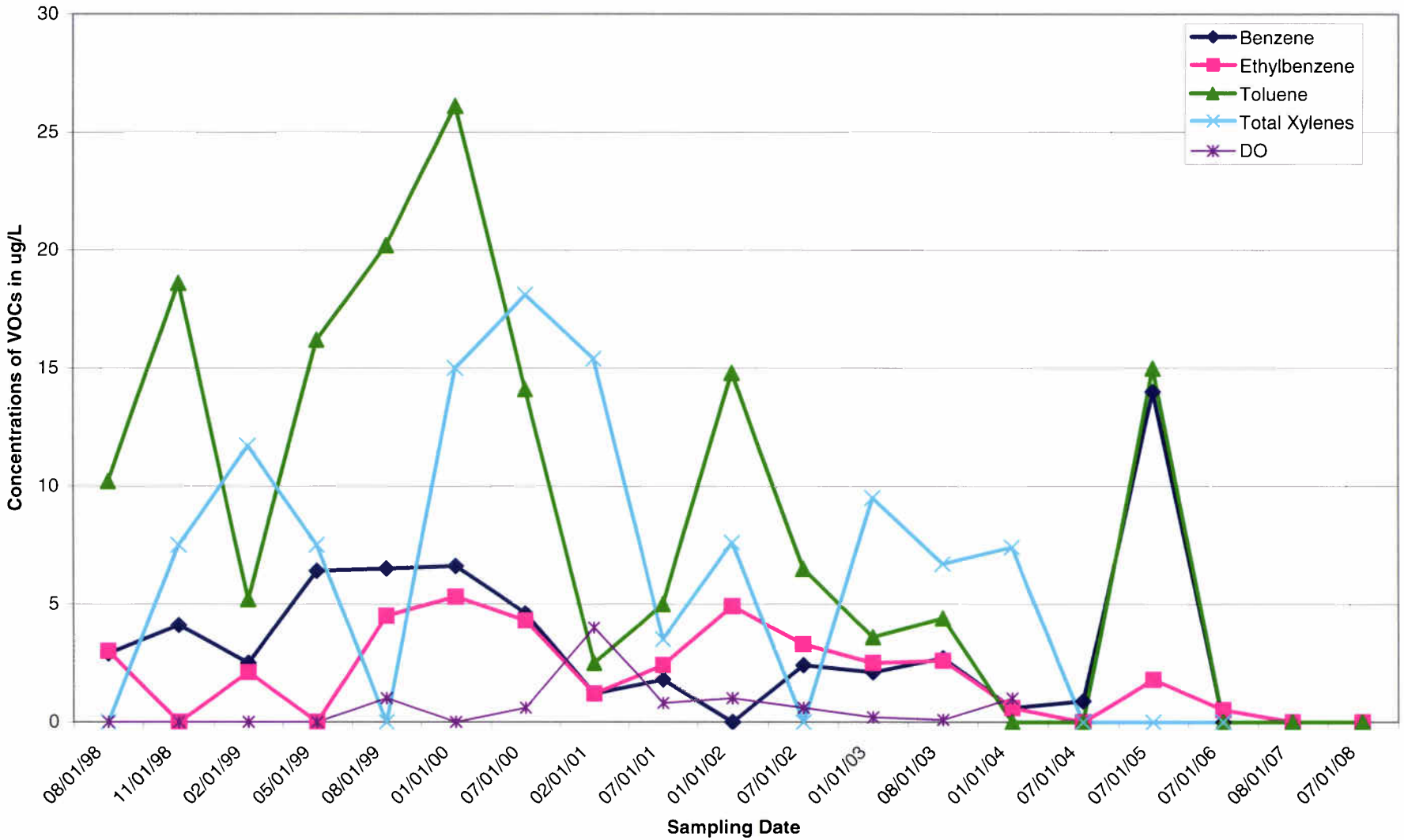


FIGURE 4-8

BTEX AND DISSOLVED OXYGEN IN CEF-008-13S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

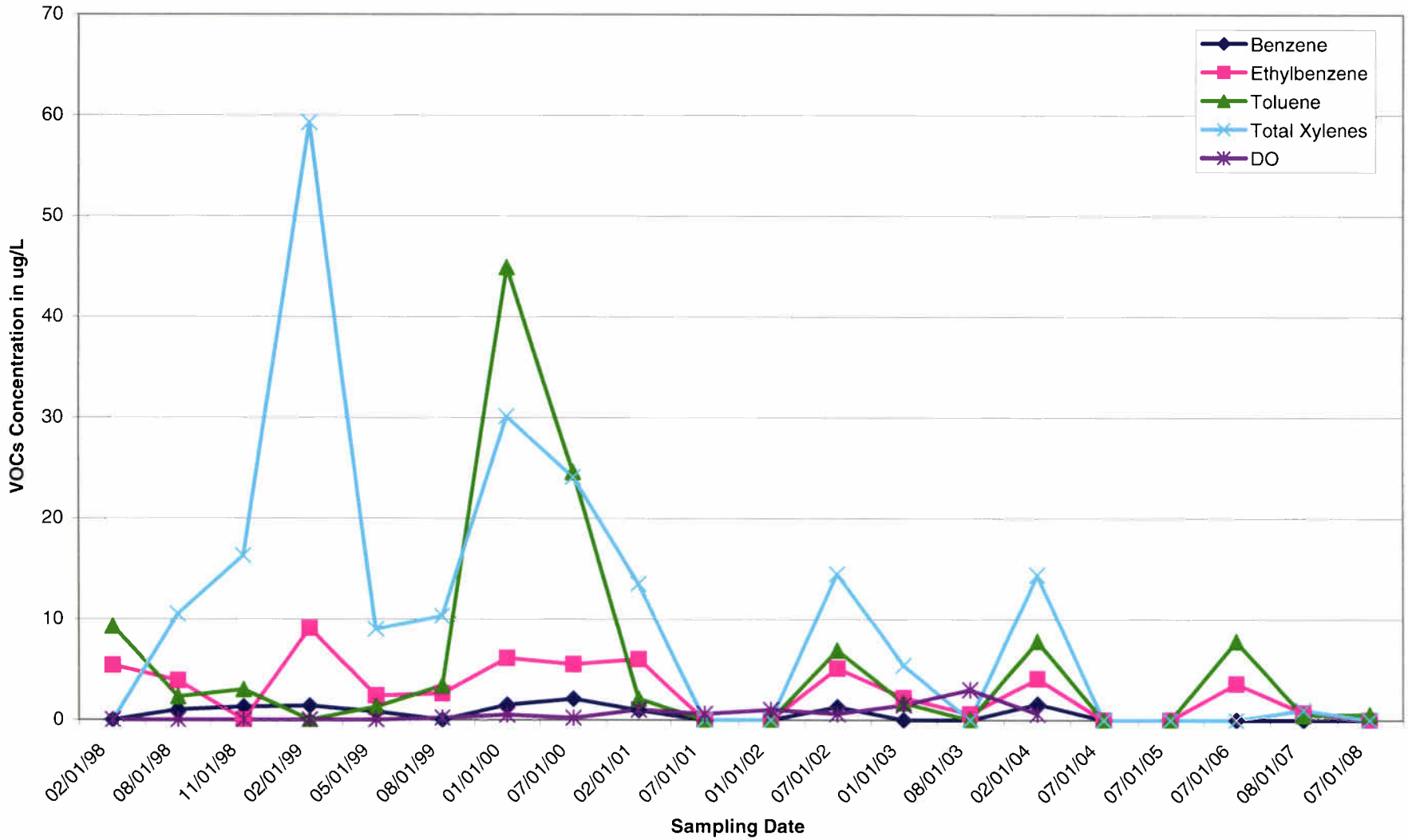


FIGURE 4-9

BTEX AND DISSOLVED OXYGEN IN CEF-008-04S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

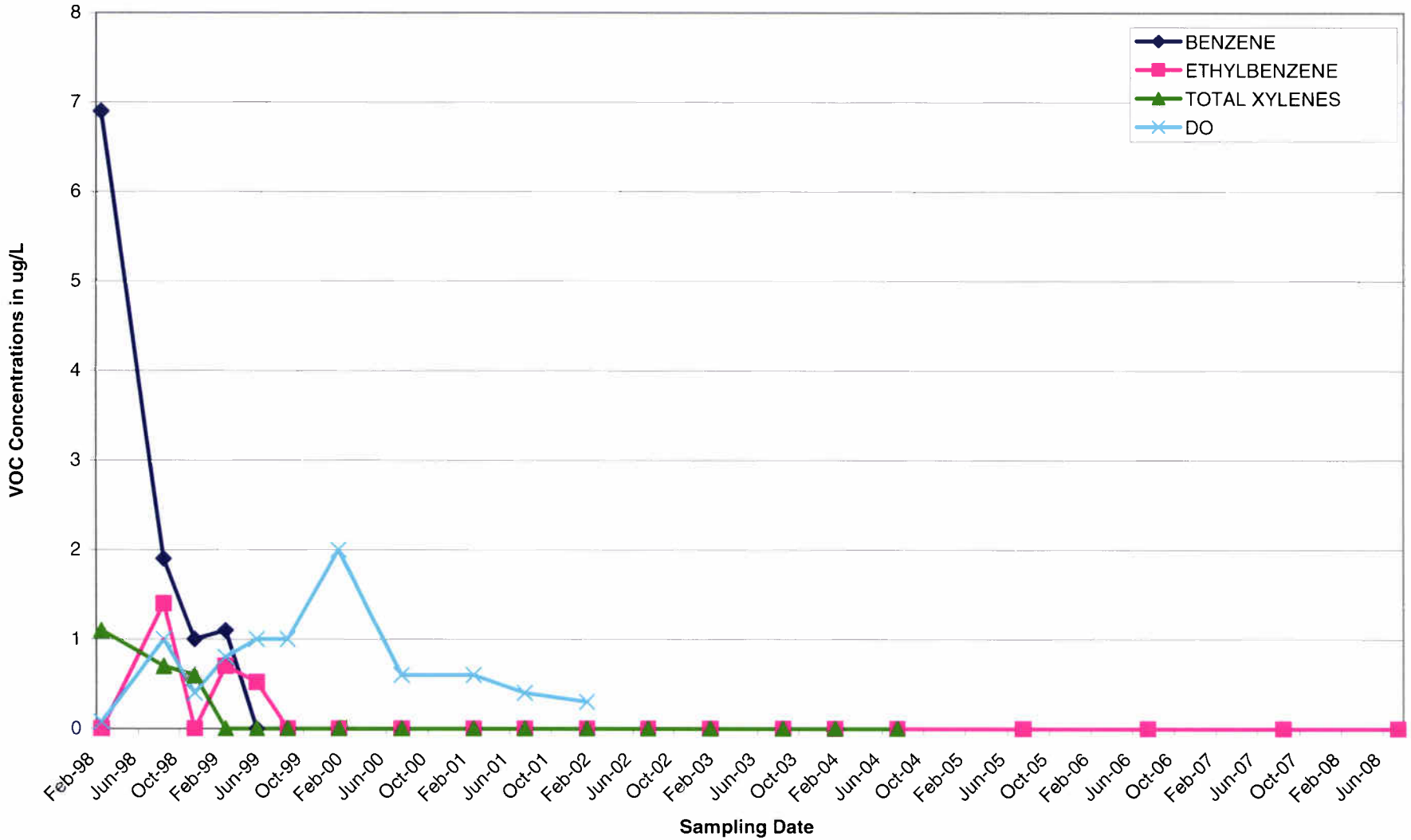
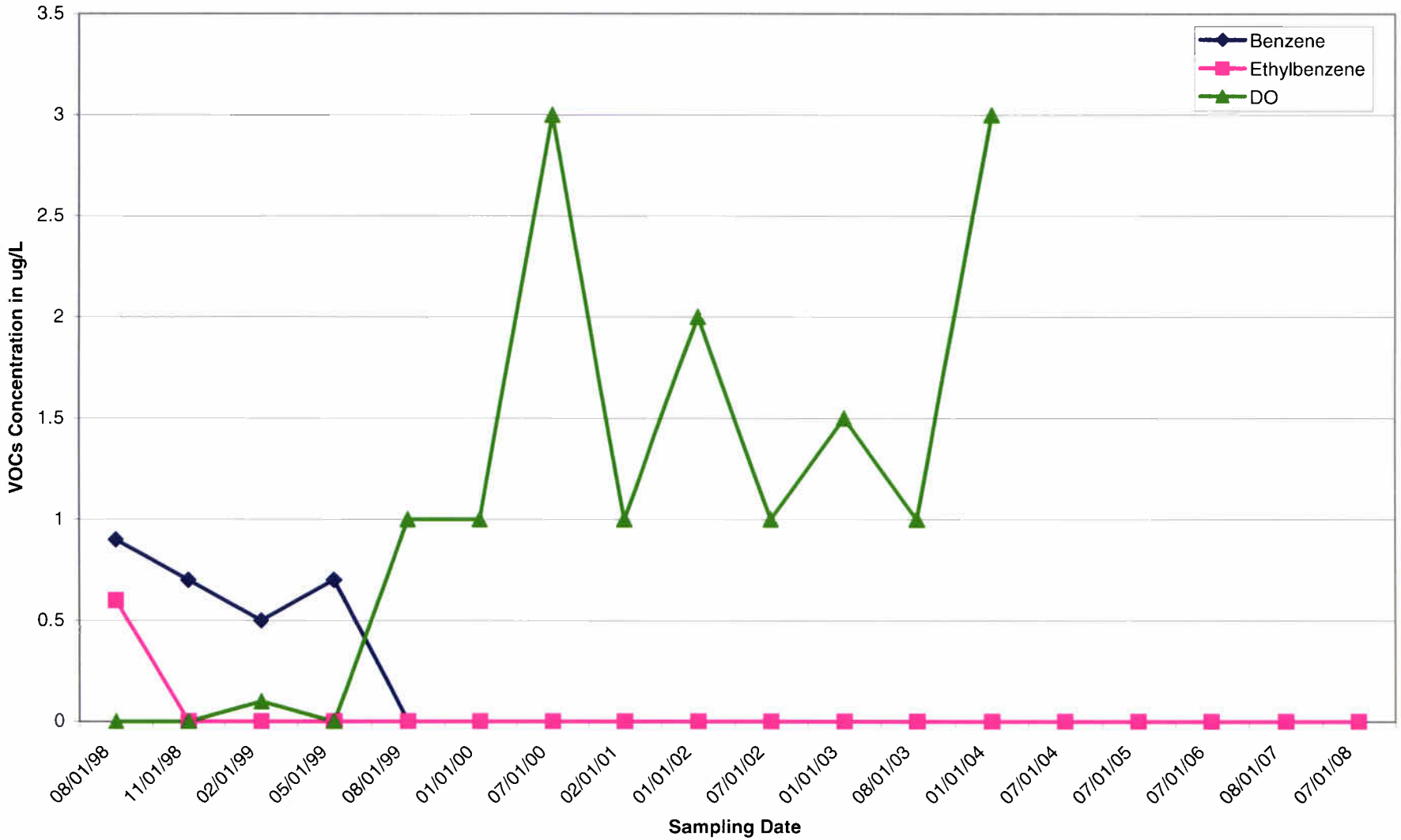


FIGURE 4-10

BENZENE AND DISSOLVED OXYGEN IN CEF-008-07S
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



5.0 OPERABLE UNIT 5, SITE 15

5.1 INTRODUCTION

This five-year review provides a detailed review of the soil and groundwater remedial actions, including excavations and munitions response. This five-year review is being conducted as a statutory review because soil contamination will remain at Site 15 at concentrations greater than levels that allow for unlimited use and unrestricted exposure; therefore, the remedy requires LUCs be implemented to prevent unacceptable risk from exposure to any remaining soil contamination. OU 5 consists of Site 15, the Blue 10 Ordnance Disposal Area, Site 14 Blue 5 Ordnance Disposal Area, Site 49 Former Skeet Range, and the Old Golf Course. These sites were grouped as OU 5 because all served a similar purpose when the base was active, and thus they have similar types of wastes present. Sites 14 and 49 were approved for no further action (NFA) prior to the previous Five-Year Review and are not discussed in this report.

The period of review for OU 5, Site 15 was extended past the September 30, 2009 cutoff date because information was obtained that had a significant impact regarding groundwater at this site.

5.2 SITE CHRONOLOGY

A list of important OU 5, Site 15 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 15 Skeet Range and Ordnance Disposal Operation	Early 1940s - 1977
RI	1997
FS	1998
Supplemental Groundwater Sampling Event	2000
Geostatistical Assessment Report	2004
Technical Memorandum for NFA for Groundwater	June 2006
Wetlands Impact Letter	March 2007
Munitions discovered at the site	April 2007
Amended Proposed Plan	April 2008
ROD	May 2008
Remedial Design for Soils	June 2008
Soil Excavation and Munitions Removal	July 2008-March 2009
LUC RD	May 2009

5.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 5. A sketch of OU 5 showing the historical layout of the Blue 10 Ordnance Disposal Area facilities is provided on Figure 5-1. The site is a heavily forested area with paved access roads that covers approximately 85 acres, and there are currently no buildings at the Site.

Land and Resource Use/History of Contamination

From the early 1940s to the mid-1950s, a 240,000 square foot area of the current Site 15 was operated as a skeet range. From the mid-1960s through 1977 at Site 15, ordnance material was burned in a large metal chamber and disposed, and static rockets were fired. An estimated 2.5 tons of ordnance were disposed at Site 15 each month, with a total of approximately 350 tons being disposed over the entire period of site operations. There were also a number of forest burns in the wooded area of the site. Burning of ordnance and firing of rockets created residual ash that contained metals and metal oxides, primarily aluminum and lead. The majority of metals and metal oxides generated tended to sorb to the soil and remain onsite. The presence of contamination from propellant residuals is also possible at Site 15. PAHs are also present at the site, most likely due to the previous use of Site 15 as a skeet range and ordnance burning and disposal site. The burning reactions of wood, brush, duff, and other organics from fires in the forested area may also contribute a small amount to the presence of PAHs.

Initial Response and Basis for Taking Action

The 1985 base-wide IAS conducted by Envirodyne Engineers, Inc. recommended further investigation for Site 15 based on the types of wastes disposed, the high potential for contaminant migration, and the presence of receptors. In the 1988 base-wide RFI conducted by HLA, hazardous constituents were detected in groundwater and sediment at Site 15, and further study was recommended.

5.4 REMEDIAL ACTIONS

5.4.1 Remedy Selection

The purpose of remedial actions at OU 5 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 in the soil at Site 15. The remedial actions for OU 5 were defined in the ROD in 2008.

The 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 ROD were:

- Prevent unacceptable human health risk associated with exposure to Site 15 surface soil containing benzo(a)pyrene equivalents (BaPEqs), arsenic, lead, and TRPH at concentrations greater than the established site-specific soil cleanup target levels (SCTLs).

- Reduce ecological risk associated with exposure to Site 15 surface soil containing BaPEqs, arsenic, and lead at concentrations greater than the established site-specific ecological target levels.

The remedial actions selected in the ROD for Site 15 were excavation of soil with COC concentrations greater than FDEP low-intensity recreational SCTLs; on-site solidification/stabilization; off-site treatment and disposal; and LUCs. The ROD required the sampling of one monitoring well for arsenic upon completion of the excavation to verify that excavation activities did not influence arsenic concentrations in groundwater. This remedial action met the Land Disposal Restrictions as well as the RCRA permit requirements and was consistent with CERCLA and the NCP. This action was considered protective of human health and the environment. Unacceptable exposure risks to soil contamination that remained after the remedial action would be addressed by LUCs.

Groundwater sampling was completed during the RI and in supplemental groundwater sampling events in April and May 2000. A Technical Memorandum for NFA for Groundwater at Site 15 was prepared by TtNUS in August 2001. Based upon the findings presented in the Technical Memorandum, it was concluded that, although the Site 15 soil contained PAHs and nitroaromatic and inorganic compounds at concentrations that exceed the FDEP SCTL for leachability to groundwater, these contaminants did not appear to have impacted groundwater quality at the site. Thus, it was recommended that no further groundwater monitoring be required at Site 15. The Technical Memorandum was accepted by FDEP on August 30, 2001, and USEPA on January 10, 2002.

5.4.2 <u>Remedy Implementation</u>

5.4.2.1 Soil

Soil excavation began July 9, 2008. Before excavation could begin, the site had to be fully prepared, which required conducting gopher tortoise surveys, clearing trees and vegetation, characterizing waste, and removing all munitions discovered onsite. Approximately 11,850 cubic yards of soil was excavated from the areas shown on Figure 5-2. Figure 2 also shows the wetlands that were delineated at Site 15 before soil excavation. Soil was excavated to a depth of 1 foot below ground surface (bgs) at Areas A-D, G-K, and M-Q. Soil in Areas F and was excavated to 2 feet bgs. Soil in area L was divided into two

separate areas: L1 was excavated to 1 foot bgs, and L2 was excavated to 2 feet bgs. Table 5-1 shows the volumes of excavation per area. Approximately 7,874 square feet of the excavation areas were located in wetlands, as shown on Figures 5-3 through 5-6, including portions of Areas F and P. By staging equipment in uplands, physical disturbance of uncontaminated wetlands was prevented by accessing contamination at the edge of wetlands. Approximately 1,000 square feet of uncontaminated wetlands disturbance was necessary to access excavation Area F, which was located in the interior of a wetland. Two monitoring wells, CEF-015-13S and CEF-015-15S, were also removed from Area F by over-excavating the area to a depth of 12 feet bgs. Figure 5-5 shows the small portion of area L excavated to 2 feet bgs, L2, as a solid black square within the larger area L.

5.4.2.2 Munitions

Surface munitions debris (MD) clearance included visual inspections and the use of handheld magnetometers. A total of 7,751 pounds of non-MD scrap, 907 pounds of MD, and 17 munitions and explosives of concern (MEC) were identified and removed from the proposed excavation areas during surface investigations. The subsurface investigation was completed after a digital geophysical mapping survey was conducted, and 100 percent of the detected subsurface anomalies were removed. A total of 7,200 point intrusive anomalies and 113 polygon intrusive anomalies were identified and removed during the subsurface investigation. All non-MD scrap was sealed in two roll-off containers which were transported off-site to be recycled. All MD scrap was placed into 55-gallon steel drums and sealed, and the drums remain on site. All MEC that were recovered were staged in a Type 2 High Explosives storage magazine and disposed by open detonation in a manner that complied with all applicable regulations.

5.4.2.3 Stabilization/Solidification

Soil identified during pre-excavation characterization as being hazardous was staged in 300-ton stockpiles after excavation. One sample was collected from each stockpile and submitted for pretreatment Toxicity Characteristic Leaching Procedure (TCLP) lead and pH analysis. All stockpiled soil was treated to solidify lead contamination because previous sampling had indicated the presence of elevated lead concentrations. Treatment consisted of incorporating a 5 percent by weight amount of Reagent FF-100-40L (Free Flow Technologies, Ltd) into the soil stockpiles using a wheel loader. Approximately 4,388 tons of soil were treated.

A confirmation sample was collected from each stockpile and submitted for TCLP-lead analysis after visual inspection confirmed that the reagent had had enough time to effectively treat the lead contamination. When confirmation sample results indicated that the toxicity characteristic criterion for lead (5.0 mg/L) had been met, the soil was considered non-hazardous waste.

After the soil was treated, it was transported and disposed offsite. From July 21 through September 22, 2008, approximately 7,000 tons of non-hazardous soil were transported to Waste Management's Chesser Island Road Landfill in Folkston, GA, and from July 31, 2008 through March 25, 2009, approximately 10,000 tons of non-hazardous soil were transported to Republic Services' Broadhurst Environmental Landfill in Screven, GA.

5.4.2.4 Land Use Controls

LUCs required at Site 15 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization implemented the associated LUCs. The LUC RD includes the following LUC objectives:

- Prohibit residential, industrial, commercial, agricultural, and medium- and high-intensity recreational reuse of the Site. Allowable low-intensity recreational activities include, but are not limited to, hiking, biking, horseback riding, birding, and hunting.
- Prohibit the excavation of soils from the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

The LUC requirements took effect upon finalization of the LUC RD for Site 15, May 29, 2009. The LUCs will remain applicable during Navy ownership. The LUC objectives and LUC requirements will be incorporated into the Quitclaim deed when the property is to be transferred, as required by FDEP, and thus, LUCs will remain in effect upon conveyance of the property to the City of Jacksonville Parks and Recreation Department. Any subsequent owners will also be responsible for maintaining LUCs as long as they are necessary.

5.4.3 <u>Operation and Maintenance</u>

Long-term monitoring and installation of a treatment system were not part of the remedy selected for Site 15.

Cost

The Navy's original capital cost estimate for implementation of the Soil Removal Action presented in the ROD was $2,767,000. The NPW of O&M was estimated to be $35,000 over 30 years, with O&M including inspections and five-year reviews. The actual cost of soil excavation activities was $2,170,371, but the total capital cost of the remedy at Site 15 was much higher than the estimated cost because of the required munitions response activities. The total cost of the surveying, clearing, mapping, munitions response operations, and project management required was $2,134,582 (CH2MHill). The total capital

cost of the project was $4,304,953. The cost of the confirmatory groundwater monitoring effort was approximately $8,500. The Site 15 RACR includes more complete cost information for the remedy.

5.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

OU 5, Site 15 was not included in the previous five-year review because the ROD was not signed and remedial activities had not been performed at the time of the second five-year review.

5.6 FIVE-YEAR REVIEW PROCESS

5.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 5, Site 15 including the ROD, the Technical Memorandum for NFA for Groundwater, the Remedial Design for Soils, RACR – Soil Removal Action, Wetlands Impact Letter, and the Preliminary Assessment/Site Inspection Report for Past Use of Munitions and Explosives of Concern. The soil removal action, including removal of soils and MEC/MD was completed at Site 15. A statistical assessment was performed prior to excavation to ensure that the site had been thoroughly sampled for lead and BaPEqs, and that confirmatory sampling after soil excavation would not be necessary. No further soil excavation is required; however, MEC and MD are still present at the site in small quantities. The areas of excavation are shown on Figure 5-2.

The following section summarizes groundwater results for Site 15 based on a review of associated documents. One exceedance of the 4,4'-DDE GCTL (0.26 µg/L at CEF-015-05S) and two exceedances of the RDX GCTL (0.451 µg/L at CEF-015-01S and 0.404 µg/L at CEF-015-05S) were also detected in 1995 but were not confirmed by the results of the resampling conducted in August 2006 in new wells installed at the same locations. Resampling results showed concentrations of 4,4'-DDE and RDX to be less than their respective analytical detection limits of 0.02 µg/L and 0.07 µg/L.

During the April 2000 sampling event, concentrations of PAHs and nitroaromatics were less than analytical limits in all eight wells sampled, and thus did not exceed any FDEP GCTLs. April 2000 groundwater sampling results for inorganics are shown on Table 5-2. Positive detections of total and filtered antimony were recorded in only two wells with maximum concentrations of 42.9 and 46.2 µg/L, respectively, measured in well CEF-015-08S. This latter concentration very slightly exceeded the IBDS value of 44.5 µg/L. There was one positive detection of total arsenic, 3.9 µg/L, and no positive detections of filtered arsenic in the wells. Positive detections of total lead were recorded in three wells, with a maximum concentration of 19.8 µg/L measured in well CEF-015-01S. This concentration exceeded both the FDEP GCTL of 15 µg/L and the IBDS value of 5.35 µg/L. However, there were no positive detections of filtered lead in the wells, and the turbidity measured in well CEF-015-01S was 501 nephelometric

turbidity units (NTUs) which is very high. It was thus hypothesized that a significant portion of the total lead concentration measured in well CEF-015-01S was associated with suspended solids rather than groundwater. To verify this, a second sampling of well CEF-015-01S was performed in May 2000, and the well was developed until measured turbidity was approximately 20 NTUs. A sample was then collected and analyzed for total and filtered lead. Analytical results showed that concentration of filtered lead was below the detection limit, and the concentration of total lead was 9 µg/L. This concentration is greater than the IBDS value but less than the FDEP GCTL.

One exceedance of the arsenic MCL and GCTL (13.7 µg/L at CEF-015-13S) was detected in July 2003 from a groundwater sample identified as having very high turbidity (greater than 1,000 NTUs). Although this exceedance was confirmed in November 2005 (16.5 µg/L at reinstalled CEF-015-13S) and in March 2006 (14.7 µg/L at reinstalled CEF-015-13S and 21.6 µg/L at new CEF-015-15S installed at same location), it was determined that the very high sample turbidities (up to 1,000 NTUs) observed in all of the samples were causing the elevated arsenic concentrations. All of the filtered samples had arsenic concentrations less than the FDEP GCTL and MCL. Because of the high turbidities in the groundwater samples, the wells were not considered adequate to provide a representative sample from the aquifer. A third well, CEF-015-16S, was installed at the same location in February 2007. This monitoring well was a 2-inch well with a larger diameter and fine sand pack. Additionally, this well was purged for several days until the groundwater was relatively clear. The turbidity recorded prior to sample collection was reported as 110 NTUs. The unfiltered arsenic concentration detected in this last sample was less than the analytical detection limit of 2.8 µg/L, which is also less than the MCL and GCTL.

Post-excavation groundwater sampling for arsenic was conducted per the ROD. Arsenic was also detected at concentrations greater than the GCTL in the well that was installed and sampled after soil excavation was complete, and the results are shown on Table 5-2. The samples were collected June 5, 2009. The unfiltered duplicate concentrations were 12.1 and 11.9 ppb with a turbidity value of 6 NTUs. When the well was resampled with a 1.0-micron filter, the unfiltered sample and its duplicate had concentrations of 12.6 and 14.5 µg/L and the filtered sample and duplicate arsenic concentrations were 16.6 and 11.8 µg/L. Another round of sampling was conducted using a 0.45-micron filter. In this round, the unfiltered arsenic concentrations were 21.8 µg/L (sample) and 19.3 µg/L (duplicate) and the filtered concentrations were 11.1 µg/L (sample) and 16.0 µg/L (duplicate). The FDEP GCTL for arsenic is 10 µg/L (and was previously 50 µg/L).

Two more rounds of sampling at CEF-015-17S were conducted in October 2009 and January 2010 with arsenic exceedances in unfiltered samples (20.0 µg/L and 10.4 µg/L, respectively). The filtered sample also exceeded the GCTL in October 2009 (22.6 µg/L), but the arsenic concentration in the filtered sample collected in January 2010 (7.3 µg/L) was less than the GCTL. The BCT decided at the February 2010

meeting (Minute No. 2608 and Decision No. 779) that another sampling event would be conducted to confirm the January 2010 results. This event was conducted in February 2010, and the arsenic concentrations in the groundwater from well CEF-015-17S were 7.5 µg/L (unfiltered) and 6.3 µg/L (filtered). Based on these results, FDEP identified that NFA would be appropriate at Site 15 if another round of sampling confirmed that the arsenic concentrations at CEF-015-17S were less than the GCTL for unfiltered samples (Meeting Minute No. 2632 and Decision No. 784, May 2010). Sampling was conducted in September 2010 and the unfiltered arsenic concentration in the groundwater at well CEF-015-17S was 2.2 µg/L, less than the GCTL of 10 µg/L. These results were presented at the November 2010 BCT meeting, and FDEP identified that the two consecutive rounds of groundwater sampling with arsenic concentrations less than the GCTL satisfied the requirement to identify that the groundwater at Site 15 was not adversely impacted by the remedial activities. It was decided (Minute No. 2647 and Decision No. 790) that a Remedial Action Completion Report (RACR) was to be prepared which will propose NFA for site and will identify that MEC issues remain to be addressed. Preparation of the RACR is underway.

5.6.2 Site Inspection

The site inspection for OU 5 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). TtNUS conducted several site visits at Site 15 as part of the field activities beginning in 1998. During the site visits soil sampling, groundwater sampling, and site walkovers were completed. No unusual observations were documented during these site visits. CH2MHill completed a final inspection on March 27, 2009. The inspection confirmed that the activities completed at the site were in compliance with the approved Work Plans and Work Plan Addenda. This remedial action only addressed areas identified as contaminated; therefore, revisions will be made to the Conceptual Site Model (CSM), Technical Project Planning, and Explosive Safety Submission which may warrant future removal actions for MEC and MD that could remain at the site. The inspection identified that the removal of MEC and maintenance of the site in regards to signage and access were ongoing. There was no sign of vandalism, trespassing, or land use changes at the site.

The land use for the site has remained unchanged. The Navy intends to transfer the property to the City of Jacksonville Parks and Recreation Department when all MEC concerns have been addressed. The Parks and Recreation Department intends to continue to use the land as a natural resources corridor and recreational area.

Site 15 LUC inspections will be completed annually by the Navy until the property is transferred, and LUCs will be incorporated into the Deed when the property is transferred, as appropriate. No issues have been reported to date.

5.6.3 Interviews

There were no interviews conducted in the course of the five year review.

5.7 TECHNICAL ASSESSMENT

5.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspection indicate that the remedy is largely functioning as intended by the ROD.

The implementation of the source control portion of the remedy was completed in March 2009. The implementation of LUCs objectives in the form of property use restrictions contained in the deed transferring the property will be protective of human health and the environment by preventing exposure to contaminated soil that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil excavation and LUCs) are operating as designed, and the RAOs have been met. The groundwater has been determined to be unaffected by the remedial actions at the site. A draft RACR is being prepared. The munitions that are present at the site and will be addressed according to the decision of the BCT.

5.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

5.7.2.1 ARAR and Site-Specific Action Level Changes

Chemical-specific ARARs have not changed since the ROD in 2008.

5.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RI. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

5.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

5.7.4 Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD and Amended ROD. There have been no changes in the physical conditions of the site, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

5.8 ISSUES

The presence of MEC/MD on site is the issue that remains at Site 15 and is currently being evaluated and will be addressed. However, the MEC and MD concerns are addressed separately from the IR program, and will therefore, not affect the NFA proposal in the RACR currently in preparation. No other issues were identified during the five-year review.

5.9 RECOMMENDATIONS FOLLOW-UP ACTIONS

The recommendations and follow-up actions developed by the BCT based on the inspection, five-year review, and anticipated transfer of the property to the Parks and Recreation Department are as follows:

Issue	Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
MEC and MD present on site	Address MEC and MD issues to enable property transfer.	Navy	U.S. EPA and FDEP	December 30, 2012	No	No

5.10 PROTECTIVENESS STATEMENT

The Site 15 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Under the CERCLA program, soil excavation and disposal, with treatment as necessary, eliminated unacceptable risks from exposure to soil, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Soil excavation activities were implemented as designed and achieved RAOs. LUCs were implemented by the Navy upon finalization of the LUC RD in May 2009, and in accordance with the LUC RD, will be continued after transfer of Site 15 to the City of Jacksonville Parks and Recreation Department. LUCs will be required until soil COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on the remedial activities that have been completed (soil excavation and disposal, with on-site treatment as needed), and that are ongoing (LUCs), the intent and goals for the ROD for Site 15 have been met.

TABLE 5-1

VOLUMES OF EXCAVATION
OPERABLE UNIT 5, SITE 15
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Excavation Area	COC	Area (ft^2)	Depth (ft)	Volume (yd^3)
A	Lead	3,205	1	119
B	Lead	14,982	1	555
C	Lead	2,904	1	108
D	Lead	19,454	1	721
E	BaPEqs	64,080	1	2,373
F1 - F4	Arsenic, Lead, BaPEqs	3,169	2	235
G	BaPEqs	14,446	1	535
H	BaPEqs	16,503	1	611
I	BaPEqs	22,749	1	843
J	BaPEqs	6,308	1	234
K	BaPEqs	4,404	1	163
L1[1]	BaPEqs	94,477	1	3,499
L2[1]	TRPH	448	2	17
M	Lead	353	1	13
N	Lead	16,249	1	602
O	BaPEqs	11,802	1	437
P	Lead	16,159	1	599
Q	Lead	3,219	1	119
	TOTALS	**314,911**		**11,799**

1 All of Area L1 was excavated to 1 foot below ground surface. Area L2, which is within Area L1, was excavated an additional 1 foot (to 2 ft below ground surface). The total surface area of L1 (94,477 ft^2) includes the surface area of L2 (488 ft^2).

BaPEqs - Benzo(a)pyrene equivalents.
COC - Contaminant of concern.
ft - Feet.
ft^2 - Square feet.
TRPH - Total recoverable petroleum hydrocarbon.
yd^3 - Cubic yards.

TABLE 5-2

SUMMARY OF INORGANIC ANALYTES DETECTED IN GROUNDWATER - APRIL 2000
OPERABLE UNIT 5, SITE 15
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP GCTL[1]	U.S. EPA MCL[2]	Background Screening Concentration[3]
Inorganic Analytes (Total), µg/L					
Antimony	3/8	2.9 - 42.9	6.0	6.0	44.5
Arsenic	1/8	3.9	10.0	10.0	7.1
Lead	3/8	2.1 - 19.8	15	15	5.35

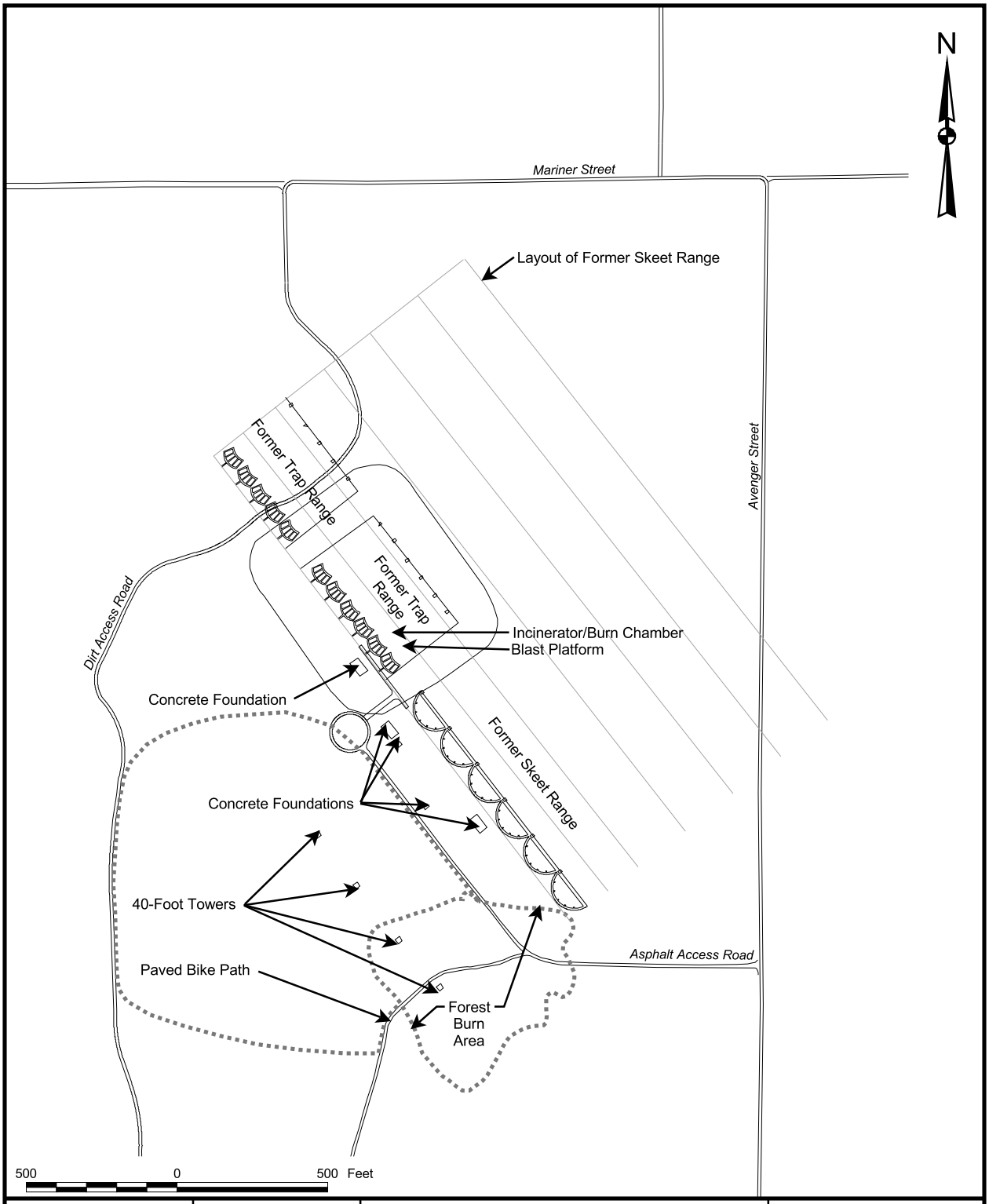
1 - Florida Department of Environmental Protection (FDEP Groundwater Cleanup Target Levels (GCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
2 - United States Environmental Protection Agency (U.S. EPA) Maximum Contaminant Levels (MCLs) (U.S. EPA, 2002)
3 - NAS Cecil Field Inorganic Background Data Set values (HLA, 1998).

No organics were detected in groundwater during this sampling event.

TABLE 5-3

POST-EXCAVATION ARSENIC CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 5, SITE 15
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Well	Date	pH	GCTL (ug/L)	Arsenic Results (ug/L)			
				Unfiltered		Filtered	
Pre-Excavation Arsenic Results							
CEF-015-13S	7/15/2003	5.11		13.7		NC	
CEF-015-13S	11/22/2005	5.37		16.5	U	8	U
CEF-015-13S	3/15/2006	5.4		14.7		3.5	
CEF-015-15S	3/21/2006	5.22		22.4		2.9	U
CEF-015-16S	2/28/2007	5.34		2.8	U	2.8	U
Post-Excavation Arsenic Results							
CEF-015-17S	6/5/2009	6.24		12.1		NC	
Duplicate				11.9		NC	
CEF-015-17S	6/19/2009	4.4		12.6		10.6	
Duplicate				14.5		11.8	
CEF-015-17S	6/29/2009	4.21		21.8		11.1	
Duplicate				19.3		16	
CEF-015-17S	10/07/09	4.80		20.0		22.6	
CEF-015-17S	01/14/10	5.47		10.4		7.3	I
CEF-015-17S	02/04/10	5.55		7.5	I	6.3	I
CEF-015-17S	09/10/10	5.24		2.2	I	NC	



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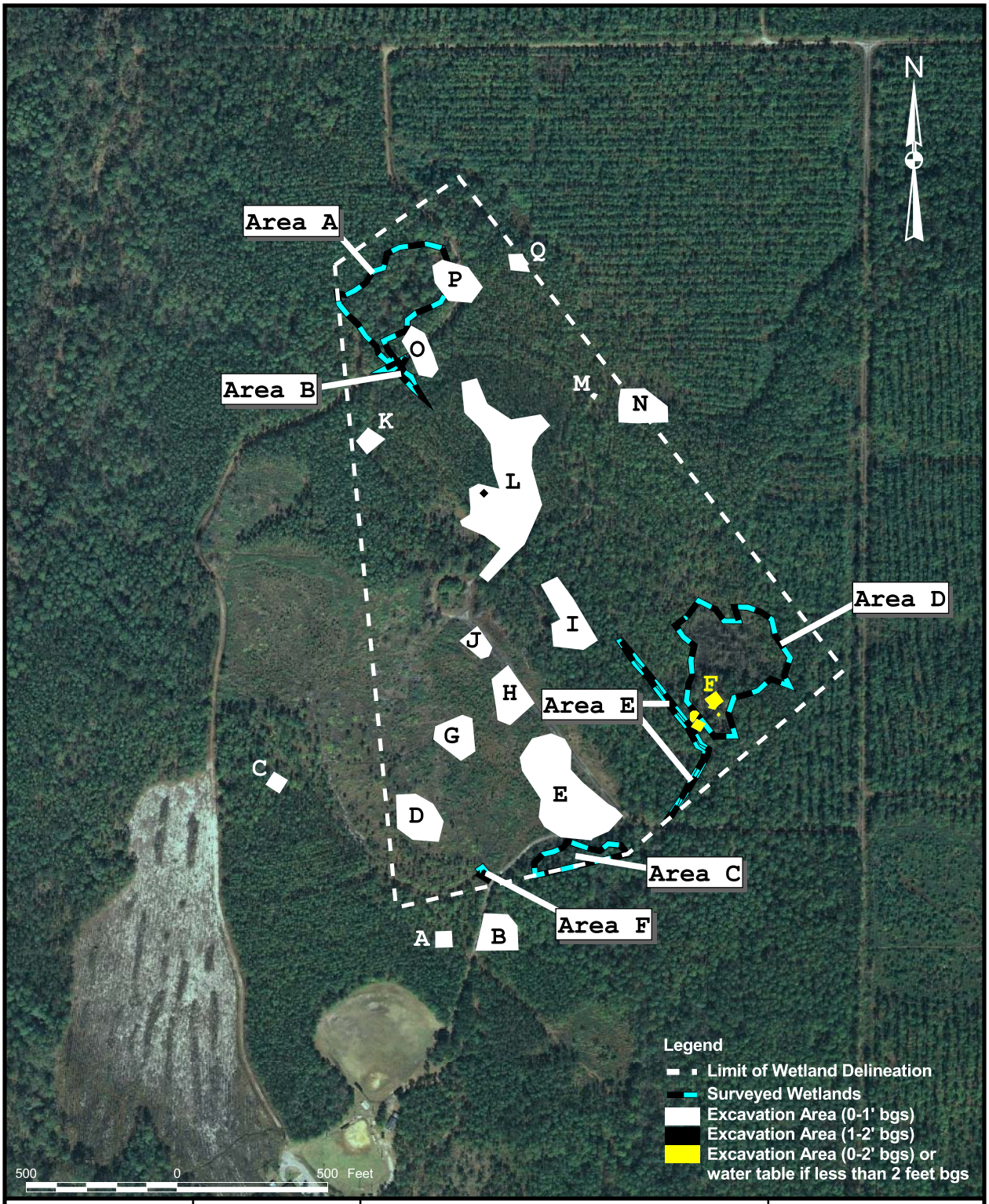
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-1 / REV 0

site-15_20091013.apr 13Oct09 01-03



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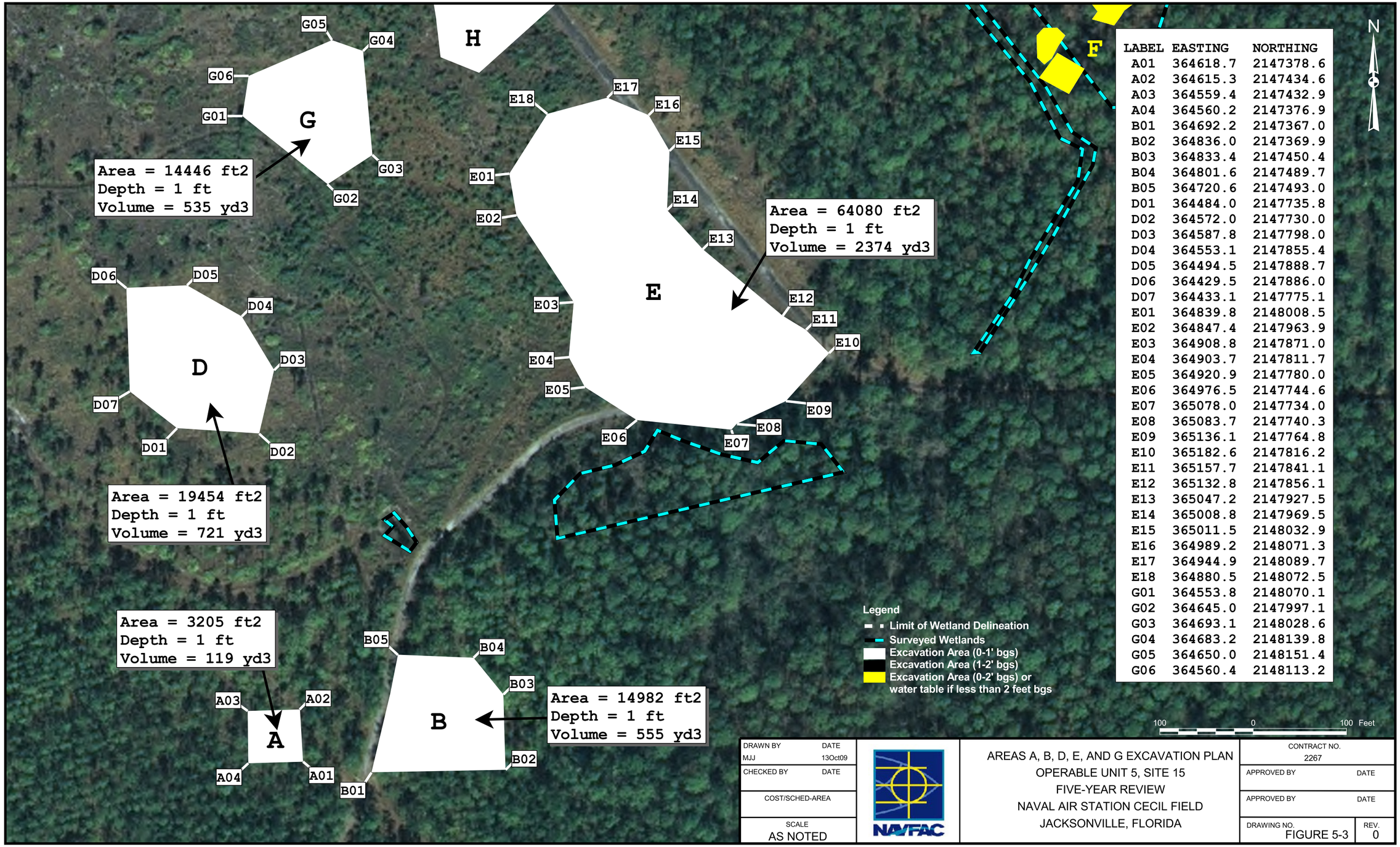
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-2 / REV 0

site-15_20091013.apr 13Oct09 01-04

site-15_20091013.apr 17Mar11 03-01



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B03	364833.4	2147450.4
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D06	364429.5	2147886.0
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E03	364908.8	2147871.0
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E05	364920.9	2147780.0
E06	364976.5	2147744.6
E07	365078.0	2147734.0
E08	365083.7	2147740.3
E09	365136.1	2147764.8
E10	365182.6	2147816.2
E11	365157.7	2147841.1
E12	365132.8	2147856.1
E13	365047.2	2147927.5
E14	365008.8	2147969.5
E15	365011.5	2148032.9
E16	364989.2	2148071.3
E17	364944.9	2148089.7
E18	364880.5	2148072.5
G01	364553.8	2148070.1
G02	364645.0	2147997.1
G03	364693.1	2148028.6
G04	364683.2	2148139.8
G05	364650.0	2148151.4
G06	364560.4	2148113.2

DRAWN BY MJJ	DATE 13Oct09	AREAS A, B, D, E, AND G EXCAVATION PLAN OPERABLE UNIT 5, SITE 15 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHED-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-3 / REV. 0

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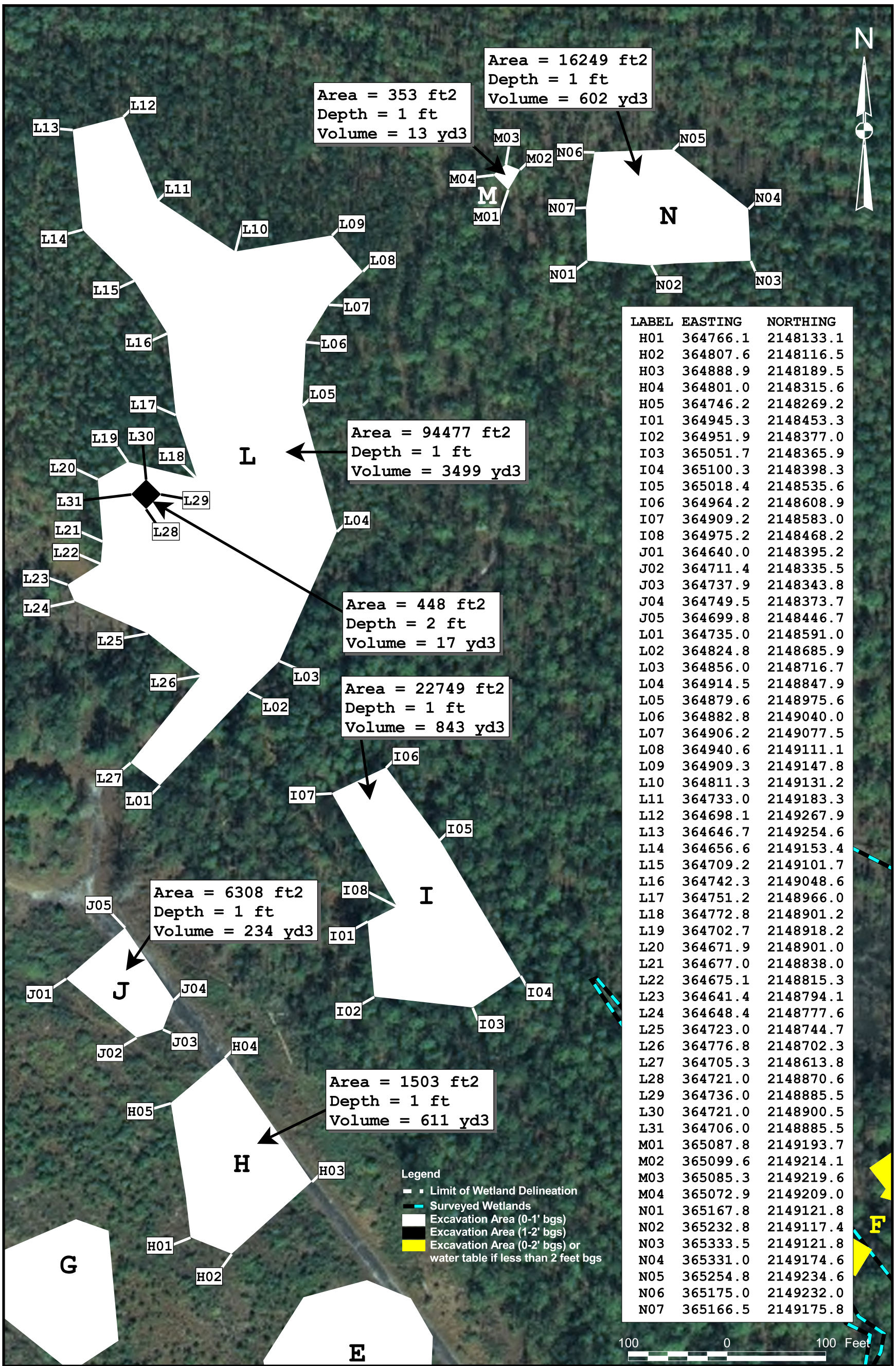

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I03	365051.7	2148365.9
I04	365100.3	2148398.3
I05	365018.4	2148535.6
I06	364964.2	2148608.9
I07	364909.2	2148583.0
I08	364975.2	2148468.2
J01	364640.0	2148395.2
J02	364711.4	2148335.5
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J04	364749.5	2148373.7
J05	364699.8	2148446.7
L01	364735.0	2148591.0
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L22	364675.1	2148815.3
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L31	364706.0	2148885.5
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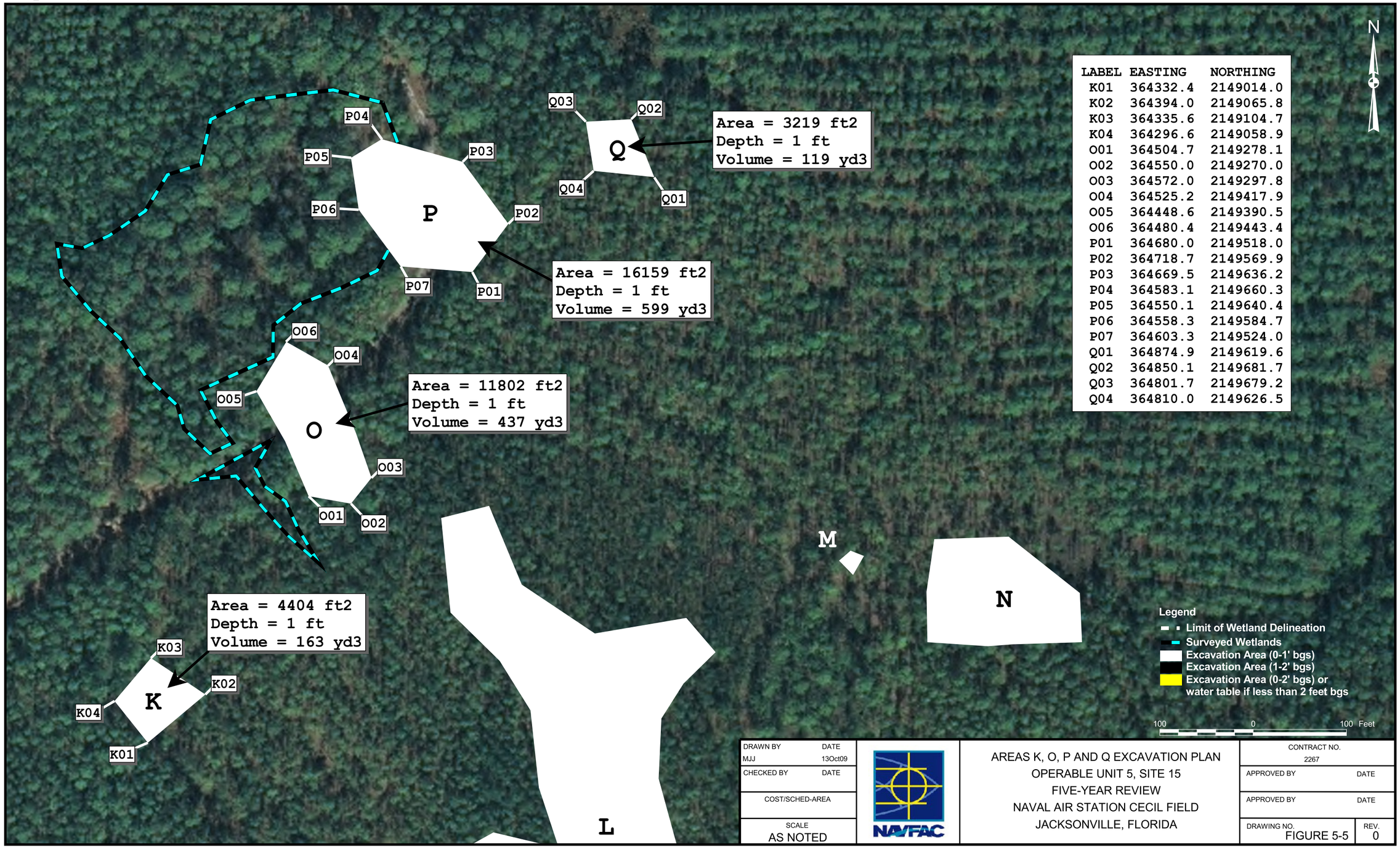
DRAWN BY MJJ	DATE 13Oct09	AREAS H, I, J, L, M, AND N EXCAVATION PLAN OPERABLE UNIT 5, SITE 15 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA
CHECKED BY	DATE	CONTRACT NUMBER 2267
COST/SCHEDULE-AREA		APPROVED BY / DATE
SCALE AS NOTED	NAVFAC	APPROVED BY / DATE
		DRAWING NO. FIGURE 5-4 / REV 0

site-15_20091013.apr 17Mar11 03-03



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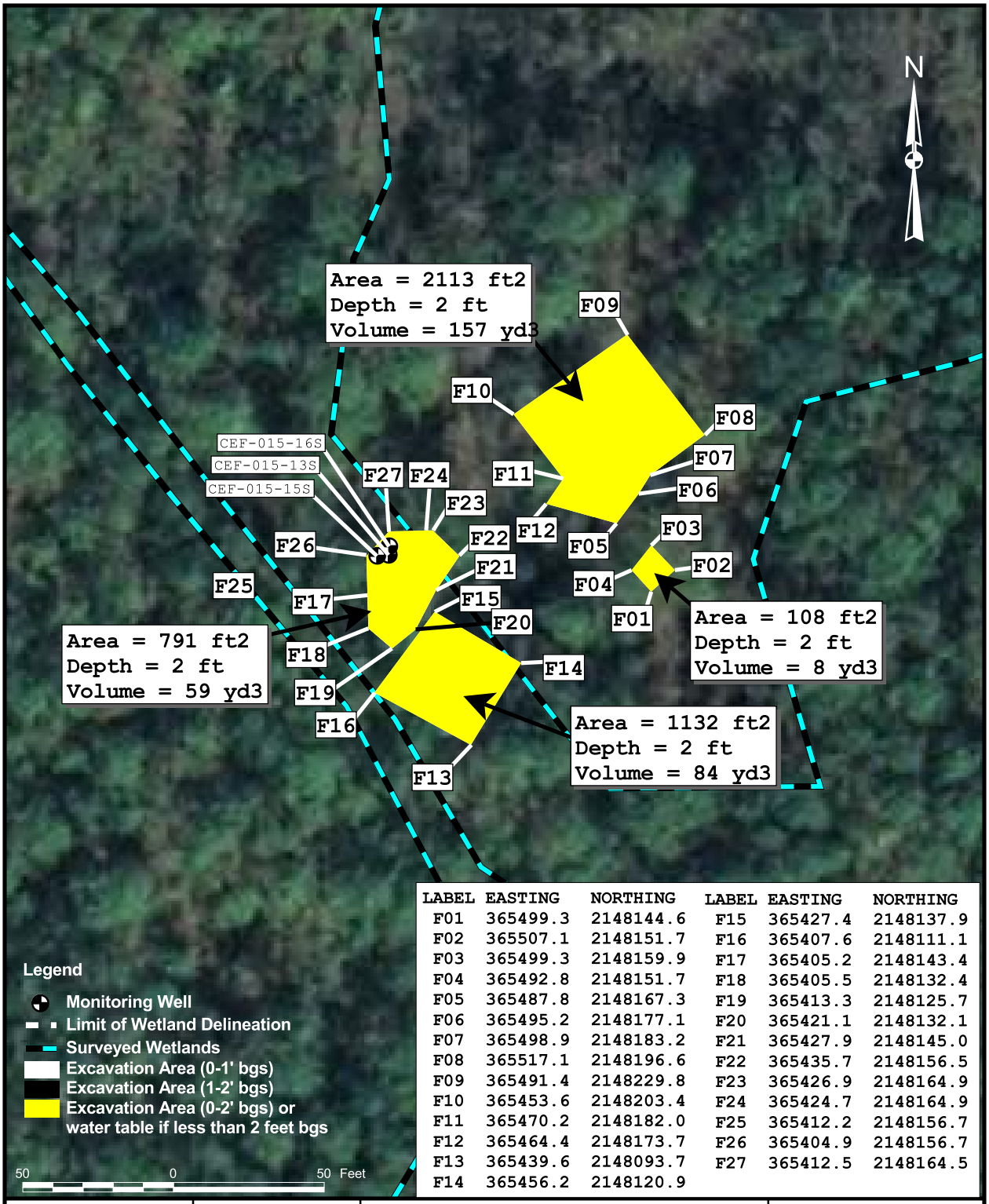
O02	364550.0	2149270.0
O03	364572.0	2149297.8
O04	364525.2	2149417.9
O05	364448.6	2149390.5
O06	364480.4	2149443.4
P01	364680.0	2149518.0
P02	364718.7	2149569.9
P03	364669.5	2149636.2
P04	364583.1	2149660.3
P05	364550.1	2149640.4
P06	364558.3	2149584.7
P07	364603.3	2149524.0
Q01	364874.9	2149619.6
Q02	364850.1	2149681.7
Q03	364801.7	2149679.2
Q04	364810.0	2149626.5

DRAWN BY MJJ	DATE 13Oct09	AREAS K, O, P AND Q EXCAVATION PLAN OPERABLE UNIT 5, SITE 15 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHED-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-5 / REV. 0



LABEL	EASTING	NORTHING	LABEL	EASTING	NORTHING
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F04	365492.8	2148151.7	F18	365405.5	2148132.4
F05	365487.8	2148167.3	F19	365413.3	2148125.7
F06	365495.2	2148177.1	F20	365421.1	2148132.1
F07	365498.9	2148183.2	F21	365427.9	2148145.0
F08	365517.1	2148196.6	F22	365435.7	2148156.5
F09	365491.4	2148229.8	F23	365426.9	2148164.9
F10	365453.6	2148203.4	F24	365424.7	2148164.9
F11	365470.2	2148182.0	F25	365412.2	2148156.7
F12	365464.4	2148173.7	F26	365404.9	2148156.7
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DRAWN BY MJJ	DATE 13Oct09	AREA F EXCAVATION PLAN OPERABLE UNIT 5, SITE 15 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
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SCALE AS NOTED			DRAWING NO. FIGURE 5-6 REV 0

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6.0 OPERABLE UNIT 7, SITE 16

6.1 INTRODUCTION

The soil remedial action at OU 7, Site 16 was completed in 1994, and the groundwater remedial action began in 1998 and is ongoing. This five-year review provides a detailed review of the soil and groundwater remedial actions, including AS/vapor extraction (VE) system construction/operation and 6 years of monitoring data, and is being conducted as a matter of policy until the cleanup levels are achieved, so as to allow unlimited use and unrestricted exposure. OU 7 consists of Site 16, the AIMD Seepage Pit / Non-Destructive Inspection (NDI) Holding Tank.

6.2 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
RI	1992
Focused FS	1993
Interim ROD for soil	1994
Interim Removal Action for soil	1994
RI/FS complete	1995
BRA	1996
Proposed Plan	March 1996
ROD	July 1996
Revised Proposed Plan	January 1999
Groundwater Monitoring – Quarterly intervals	September 1998 to January 2001
Amended ROD	April 1999
Storm Sewer Repair	April 1999
Groundwater Remedial Design	March 1999
AS/VE system installation and start-up	June 1999
AS/VE system turned off	May 2000
AS/VE system turned on	December 2000
Groundwater monitoring – Semi-annual intervals	January 2001 to present
AS/VE system turned off	February 2001
ESD	November 2003
AS/VE system turned on	December 2004
AS/VE system turned off	January 2005
LUC RD	April 2005

Event	Date
OPS Demonstration	April 2005
Site 16 FOST	June 17, 2005
Pilot Study for In-Situ Bioremediation in effect	July 2007 – October 2007
Pilot Study for In-Situ Chemical Oxidation (ISCO) in effect	April 2008 – July 2008
Direct-Push Technology (DPT) Investigation Workplan	March 2009
AS/VE System turned on	April 2009

6.3 BACKGROUND

Physical Characteristics

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 a site map showing the contaminated groundwater plumes at the site are provided on Figures 6-1 and 6-2, respectively.

Land and Resource Use/History of Contamination

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 eastern 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.

Initial Response and Basis for Taking Action

The1985 base-wide IAS conducted by Envirodyne Engineers, Inc. recommended further investigation for Site 16 based on the types of wastes disposed, the high potential for contaminant migration, and the presence of receptors. In the 1988 base-wide RFI conducted by HLA, hazardous constituents were detected in groundwater and sediment at Site 16, and further study was recommended.

6.4 REMEDIAL ACTIONS

6.4.1 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 soils and 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 as follows:

- 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 in 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 greater 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 consistent with CERCLA and the NCP. This action was considered protective of human health and the environment. Soil contamination that remained after the interim remedial action would be addressed during the RI and FS and the resulting ROD.

The ROD for groundwater and the stormwater sewer system was signed in July 1996. This ROD was amended to revise the RAOs, based on re-evaluation of site conditions, risks, and legal requirements (ARARs). The Amended ROD was signed in April 1999. The following RAO was identified in the Amended ROD: Prevent exposure to groundwater that contains chlorinated VOCs at concentrations that are greater than the State of Florida GCTLs (which include the state and federal drinking water standards), and that cause unacceptable risk to human health.

The original ROD for 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. Because of 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 AS/VE for groundwater in the source area, natural attenuation of groundwater in the downgradient area, repair of a damaged section of the storm sewer, implementation of LUCs, 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.

6.4.2 Remedy Implementation

6.4.2.1 Soil

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 (see Figure 6-3). Associated piping was removed or plugged with grout, and 1,500 cubic yards of surrounding contaminated soil was excavated and disposed off site.

6.4.2.2 Storm Sewer Repair

As identified in the Design Basis Document for Operable Unit 7, Site 16, the 66-inch-diameter storm sewer between manholes CF-STM2-6 and CF-STM2-7 required repair. The RAC submitted a Work Plan Addendum for the installation and inspection of the cured-in-place liner system. The liner system was installed by the RAC in April 1999 in accordance with Navy SPECINTACT Specification 02776, provided in the Design Basis Document (see Figure 6-4).

6.4.2.3 AS/VE System

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/VE system at Site 16. The full-scale AS/VE began operation in June 1999. The AS/VE system is composed of a VE system, an AS system, and a gas-phase granular activated carbon adsorption system to treat the off gases (see Figures 6-5 and 6-6).

Construction of the AS/VE system to treat the area of high groundwater contaminant concentrations within the source area was performed by CH2MHill, the RAC for the Navy, in accordance with the Groundwater Remedial Design. Design parameters for the system were determined by conducting a

pilot-scale test. The full-scale system consists of three pairs of air injection wells with one well in each pair (three wells) screened at an intermediate depth of 58 feet to 60 feet bgs, and the other well in each pair (three wells) screened at a deep depth of 95 feet to 100 feet bgs; 19 vapor extraction wells screened from 3 feet to 7 feet bgs across the area; and three piezometers used to monitor the effectiveness of the VE system. A granular activated carbon off-gas treatment system consisting of two 1,500-pound units placed in series treats the extracted vapors.

Although the AS/VE system was successful in decreasing TCE concentrations, it proved to not be a permanent solution, because the concentrations rebounded after a few months of being shut down each of the three times the system was stopped. Other treatment alternatives began to be considered in 2006.

Based on the results of two pilot studies discussed below, the AS/VE system was restarted April 16, 2009.

6.4.2.4 In-Situ Bioremediation Treatment System

TtNUS completed the Pilot Study Workplan for In-Situ Bioremediation for the Navy in July 2007. The workplan included the specifications necessary to construct and operate the bioremediation treatment system. The bioremediation system was designed to use reductive dechlorination to degrade TCE at Site 16 by employing appropriate bacteria [*Dehalococcoides* (DHC)], a suitable electron donor (sodium lactate), and favorable geochemical conditions (sodium carbonate/bicarbonate injected to adjust pH). Construction of the pilot scale system was completed and pilot-scale operation began July 19, 2007. The recirculation system ran for five days with no injection to ensure proper recirculation. Sodium carbonate injection was initiated July 24, 2007, but sodium lactate addition was delayed because a precipitate formed in the injection well. Sodium carbonate and sodium lactate were injected from September 3, 2007 through October 8, 2007, but precipitate again formed in the injection well and in-line filter, clogging them. Troubleshooting of the system was conducted from October 8 to October 25, 2007 while the system ran intermittently, and the system was shut down on October 25, 2007. Because of the frequency of the shut-downs of the system, the injection quantities of sodium lactate and sodium carbonate were less than what was proposed in the workplan, and DHC was not injected.

Eight sampling events were scheduled to track the progress of the bioremediation system, but only the baseline sampling was completed because the system did not progress past start-up. On November 23, 2007, pH adjustment jar tests were conducted at Site 16 to test how the precipitant formed. The jar tests indicated pH adjustment at Site 16 was not possible without the formation of a noticeable precipitant. The continuous formation of the precipitant ultimately caused the pilot study to fail. It was determined that the low groundwater pH in the area of the pilot study and the effects of previous AS at the site rendered the site incompatible with the technology of promoting anaerobic degradation for the remediation of TCE.

6.4.2.5 In-Situ Chemical Oxidation Treatment System

The general approach of the ISCO pilot study was to oxidize Site 16 COCs through hydrogen peroxide injection. Hydrogen peroxide ISCO is a proven technology using Fenton's reaction, which uses soluble iron as a catalyst in conjunction with hydrogen peroxide. New wells were installed at Site 16 for the ISCO pilot study, and the system was started up on April 23, 2008 and ran in recirculation mode until April 28, 2008. On April 28, 2008, the hydrogen peroxide injection pump was initiated and the system ran as designed until July 28, 2008 with two minor shutdowns (May 5, 2008 and June 10 to 11, 2008). Precipitate formation caused the wells to clog, limiting chemical injection. The ISCO Pilot Study Workplan recommended the injection of approximately 187 gallons of a 35 percent hydrogen peroxide solution; however, approximately 47 gallons of 35 percent solution were added. The volume of hydrogen peroxide was less than that projected in order to reduce the formation of precipitate.

The system was effective in reducing TCE concentrations, but was not recommended as a full-scale solution at Site 16 because well fouling would require high levels of maintenance to maintain oxidant injection wells and would cause excessive backpressures from the precipitation of metals that could impede oxidant delivery.

6.4.2.6 Groundwater Monitoring

The natural attenuation sampling work plan was included in the groundwater remedial design. Quarterly groundwater monitoring activities began in September 1998, and sampling frequency was changed to semi-annually in February 2002. Twenty-seven groundwater sampling events have been conducted at Site 16 in support of the OU 7, Site 16 groundwater remedial design.

6.4.2.7 Land Use Controls

LUCs required at Site 16 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC control objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).
- Prohibit the breaching of the storm sewer line that intersects the contaminated groundwater plume at the site.

An ESD for multiple sites was finalized in November 2003 that modified the Amended ROD for Site 16 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements took effect upon finalization of the LUC RD for Site 16, April 22, 2005. The LUCs remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 16 property to JAA, as required by FDEP. Therefore, the LUCs have remained in effect upon conveyance of the property to JAA per the FOST dated June 17, 2005. Any subsequent owners will also be responsible for maintaining LUCs as long as they are necessary.

6.4.2.8 DPT Investigation

TCE was detected during sampling associated with the Pilot Studies in two wells at concentrations exceeding the remedial system action level. A DPT investigation was proposed to determine the extent of groundwater concentrations in excess of the system action level as a means to determine if additional remedial activities ought to be considered.

The DPT investigation was conducted in March 2009, and results indicated that all areas with TCE concentrations greater than 1,000 μg/L were within the effective area of the existing AS/VE system.

6.4.3 System Operations/Operation and Maintenance

The in-situ bioremediation system and ISCO system were not implemented as full-scale systems.

6.4.3.1 AS/VE System

Start-up of the AS/VE system occurred on June 18, 1999. A quarterly groundwater sampling event was conducted prior to system start-up, during the week of April 26, 1999. This event consisted of sampling both source area and downgradient monitoring wells. The source area results were used as a baseline to help evaluate the effectiveness of the active remedial system.

The system was taken off line on May 26, 2000 based on the results of two consecutive sampling events in which the remedial groundwater objective (1,000 µg/L TCE) was met. However, based on the Year 2 second-quarter results, the AS/VE system was restarted on December 22, 2000. Following the Year 2 third-quarter sampling, the system was shut off again on February 7, 2001. The system was restarted in December 2004 after review of the July 2004 data because TCE concentrations had rebounded to greater than 1,000 µg/L, and turned off again January 14, 2005, about one week prior to January 2005

sampling. Weekly checks on the system were conducted whenever the system was not on, and the unit was periodically started up to confirm that the equipment was still in working condition. Visual inspections are conducted to see if damage has occurred due to environmental conditions or vandalism.

The effectiveness of the AS/VE system is measured in two ways: by measuring the concentrations of total VOCs extracted by the VE system, and through the evaluation of reductions in groundwater contamination in the source area, as identified by groundwater monitoring results.

Air samples were collected using Suma canisters during system start-up and approximately every month the system operates as directed in the groundwater remedial design. The air samples, analyzed via U.S. EPA Method 18: TO-14, are collected both before and after the granular activated carbon off-gas treatment system to evaluate the amount of VOCs extracted and to evaluate the effectiveness of the off-gas treatment system. Because most of the contaminants are TCE or biological degradation products of TCE, total VOC concentrations are also a good indicator of TCE removal.

Air samples were collected beginning on June 21, 1999 (first full day of system operation), and are collected approximately every 3 to 4 weeks when the system is in operation. A total of 12 air sampling events were conducted and reported in the RAC O&M quarterly reports. The first sampling event identified that approximately 23 pounds of total VOCs were extracted by the system and that the off-gas treatment unit, using granular activated carbon, had a greater than 99 percent removal efficiency prior to discharge to the atmosphere. As shown on Figure 6-7, the loading rate of the extracted VOC vapors decreased over time.

The reduction in VOC loading continued to decline until the January 2000 evaluation (after approximately 7 months of operation) when the concentration began to level off at less than 0.5 pounds of total VOCs per day. At the time of the first system shut off (May 2000), the VE unit was only extracting approximately 0.02 pounds of total VOCs per day. An air sample was collected on December 27, 2000 after the AS/VE system was restarted on December 22, 2000. The results identified that only 0.3 pounds of total VOCs were extracted. Because this extraction rate was expected to decrease, and because it was already less than the regulated criterion of 13.75 pounds per day of total VOCs, the granular activated carbon off-gas treatment system was taken off line in January 2001. Air samples were collected on a weekly basis for the first month and then on a monthly basis until February 2001 when the AS/VE system was taken out of service. The results of these sampling events were reported in quarterly O&M reports prepared by the RAC.

Prior to the initial system start-up, the total amount of TCE in source area groundwater was estimated at 878 pounds using the April 1999 monitoring well data. Approximately 1,220 pounds of total VOCs were

extracted during the initial operation of the system, with the majority of the removal occurring in the first few months of operation (see Figure 6-8). This is a good indication that the majority of the chlorinated VOC contamination in the source area was removed.

The air sampling results indicating that the majority of groundwater contamination was removed in the first few months of remedial system operation correspond well with the groundwater sampling analytical results, which identify a rapid reduction in groundwater contamination in the same time period.

Piezometer wells were installed around the exterior of Building 313 to measure the effectiveness of the VE system and to determine if VOCs generated from the AS operation would cause an unsafe condition in the area of the building. In accordance with the groundwater remedial design, organic vapor analyzer (OVA) measurements from the piezometers were evaluated and reported in the quarterly O&M reports. Elevated OVA readings were identified during the November 1999 sampling effort, as reported in the second-quarter O&M report, and the system was adjusted accordingly. The December 1999 OVA readings were less than 30 ppm, except PZ-1, which had a reading of 200 ppm. An air sample from this piezometer well was collected for fixed-base analysis, and the results were compared to worker exposure criteria. The evaluation identified that the concentration of TCE observed in PZ-1 was less than the published criterion for worker exposure.

The AS/VE system has been reliable during its operation. Downtime occurs during planned maintenance activities such as air compressor oil and filter changes, and changing of granular activated carbon units. The system was also shut down for a few days prior to and during groundwater sampling events. Other downtimes have occurred as a result of power supply outages.

TCE concentrations rebounded after the shutdowns in February 2001 and January 2005. In response to these exceedances in remedial system treatment level, the AS/VE system was restarted in December 2004 and April 2009. The system continues to operate as designed.

6.4.3.2 Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted in accordance with the Amended ROD, the Final Remedial Design, the Work Plan Addendum for Long-Term Monitoring at Sites 3, 5, 8, and 16, and the recommendations of the Years 1 through 10 annual reports for Site 16. Monitoring began in August 1998 and includes 12 quarterly and 15 semi-annual groundwater sampling events. Monitoring wells within and downgradient of the plume were sampled and analyzed for VOCs and natural attenuation parameters. Sampling of deep monitoring well CEF-16-11DD, required once every 5 years, was conducted in January 2009 to verify that vertical migration is not occurring.

The monitoring system is operating as designed, remedy performance is being measured on a regular basis, and preliminary data indicate that the plume is contained and that the required remedial objectives are likely to be attained in accordance with the remedy design. The current and future land use is aviation flightline activities. The Navy is regularly re-evaluating the status of the site to optimize the monitoring program for Site 16. The monitoring frequency is specified in the recommendations of the annual groundwater reports for Site 16. Based on the January 2001 results, the BCT changed the sampling frequency from quarterly to semi-annually. Groundwater monitoring is expected to continue for 30 years. Optimization of the long-term monitoring program will continue to be considered after each round of data is collected and analyzed.

6.4.3.3 Cost

The Navy's original cost estimate for implementation of the Interim Removal Action was between $772,000 and $3,133,000. The RAC completed the excavation and disposal for OU 7 for approximately $725,000. The Groundwater Remedial Design estimated the NPW cost of the AS/VE system and 1 year of operation to be $712,000. The actual cost to install the AS/VE system was approximately $500,000, and operational costs were approximately an additional $5,500 per month. The cost of storm sewer repair was estimated in the Amended ROD at $106,000; the actual cost of the repairs was $244,000. Implementation of long-term monitoring and LUCs was estimated to cost approximately $780,000. The cost per groundwater monitoring event ranges from approximately $8,000 to $12,000 depending on the number of wells sampled. The cost for the implementation of the remedy over the 5 years encompassed in this five-year review is approximately $258,000, including long-term monitoring sampling and analysis, treatment system operation, DPT investigation, and Pilot Studies. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

6.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 7 during the past review period.

> The remedy at OU 7 is expected to be protective of human health and the environment upon completion. The implementation of the AS/VE and long-term groundwater monitoring program provides a degree of protection of human health and the environment. Implementation of the LUCs 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 soil 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 generally remained constant or decreased over the monitoring period. The AS/VE system has been installed and operated, and the storm sewer has been repaired. The results of future groundwater monitoring will be used to evaluate performance/operation of the AS/VE system and effectiveness of the storm sewer repair.

LUCs will be implemented upon finalization of the LUC RD for Site 16. The Navy will temporarily retain control of OU 7, Site16 and will transfer the property when it has determined that the remedial action is OPS or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

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 (AS/VE and 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.

The following recommendations and required actions were developed by the BCT based on the previous five-year review for OU 7, Site 16:

Previous Recommendation/ Required Action	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program	Semi-annually	Long-term monitoring was completed semi-annually since the last five-year review
Implement LUCs	Upon finalization of the LUC RD	The LUC RD was finalized April 22, 2005 and the LUCs went into effect immediately

6.6 FIVE-YEAR REVIEW PROCESS

6.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 7, Site 16 including the ROD and Amended ROD, ESD, the NDI Holding Tank Closure Certification and Report, the Groundwater Remedial Design, AS/VE and the storm sewer investigation and construction completion reports, Pilot Study Work Plans for In-Situ Bioremediation and In-situ Chemical Oxidation, DTP Investigation Work Plan, LUC RD, OPS Demonstration, and long-term groundwater monitoring reports. The soil removal action, including removal of soils and structures that acted as a source of groundwater contamination, was completed at Site 16. Confirmatory sampling detected TCE concentrations in soil at a maximum concentration of 0.65 mg/kg, less than the established cleanup level. No further soil excavation is required. The area of excavation is shown on Figure 6-3, and analytical results from soil sampling activities conducted for the RI in 1995 are shown on Figures 6-9 and 6-10.

The following section summarizes groundwater results for Site 16 based on review of associated documents. Groundwater monitoring is ongoing semi-annually at Site 16.

The maximum concentrations of COCs identified in the RI, immediately before startup of the AS/VE system, in January 2004, and during the most recent sampling are shown in Table 6-1. VOC detections from the last five sampling events are presented on Figure 6-11.

Analysis for BEHP was discontinued after the first year of sampling because the compound was not detected for several consecutive sampling events.

The concentrations and numbers of VOCs and SVOCs detected at the site have decreased significantly since the RI, particularly near the source. The TCE concentration in well CEF-45I/46I was 978,000 µg/L in April 1999 before start-up of the AS/VE system and had decreased to 879 µg/L by July 2003. The AS system was shut down on January 14, 2005, and by that time, concentrations of all VOCs except TCE had decreased to less than FDEP GCTLs, and no contaminants had been detected in the downgradient point-of-compliance wells or in CEF-16-11DD (deep well sampled once every 5 years). The bioremediation treatment system pilot study was conducted from July through October 2007, and the ISCO system pilot study was conducted from April through July 2008.

Only baseline groundwater sampling was performed along with the bioremediation system, because the pilot study for the system did not progress past the start-up phase. Baseline sampling at the three monitoring wells that were part of the pilot study showed TCE at concentrations exceeding its GCTL at

two locations: 387 µg/L and 4,050 µg/L. TCE concentrations during the ISCO pilot study baseline sampling in December 2007 were 524 µg/L at CEF-016-MW-02, and 1,640 µg/L at CEF-016-MW-04.

Although the TCE concentrations in several wells initially increased after the initial start-up of the AS/VE system, the concentrations have gradually declined since the initial peak. The concentration of TCE in well CEF-16-09D, near the source, increased to 497 µg/L about 5 months after the initial start-up of the AS/VE system. Prior to this, no TCE was detected. Since that time, the concentration has decreased and was 51.6 µg/L in January 2004. TCE concentrations decreased during the ISCO pilot study, with the final sampled concentrations being 823 µg/L at CEF-016-MW-04 in May 2008, and 566 µg/L at CEF-016-MW-02 in June 2008. However, the concentrations at CEF-016-MW-02 rebounded to 1,200 µg/L by July 7, 2008.

During the most recent sampling event, second semi-annual, Year 11, in September 2009, TCE was detected at CEF-016-07S at 5.5 µg/L, an increase from 3.7 µg/L during the previous event, and after being less than the GCTL (at 1.2 µg/L) for the first time since July 2006, in October 2008. TCE was 85.6 µg/L at CEF-016-10S, significantly greater than the GCTL and an increase from 7.9 µg/L (March 2009) and 6.0 µg/L, the concentration in October 2008 which was the lowest TCE concentration at that well since January 2004. No constituents, including TCE, were detected at concentrations greater than their respective GCTLs at CEF-016-12I. TCE continued to be detected at levels greater than the GCTL at source area wells CEF-016-46I (86.8 µg/L) and CEF-016-09D (30.3 µg/L). There were no downgradient TCE exceedances at nine of the eleven downgradient wells. Many of the wells have not had exceedances since July 2001 or before (CEF-016-21S, CEF-016-22I, CEF-016-23D, CEF-016-35S, CEF-016-38S, and CEF-016-39I). CEF-016-44I had a TCE concentration of 25 µg/L during the September 2009 sampling, and TCE was detected at CEF-016-27I at 45.3 µg/L.

Site data in the source area are not conclusive regarding the effectiveness of natural attenuation at the site. DO values generally indicate anaerobic conditions. OPR readings are not indicative of either oxidative or reductive conditions. Concentrations of dissolved sulfide, ferrous iron, alkalinity, and carbon dioxide detected in September 2009 were generally consistent with historical concentrations, and remained low. The geochemical data of the first year of monitoring indicated that anaerobic biological processes were occurring within and downgradient of the source area. When the AS/VE system is operating, DO concentrations in the source area increase, and the groundwater conditions became more favorable to aerobic biological activity. Since the AS/VE system was turned off in 2005, natural attenuation parameter results did not clearly indicate that there was active reduction of contamination at the site from NA alone. Non-destructive mechanisms such as advection, dispersion, sorption, and volatilization also may be contributing to the further reduction of contaminant concentrations at the site.

The AS/VE system installation and the storm sewer repair were conducted in accordance with the remedial design. The layout of the wells and the equipment building are shown on Figure 6-5, and conceptual layout of the AS/VE equipment is shown on Figure 6-6. The location of the storm sewer repair is shown on Figure 6-4. The in-situ bioremediation treatment pilot study system and ISCO pilot study system were installed and operated according to their respective work plans. The bioremediation and ISCO treatment systems were not installed on a full-scale, but did affect the concentrations of contaminants in groundwater. Because the systems tested by the pilot study were not altogether effective in permanently reducing TCE concentrations at the site, and natural attenuation does not seem to be effective in reducing TCE concentrations alone, the AS/VE system was turned on again April 16, 2009, according to the May BCT Meeting Minute 2552.

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 and modified based on recommendations of annual monitoring reports appears to be adequate.

Quarterly, semi-annual, and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 16 are adequate for evaluating the concentration trends of COCs at the site. The Navy is routinely re-evaluating the status of the site to optimize the monitoring for Site 16.

The monitoring system is providing adequate data to evaluate remedy performance and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source, at the perimeter of the AS/VE system zone of influence, and at downgradient locations.

A shallow VOC plume is present beneath buildings at Site 16; therefore, the Navy evaluated the potential for vapor intrusion in these buildings. The results were presented in the submission entitled “Potential Indoor Air Evaluation Locations due to underlying contaminated groundwater at NAS Cecil Field”, February 2001. This report concluded that groundwater contamination was not identified at levels greater than the Connecticut Groundwater Standards for Protection of Indoor Air in any residential areas. Therefore, vapor intrusion at this site is not a concern and any possible indoor air contamination would likely be due to building activities and would likely not be attributable to groundwater contamination.

6.6.2 Site Inspection

The site inspection for OU 7 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark

Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at OU 7, Site 16 included visual observations of the area, the AS/VE system and pilot study systems during their operation, the storm sewer system, and the groundwater monitoring wells. The inspection identified that there had been no damage to the fence protecting the remedial system, or to the signs at the site. Inspection observations indicated that the remedy and monitoring program were operating as designed and are protective of human health and the environment. TtNUS conducted several site visits at Site 16 as part of the field activities from 1998 and 2009. Activities conducted during the site visits included construction monitoring of the AS/VE system installation and pilot study installations, groundwater sampling, and site walkovers. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Navy has transferred the site and surrounding property to JAA, which intends to continue the land use as an airport. The base reuse plan indicates OU 7, Site 16 will continue to be used for industrial purposes. LUC objectives and use restrictions outlined in the LUC RD were included in the Deed.

Site 16 LUC inspections have been completed annually by JAA since the transfer of the property, and no issues were discovered, as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RD. The five-year review field inspection confirmed the LUC compliance.

6.6.3 Interviews

There were no interviews conducted in the course of the five year review.

6.7 TECHNICAL ASSESSMENT

6.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the Interim ROD and Amended ROD, with some changes.

The implementation of the source control portion of the remedy was completed in June 1994. The implementation of the long-term groundwater monitoring program is ongoing and indicates overall that natural attenuation is working at the site. There is less evidence of natural attenuation occurring at the site during the most recent sampling events than in past sampling events. The AS/VE system has been turned back on and is functioning as designed at Site 16. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil excavation, pilot studies, and storm sewer repair) and that are currently in operation (AS/VE system operation and long-term groundwater monitoring) are operating as designed, and the data indicate progress toward meeting the RAOs.

6.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

6.7.2.1 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 FDEP regulations (Chapter 62-777, FAC Contaminant Cleanup Target Levels Rule and Chapter 62-785, FAC Brownfields Criteria Rule) and revised Florida Surface Water Quality Standards (Chapter 62-302, FAC).

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 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 4 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 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.

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

6.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RI. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 7.

6.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

6.7.4 Technical Assessment Summary

According to the data reviewed and the site inspections, the remedy is functioning as intended by the ROD and Amended ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

6.8 ISSUES

When OU 7, Site 16 was transferred to JAA, LUCs as defined in the LUC RD needed to be continued. These LUCs are designed to ensure protection of human health and the environment. When the Navy transferred the property to JAA, these LUCs, by way of deed restrictions, notices, or other agreements were adopted. The current and future land use at these sites suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met...

The other issue at Site 16 is that TCE concentrations in groundwater have been found to rebound to greater than the remedial system action levels when the AS/VE system is shut down. The active remedial system was effective in removing a significant amount of contamination, however the rebounding of TCE concentrations above the action level indicates more source area treatment might be required. Rebounding of contamination is not uncommon with the type of active remediation and it is anticipated eventually this technology will obtain its design objective. The Pilot Study Technical Memorandum (TtNUS, 2010) identified that the most appropriate action to address the rebound of TCE concentrations was to operate the existing system again until TCE concentrations reduced to below the system action level and continue this cycle as needed until the cleanup goals are obtained.

6.9 RECOMMENDATIONS FOLLOW-UP ACTIONS

There are no recommendations for OU 7, as no deficiencies were identified during the five-year review.

6.10 PROTECTIVENESS STATEMENT

The Site 16 remedy is expected to be protective of human health and the environment upon completion and, in the interim, exposure pathways that could result in unacceptable risks are being controlled. Removal of the soil and structures that acted as a source of groundwater contamination was completed in 1994 and met the RAOs identified in the Interim ROD. Although the original groundwater remedy was not implemented, the remedy documented in the Amended ROD, including source area AS/VE, downgradient natural attenuation, storm sewer repair, and LUCs, was implemented as designed, achieved an equivalent level of protection, and attained RAOs. AS/VE and natural attenuation continue to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs in the form of deed restrictions provide a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. AS/VE, natural attenuation, and the associated groundwater monitoring program were implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in April 2005, and in accordance with the LUC RD, are being continued after transfer of Site 16 to JAA per the FOST dated June 2005. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on the remedial activities that have been completed (source removal) and that are ongoing (AS/VE, natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 16 have been or will be met.

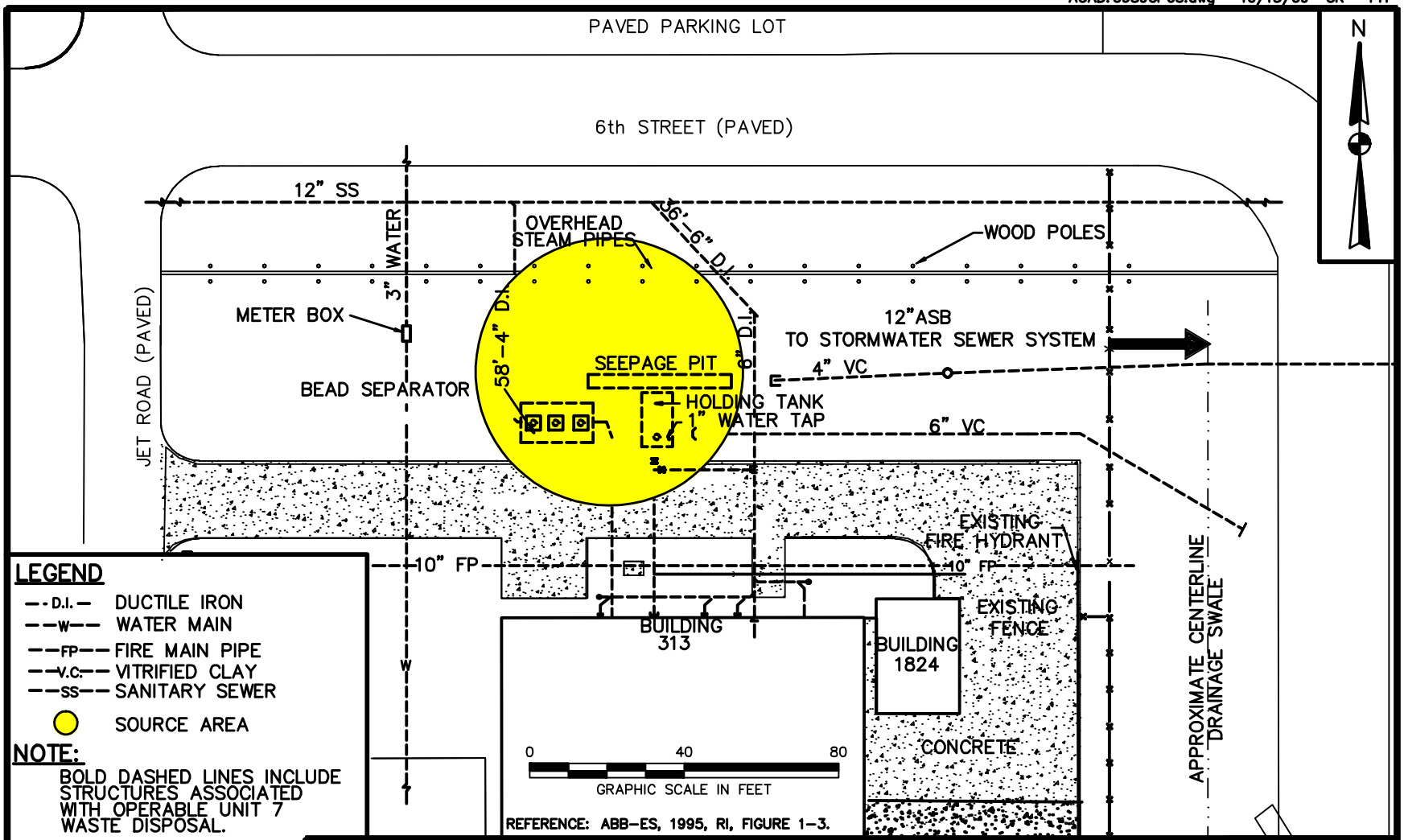
TABLE 6-1

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Contaminant of Concern	Current Regulatory Criteria		Remedial Investigation		Pre AS/VE Startup Maximum Concen-tration	January 2004		September 2009	
	FDEP GCTL	U.S. EPA MCL	Frequency of Detection	Maximum Concen-tration		Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (µg/L)									
1,1,1-Trichloroethane	200	200	1 / 26	3,000	8,030	2 / 13	11.2	3 / 17	18.8
1,1-Dichloroethane	70	NC	1 / 26	1	2,710	2 / 13	10	4 / 17	7.5
1,1-Dichloroethene	7	7	1 / 26	400	3,620	2 / 13	2	3 / 17	1.9
cis-1,2-Dichloroethene	70	70	2 / 26*	12,500*	11,900	10 / 13	29.6	6 / 17	7.9
trans-1,2-Dichloroethene	100	100	2 / 26*	12,500*	49.9	2 / 13	1	0 / 16	--
Trichloroethene	3	5	7 / 26	630 J	978,000	10 / 13	879	11 / 17	274
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)									
bis(2-Ethylhexyl) phthalate	6	6	21 / 26	20.5	ND	NA	NA	NA	NA

Data are from the shallow surficial aquifer.
J = Estimated concentration.
NC = No criterion.
NA = Not analyzed.
ND = Not detected.
bis(2-Ethylhexyl) phthalate was eliminated as a contaminant of concern based on long-term monitoring data.
* Data are for total 1,2-dichloroethene.

ACAD: 0989CP03.dwg 10/13/09 CK PIT



LEGEND

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

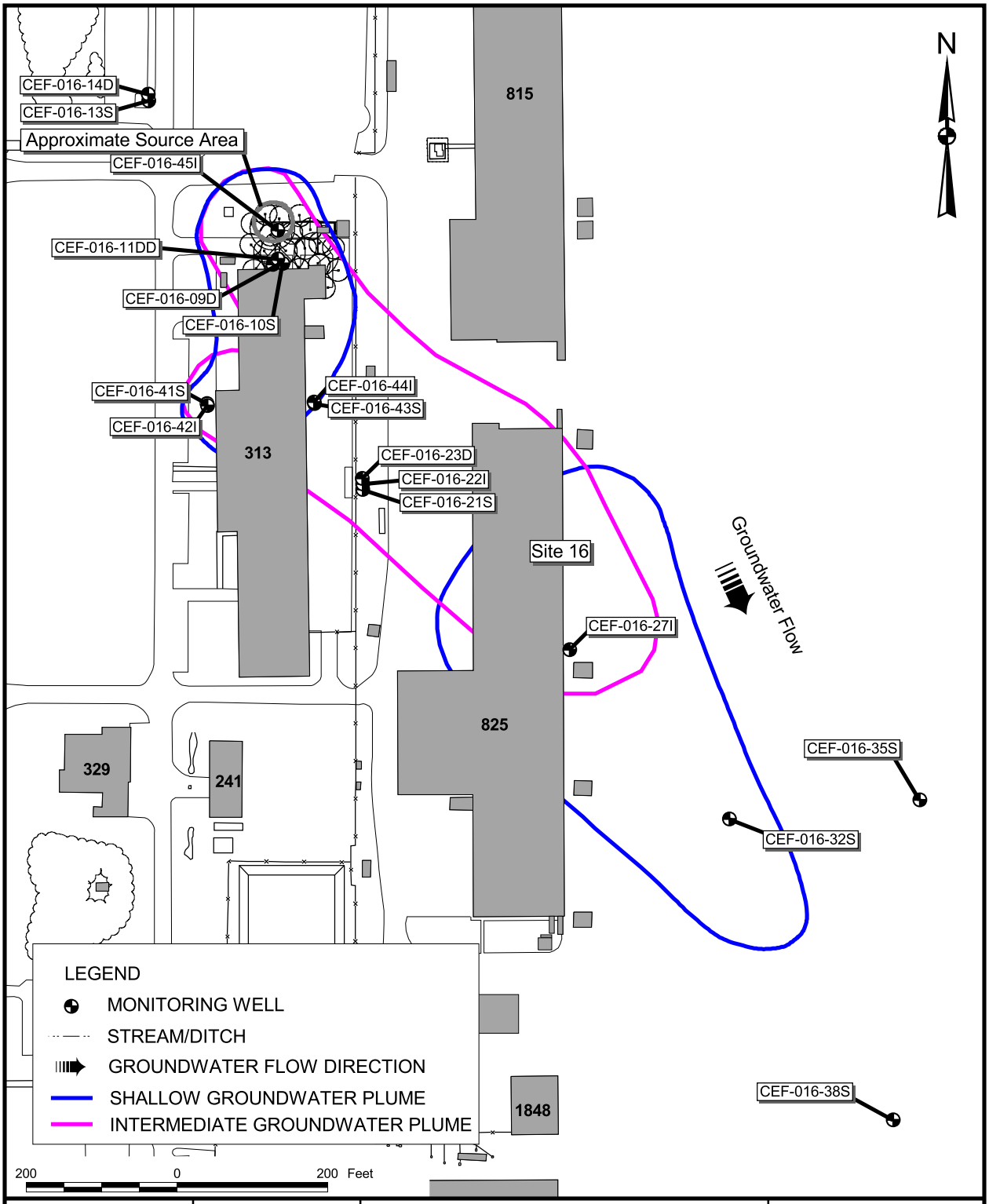
NOTE:

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

DRAWN BY CK	DATE 10/13/09	SITE LAYOUT BEFORE REMOVAL ACTION OPERABLE UNIT 7, SITE 16 FIVE YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-1 / REV. 0

NAVFAC

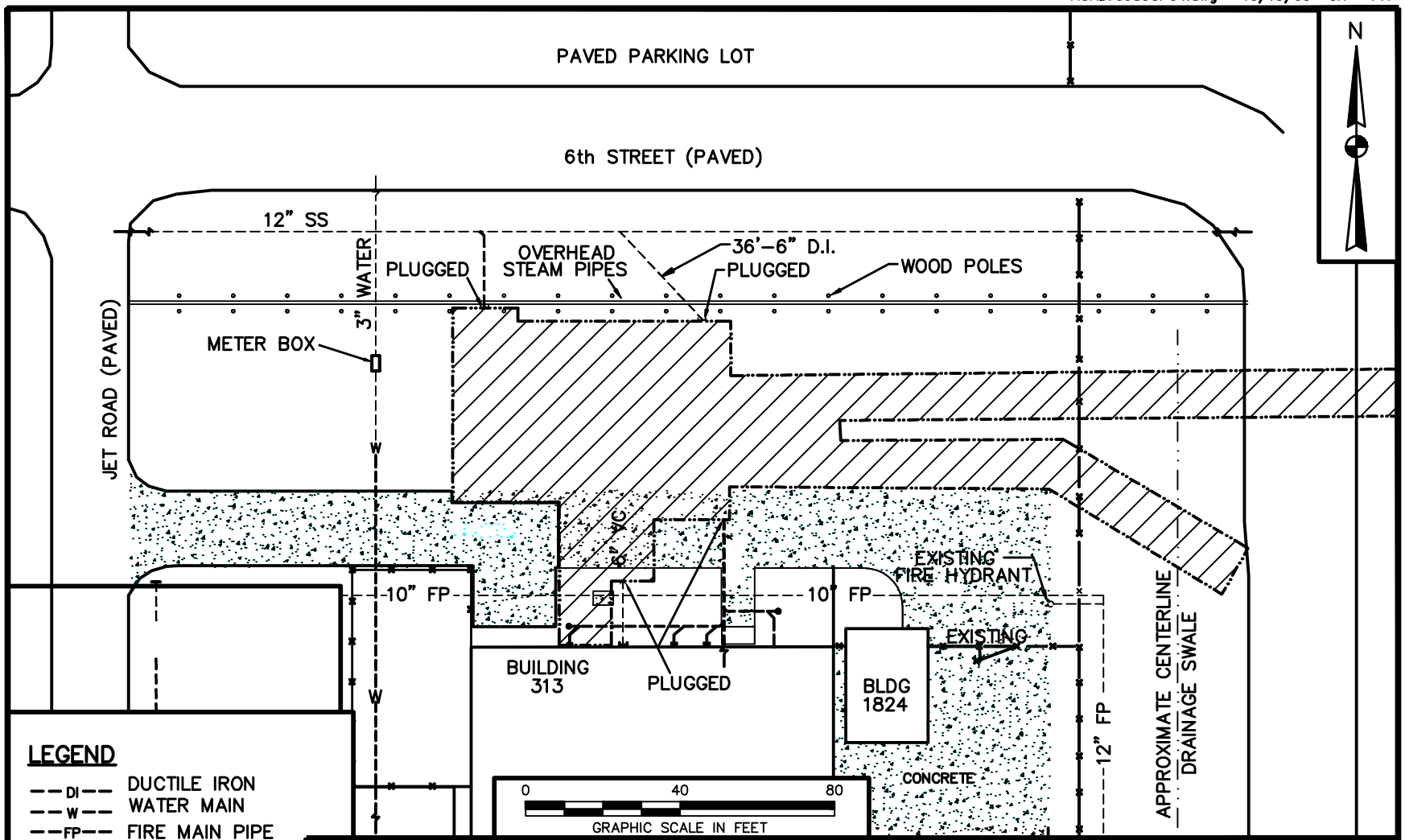
FORM CADD NO. SDIV-AH.DWG - REV 1 - 9/10/98



DRAWN BY MJJ	DATE 13Oct09	SITE MAP OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-2 / REV 0

P:\GIS\NAS_CecilField\Chapter-07.apr 13Oct09 MJJ Layout 7-2

ACAD: 0989CP04.dwg 10/13/09 CK PIT



LEGEND

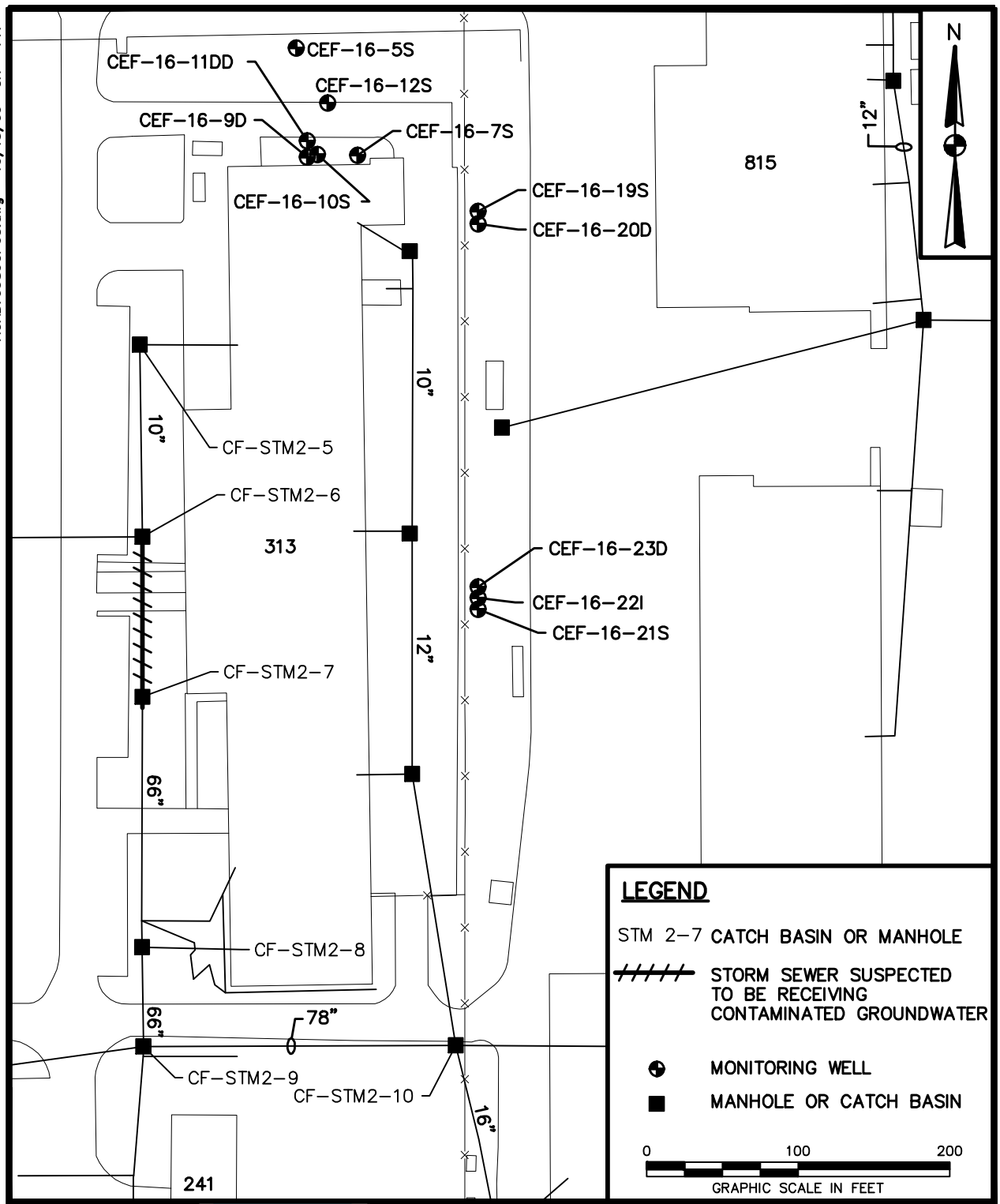
- DI — DUCTILE IRON WATER MAIN
- W — WATER MAIN
- FP — FIRE MAIN PIPE
- VC — VITRIFIED CLAY
- SS — SANITARY SEWER
- EXTENT OF EXCAVATION

REFERENCE: ABB-ES, 1995, RI, FIGURE 2-4.

DRAWN BY CK	DATE 10/13/09	AREA OF EXCAVATION FOR INTERIM REMOVAL ACTION OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-3 / REV. 0

NAVFAC

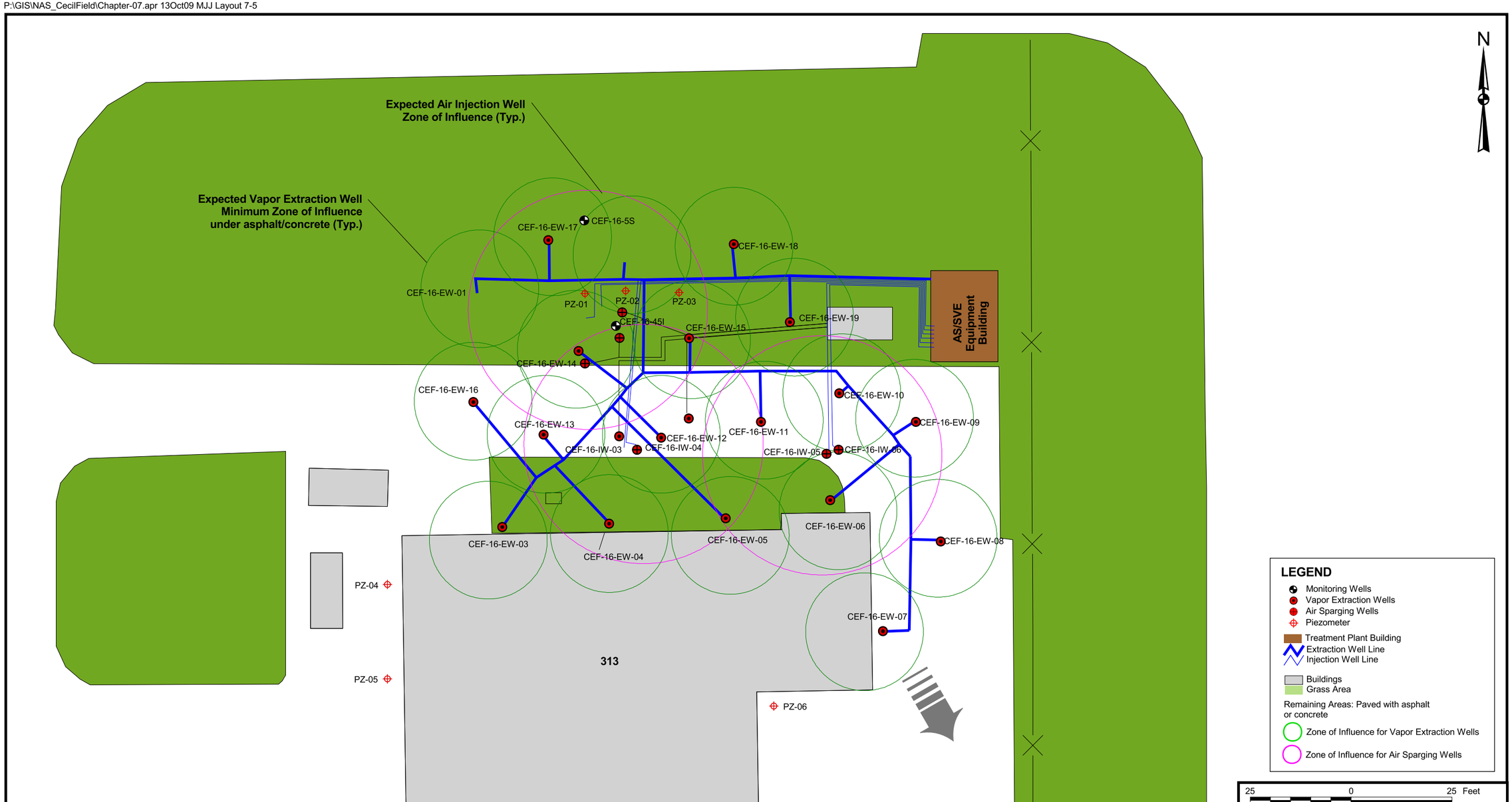
FORM CADD NO. SDIV-AH.DWG - REV 1 - 9/10/98



ACAD: 0989CP05.dwg 10/13/09 CK PIT

DRAWN BY CK	DATE 10/13/09	STORM SEWER SYSTEM REPAIR OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989
CHECKED BY	DATE		OWNER NO. 0000
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-4 / REV. 0

P:\GIS\NAS_CecilField\Chapter-07.apr 13Oct09 MJJ Layout 7-5



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

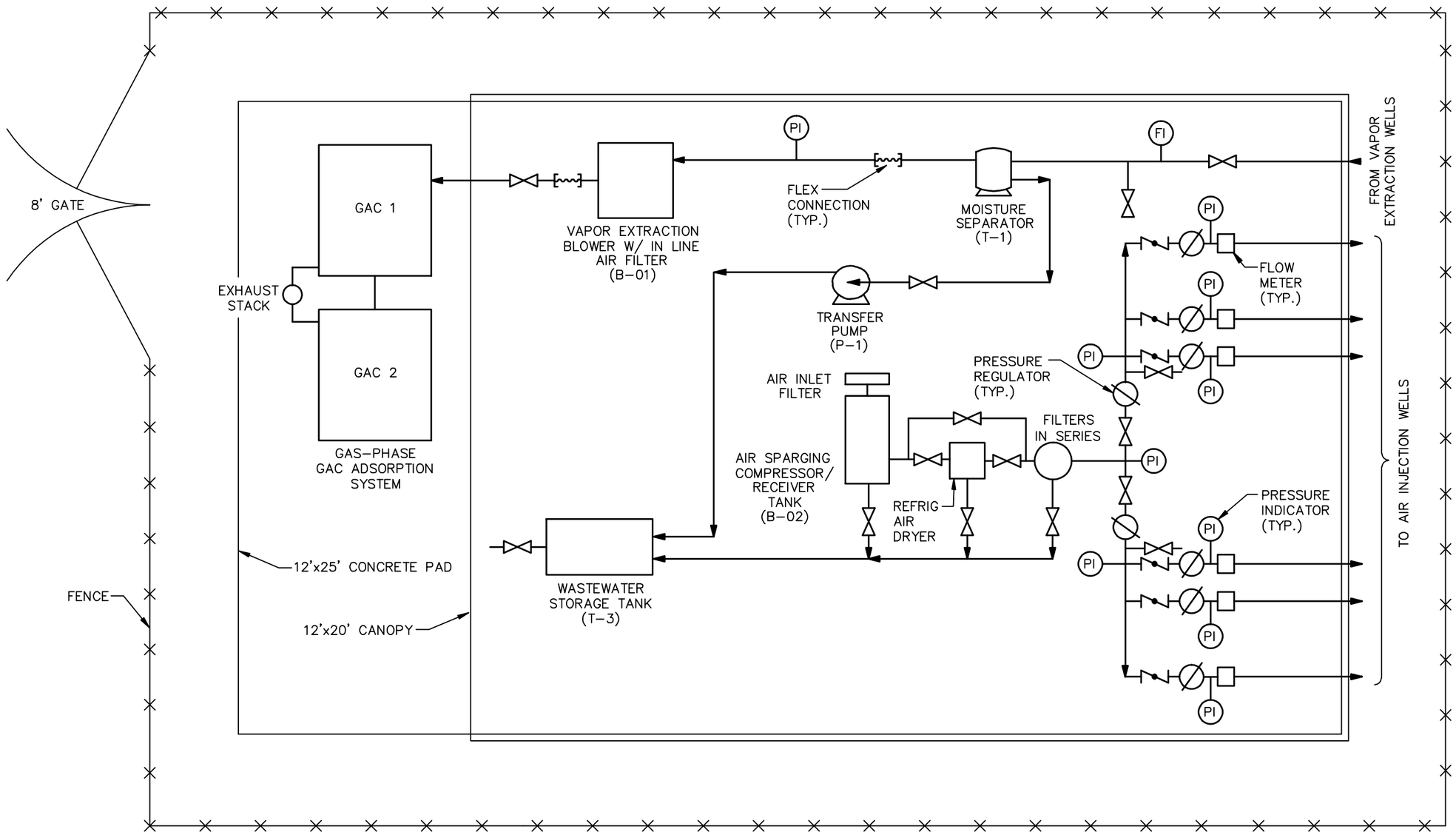
DRAWN BY MJJ	DATE 13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

AIR SPARGING / VAPOR EXTRACTION SYSTEM LAYOUT
OPERABLE UNIT 7, SITE 16
FIVE - YEAR REVIEW
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

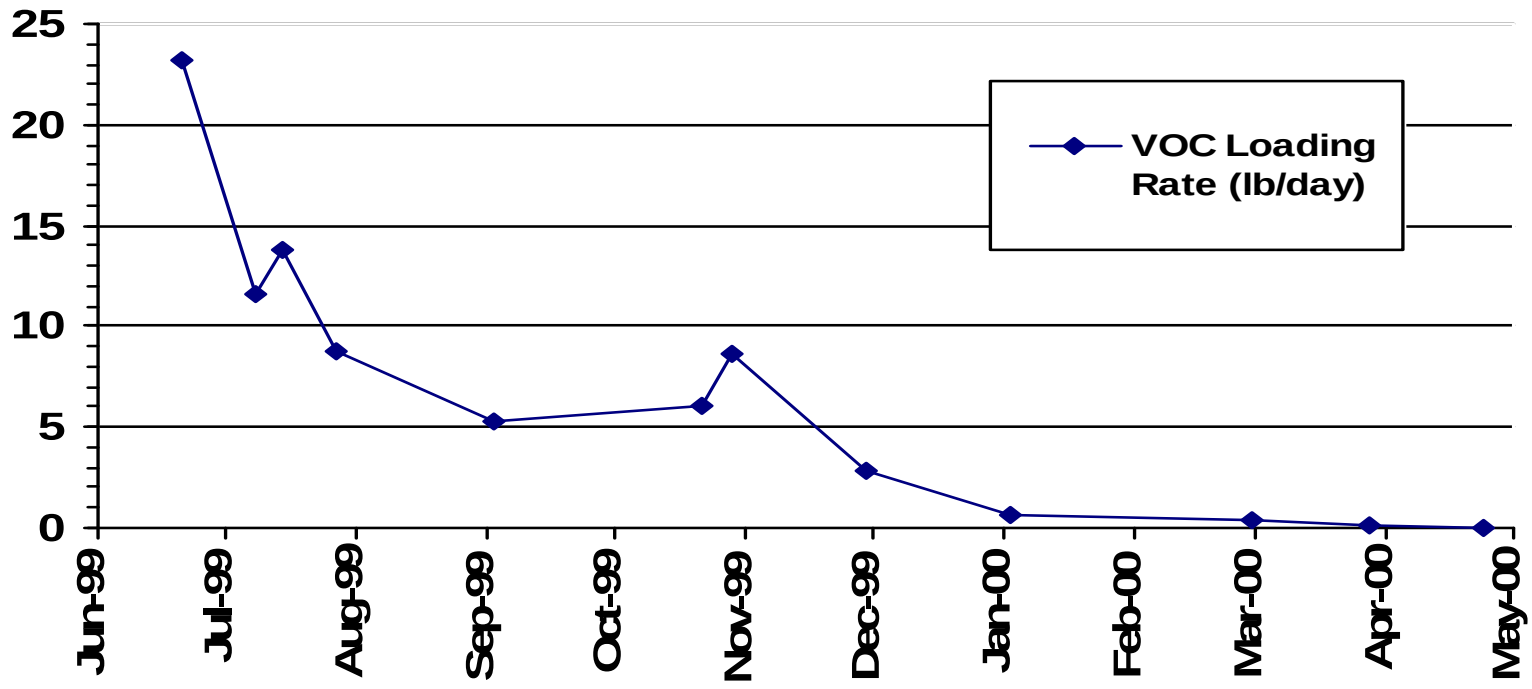
CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-5	REV. 0

ACAD:0989CP06.dwg 10/13/09 CK PIT



DRAWN BY CK DATE 10/13/09	NAVFAC	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. 0989
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 6-6 REV. 0

FORM CADD NO. SDIV-BH.DWG – REV 1 – 9/10/98



VOC removal based on groundwater data.

DRAWN BY MJJ	DATE 29Dec04	OFF-GAS VOC LOADING RATE OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-7 / REV 0

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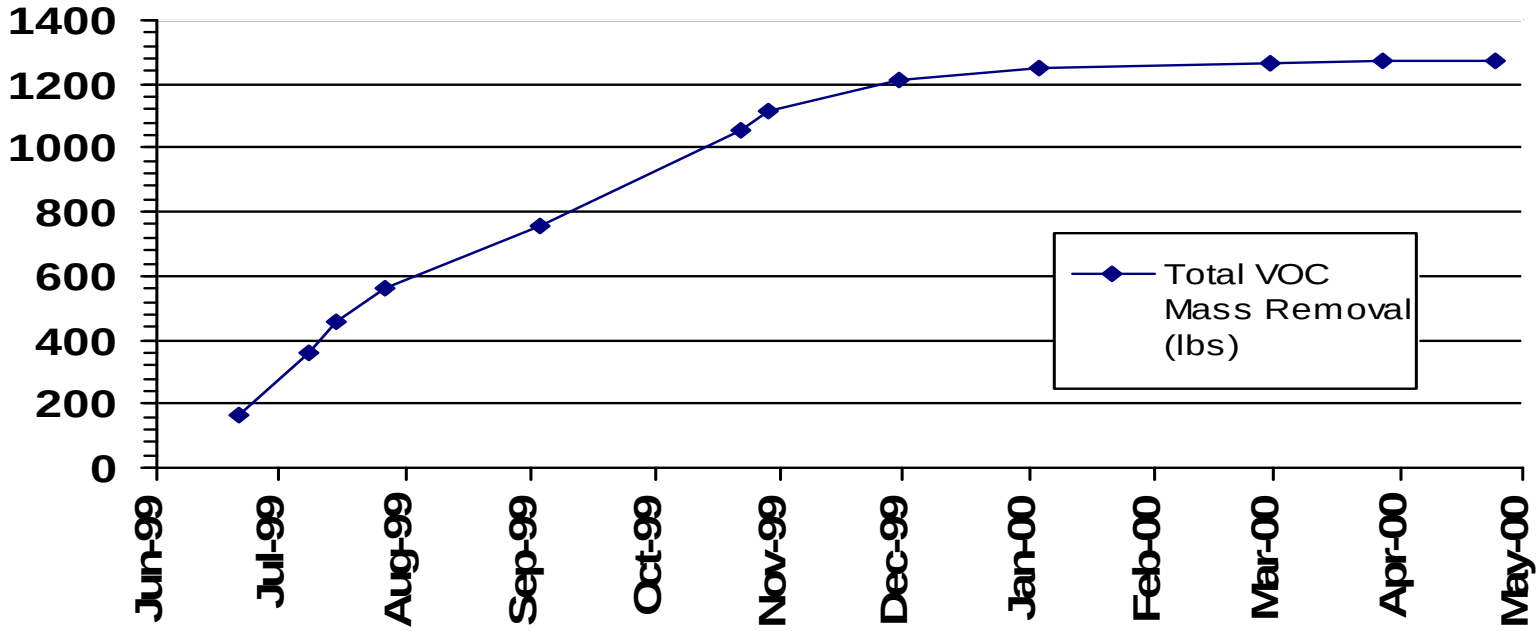

VOC removal based on groundwater data.

DRAWN BY MJJ	DATE 29Dec04	VOC MASS REMOVAL FROM GROUNDWATER OPERABLE UNIT 7, SITE 16 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 6-8 / REV 0

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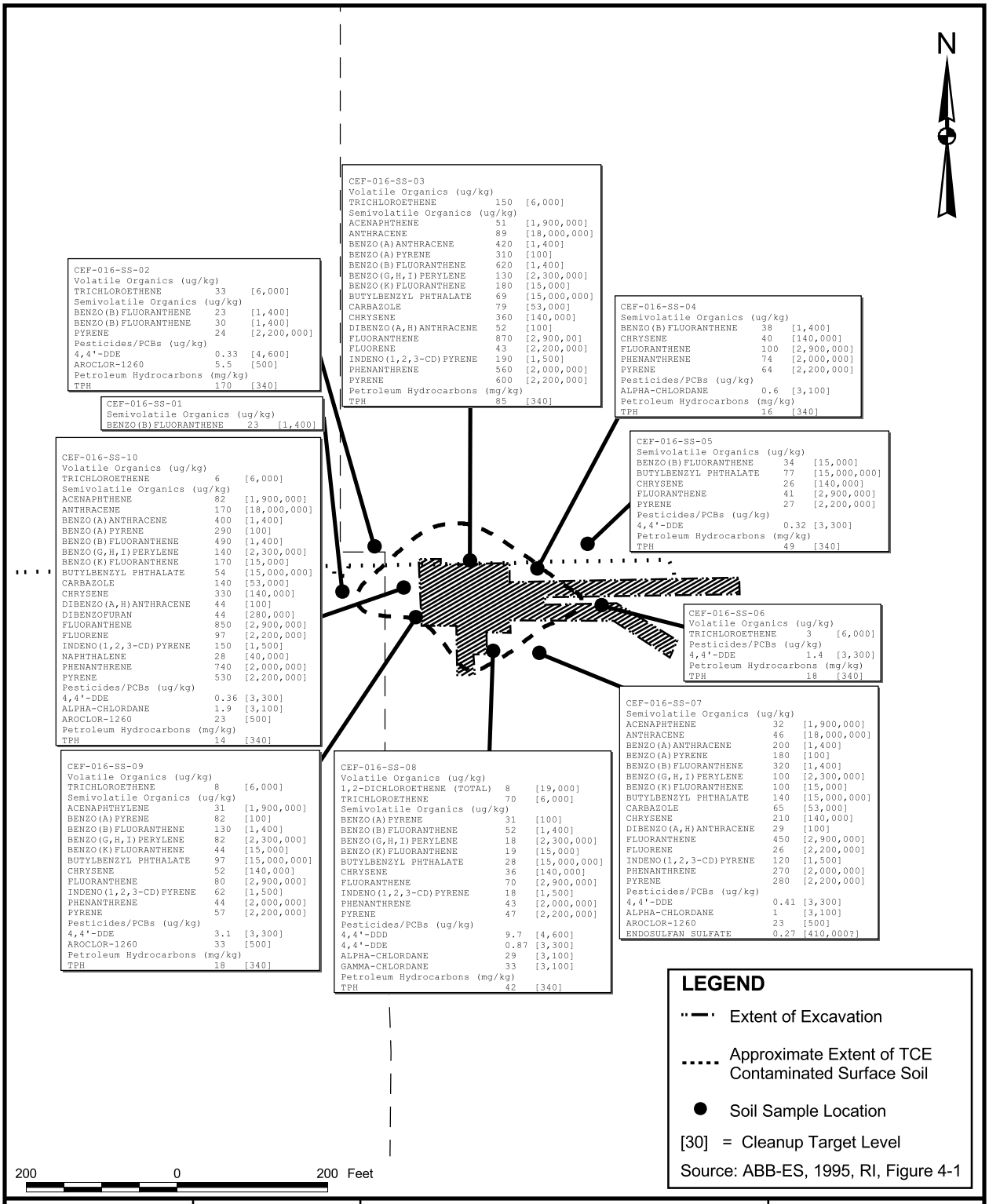

DRAWN BY	DATE			CONTRACT NUMBER
MJJ	13Oct09		ORGANICS DETECTED IN SURFACE SOIL	2267
CHECKED BY	DATE		DURING REMEDIAL INVESTIGATION IN 1995	APPROVED BY / DATE
COST/SCHEDULE-AREA			OPERABLE UNIT 7, SITE 16	APPROVED BY / DATE
SCALE			FIVE-YEAR REVIEW	DRAWING NO. / REV
AS NOTED		NAVFAC	NAVAL AIR STATION CECIL FIELD	FIGURE 6-9 / 0
			JACKSONVILLE, FLORIDA	

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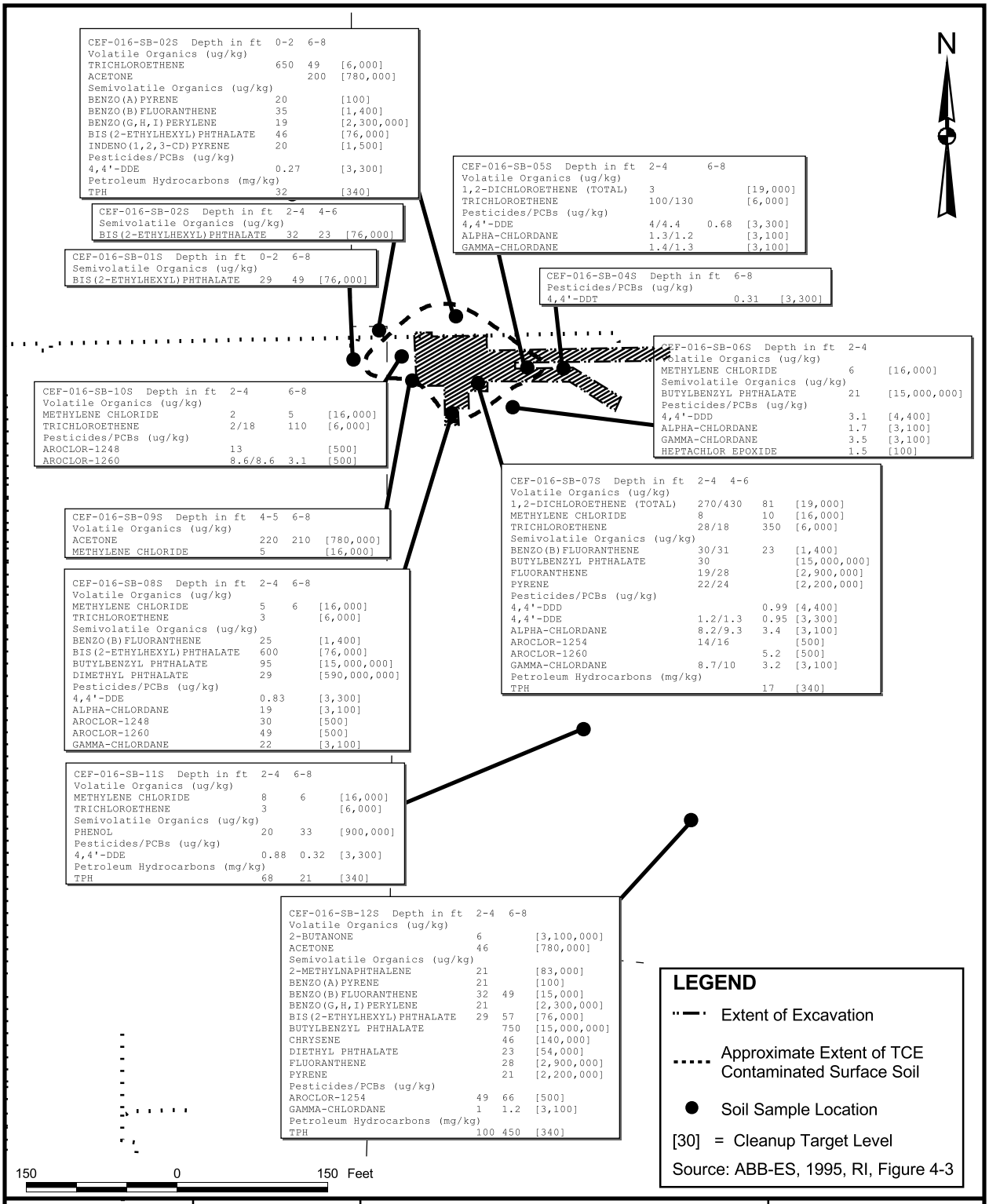

DRAWN BY	DATE			CONTRACT NUMBER
MJJ	13Oct09		ORGANICS DETECTED IN SUBSURFACE SOIL	2267
CHECKED BY	DATE		DURING REMEDIAL INVESTIGATION IN 1995	APPROVED BY / DATE
COST/SCHEDULE-AREA			OPERABLE UNIT 7, SITE 16	APPROVED BY / DATE
SCALE			FIVE-YEAR REVIEW	DRAWING NO. / REV
AS NOTED		NAVFAC	NAVAL AIR STATION CECIL FIELD	FIGURE 6-10 / 0
			JACKSONVILLE, FLORIDA	

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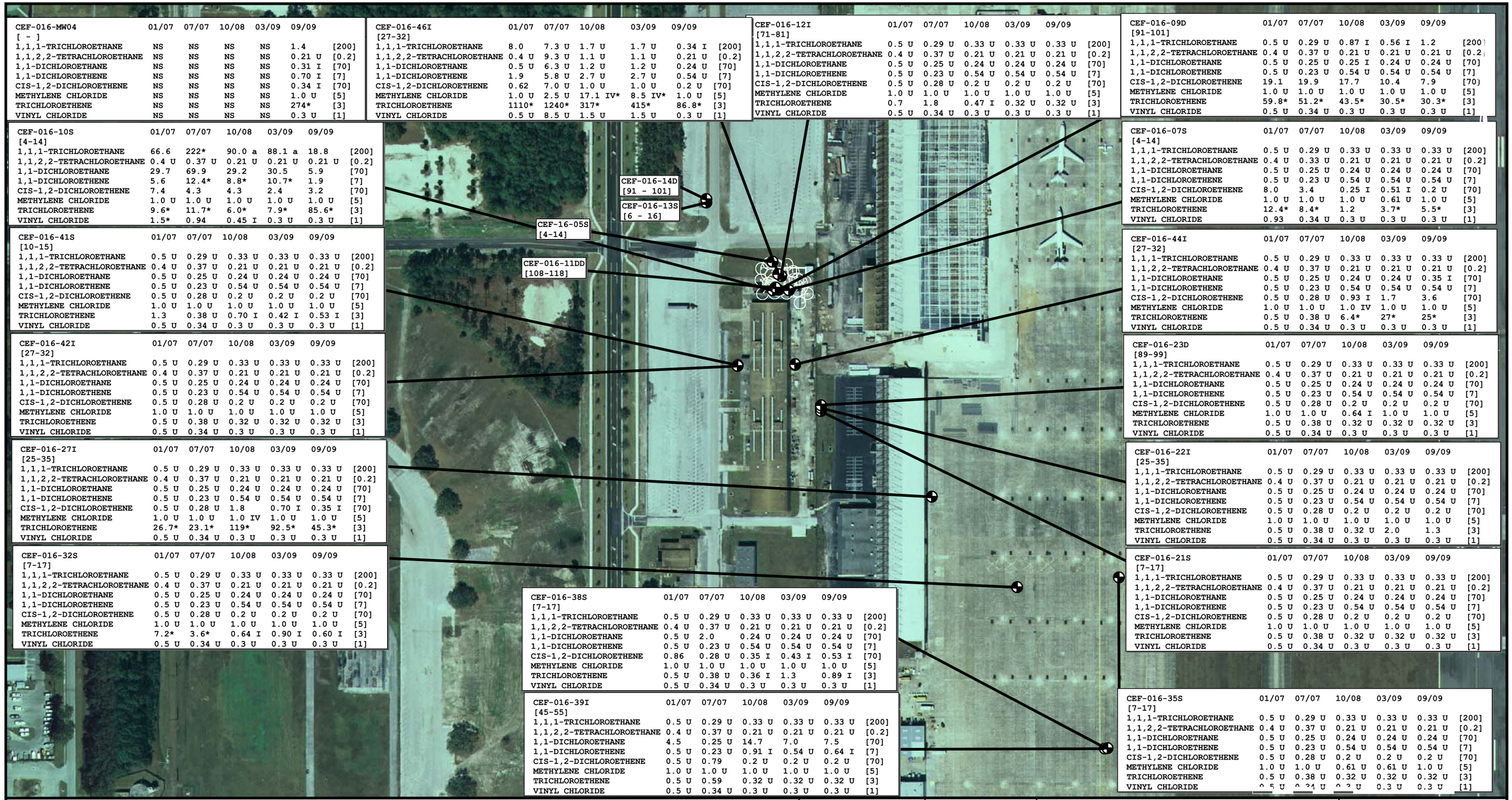


CEF-016-MW04	01/07	07/07	10/08	03/09	09/09	
[-]						
1,1,1-TRICHLOROETHANE	NS	NS	NS	NS	1.4	[200]
1,1,2,2-TETRACHLOROETHANE	NS	NS	NS	NS	0.21 U	[0.2]
1,1-DICHLOROETHANE	NS	NS	NS	NS	0.31 I	[70]
1,1-DICHLOROETHENE	NS	NS	NS	NS	0.70 I	[7]
CIS-1,2-DICHLOROETHENE	NS	NS	NS	NS	0.34 I	[70]
METHYLENE CHLORIDE	NS	NS	NS	NS	1.0 U	[5]
TRICHLOROETHENE	NS	NS	NS	NS	274*	[3]
VINYL CHLORIDE	NS	NS	NS	NS	0.3 U	[1]

CEF-016-46I	01/07	07/07	10/08	03/09	09/09	
[27-32]						
1,1,1-TRICHLOROETHANE	8.0	7.3 U	1.7 U	1.7 U	0.34 I	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	9.3 U	1.1 U	1.1 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	6.3 U	1.2 U	1.2 U	0.24 U	[70]
1,1-DICHLOROETHENE	1.9	5.8 U	2.7 U	2.7 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.62	7.0 U	1.0 U	1.0 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	2.5 U	17.1 IV*	8.5 IV*	1.0 U	[5]
TRICHLOROETHENE	1110*	1240*	317*	415*	86.8*	[3]
VINYL CHLORIDE	0.5 U	8.5 U	1.5 U	1.5 U	0.3 U	[1]

CEF-016-12I	01/07	07/07	10/08	03/09	09/09	
[71-81]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.7	1.8	0.47 I	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-09D	01/07	07/07	10/08	03/09	09/09	
[91-101]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.87 I	0.56 I	1.2	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.25 I	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	19.1	19.9	17.7	10.4	7.9	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	59.8*	51.2*	43.5*	30.5*	30.3*	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-10S	01/07	07/07	10/08	03/09	09/09	
[4-14]						
1,1,1-TRICHLOROETHANE	66.6	222*	90.0 a	88.1 a	18.8	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	29.7	69.9	29.2	30.5	5.9	[70]
1,1-DICHLOROETHENE	5.6	12.4*	8.8*	10.7*	1.9	[7]
CIS-1,2-DICHLOROETHENE	7.4	4.3	4.3	2.4	3.2	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	9.6*	11.7*	6.0*	7.9*	85.6*	[3]
VINYL CHLORIDE	1.5*	0.94	0.45 I	0.3 U	0.3 U	[1]

CEF-016-07S	01/07	07/07	10/08	03/09	09/09	
[4-14]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.33 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	8.0	3.4	0.25 I	0.51 I	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	0.61 U	1.0 U	[5]
TRICHLOROETHENE	12.4*	8.4*	1.2	3.7*	5.5*	[3]
VINYL CHLORIDE	0.93	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-41S	01/07	07/07	10/08	03/09	09/09	
[10-15]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	1.3	0.38 U	0.70 I	0.42 I	0.53 I	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-44I	01/07	07/07	10/08	03/09	09/09	
[27-32]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.35 I	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.93 I	1.7	3.6	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 IV	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	6.4*	27*	25*	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-42I	01/07	07/07	10/08	03/09	09/09	
[27-32]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.32 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-23D	01/07	07/07	10/08	03/09	09/09	
[89-99]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	0.64 I	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.32 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-27I	01/07	07/07	10/08	03/09	09/09	
[25-35]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	1.8	0.70 I	0.35 I	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 IV	1.0 U	1.0 U	[5]
TRICHLOROETHENE	26.7*	23.1*	119*	92.5*	45.3*	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-22I	01/07	07/07	10/08	03/09	09/09	
[25-35]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.32 U	2.0	1.3	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-32S	01/07	07/07	10/08	03/09	09/09	
[7-17]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	7.2*	3.6*	0.64 I	0.90 I	0.60 I	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-21S	01/07	07/07	10/08	03/09	09/09	
[7-17]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.32 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-38S	01/07	07/07	10/08	03/09	09/09	
[7-17]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	2.0	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.86	0.28 U	0.35 I	0.43 I	0.53 I	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.36 I	1.3	0.89 I	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-39I	01/07	07/07	10/08	03/09	09/09	
[45-55]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	4.5	0.25 U	14.7	7.0	7.5	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.91 I	0.54 U	0.64 I	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.79	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.59	0.32 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

CEF-016-35S	01/07	07/07	10/08	03/09	09/09	
[7-17]						
1,1,1-TRICHLOROETHANE	0.5 U	0.29 U	0.33 U	0.33 U	0.33 U	[200]
1,1,2,2-TETRACHLOROETHANE	0.4 U	0.37 U	0.21 U	0.21 U	0.21 U	[0.2]
1,1-DICHLOROETHANE	0.5 U	0.25 U	0.24 U	0.24 U	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.54 U	0.54 U	0.54 U	[7]
CIS-1,2-DICHLOROETHENE	0.5 U	0.28 U	0.2 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	0.61 U	0.61 U	1.0 U	[5]
TRICHLOROETHENE	0.5 U	0.38 U	0.32 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.34 U	0.3 U	0.3 U	0.3 U	[1]

LEGEND:

- Monitoring well
- * Concentration exceeds target cleanup goal.
- ** CEF-016-45I was abandoned in March 2000, and CEF-016-46I was installed as a replacement well in March 2000
- J Estimated concentration.
- U Not detected at or above associated detection limit.
- NA Not analyzed
- ND None detected

Notes:
1. Duplicate sample results reported as sample/duplicate.
2. Air sparging/soil vapor extraction system operated from June 1999 to May 2000 and December 22, 2000 to February 7, 2001.

```
CEF-016-46I**        02/03
[27-32]
1,1,1-TRICHLOROETHANE  3.1/2.5 [200]
```

- Sample ID
- Sample Date
- Well Screen Interval, feet below ground surface
- Groundwater Cleanup Target Level (GCTL)
- Detected Concentration in ug/L, * indicates GCTL exceedance
- Parameter

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
FIVE - YEAR REVIEW
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-11	REV. 0

7.0 OPERABLE UNIT 8, SITE 3

7.1 INTRODUCTION

Implementation of the remedial actions at OU 8 began in the fall of 1998. This five-year review provides a detailed review of the soil and groundwater remedial actions, including AS system construction/operation and 11 years of monitoring data, and is being conducted as a statutory review because LUCs will remain for soil area even after all groundwater cleanup levels are achieved. OU 8 consists of Site 3, the Oil and Sludge Disposal Pit.

7.2 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 operation	1950s to 1975
RI completed	1996
FS completed	1997
Signing of ROD	September 1998
Remedial Design for Groundwater	October 1998
Groundwater monitoring – quarterly intervals	December 1998 to January 2001
AS system installation and start-up	May 27, 1999
AS system turned off	May 26, 2000
AS system turned on	December 22, 2000
AS system turned off	February 14, 2001
Special monthly monitoring of source well CEF-3-13S	April 2002, May 2002, June 2002
AS system turned on	July 12, 2002
AS system turned off	July 19, 2002
AS system turned on	July 24, 2002
AS system turned off	August 30, 2002
Special monitoring of source wells CEF-3-03S, -07S, and -13S	September 2002
AS system turned on	April 09, 2003
AS system turned off	May 27, 2003
Semi-annual monitoring	July 2001-2007
ESD	November 2003
OPS Demonstration	April 2005
LUC RD	April 2005

Event	Date
Site 3 FOST	June 17, 2005
Annual monitoring	October 2008-present
Long-Term Monitoring Work Plan and Health and Safety Plan (HASP)	September 2008

7.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 8. Figure 7-1 is a site layout map of OU 8, Site 3. Site 3 occupies approximately 0.5 acres.

Land and Resource Use/History of Contamination

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 base 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 department, and 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.

Initial Response and Basis for Taking Action

The 1985 base-wide IAS conducted by Envirodyne Engineers, Inc. recommended further investigation for Site 3 based on the types of wastes disposed, the potential for contaminant migration, and the presence of receptors. In the 1988 base-wide RFI conducted by HLA, hazardous constituents were detected in groundwater at Site 3, and further study was recommended.

7.4 REMEDIAL ACTIONS

7.4.1 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 remedial actions for the selected remedy include in-situ air stripping of VOCs from the source area groundwater by AS, natural attenuation of downgradient groundwater, LUCs, and five-year site reviews.

Based on modeling, the action levels at the source area were expected to be met in less than 3 years, and the RAO/cleanup goals within the plume were expected to be met in 16.5 years. These actions were considered protective of human health and the environment, would eventually attain ARARs, and would be cost effective. 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.

7.4.2 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.

AS System

Construction of this AS system was performed by CH2MHill, the RAC for the Navy, in accordance with the Groundwater Remedial Design. Design parameters for the AS system were based on the results of a pilot-scale test at a similar site at NAS Cecil Field (OU 2, Site 5). The full-scale AS system consists of 15 air injection wells screened at a depth of 45 to 50 feet below the water table, and five vapor monitoring point wells used to monitor VOC emissions. The layout of the AS system is shown on Figure 7-2.

The remedial design established a remedial action level for the AS system of 1,255 µg/L for TCE in the potential source area groundwater. This remedial action level was established using fate and transport modeling (ECTran model), conservatively assuming that limited natural attenuation would occur. Based on modeling of volatilization of TCE from groundwater and conservative assumptions, it was estimated that it would take the AS system less than 3 years to achieve this remedial action level within the potential source area. When groundwater concentrations of TCE in the potential source area decreased to 1,255 µg/L, the time required to further reduce concentrations of this compound to the target cleanup goal (TCG) (i.e., the FDEP GCTL of 3 µg/L) at the source and downgradient was estimated to be about

16.5 years. Detailed information on the modeling efforts and remedial cleanup time estimates is presented in the Groundwater Remedial Design.

Initial start-up of the AS system occurred on May 27, 1999. A quarterly groundwater sampling event including both source and downgradient wells was conducted immediately preceding start-up, and the data were used as a baseline to help evaluate the effectiveness of the remedial action. The AS system was turned on and off based on monitoring results, and has been off since May 27, 2003.

Groundwater Monitoring

Long-term groundwater monitoring is being conducted in accordance with the ROD; the Final Groundwater Remedial Design; the Work Plan Addendum for Long-Term Monitoring at Sites 3, 5, 8, and 16; and the recommendations of the annual reports for Site 3. Twenty-four groundwater monitoring events, in addition to four supplemental source area sampling events, have been conducted at OU 8, Site 3.

Land Use Controls

LUCs required at Site 3 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit residential, recreational, or agricultural reuse of the site.
- Prohibit the disturbance of the sediments in Rowell Creek.
- Prohibit the excavation of surface and subsurface soils from the site.
- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

An ESD for multiple sites was finalized in November 2003 that modified the ROD for Site 3 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements went into effect upon finalization of the LUC RD for Site 3 on April 22, 2005. The LUCs remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 3 property to JAA, as required by FDEP. Therefore, the LUCs have remained applicable since conveyance of the property to JAA, and will also apply to any subsequent owners.

7.4.3 System Operations/Operation and Maintenance

7.4.3.1 AS/VE System

The AS/VE system began operating in May 1999 and was shut down in May 2003 and not put back into operation because concentrations of TCE in site monitoring wells have remained less than the system action level, 1,255 μg/L. Thus, the AS system was effective in removing VOCs as shown by measuring the concentrations of total VOCs in the vapor from the vapor monitoring point wells, and through evaluation of reductions in groundwater contamination in the potential source area, as identified by groundwater monitoring. The AS/VE system has not been turned on since 2003.

The vapor sampling data indicate that a significant portion the of groundwater contamination was removed in the first few months of AS system operation, and this corresponds with the groundwater sampling analytical results, which identify reductions in groundwater contamination in the first year of operation.

7.4.3.2 Long-Term Groundwater Monitoring Program

Groundwater monitoring was initially conducted on a quarterly basis from December 1998 to January 2001. The site layout and several monitoring wells are shown on Figure 7-1. Based on the results from these first 10 monitoring events, the BCT decided in February 2001 to change the frequency of monitoring from quarterly to semi-annually, starting in July 2001. In addition, the BCT also decided to conduct four special sampling events to further investigate the source area groundwater. The first three special events were conducted at monthly intervals starting in April 2002 for source area well CEF-3-13S only. The fourth special event was conducted in September 2002 for source area wells CEF-003-03S, CEF-003-07S, and CEF-3-13S. Groundwater samples collected from source area wells CEF-3-03S, CEF-3-04S, and CEF-003-06S were analyzed for chlorinated VOCs and benzene, toluene, ethylbenzene, and xylenes (BTEX). Groundwater samples collected from source area wells CEF-003-07S, CEF-003-13S, and CEF-003-14I, and from downgradient wells CEF-003-25S, CEF-003-28S, CEF-003-31S, CEF-003-38S, CEF-003-39I, and CEF-003-WP were analyzed for chlorinated VOCs, BTEX, selected SVOCs, and natural attenuation parameters. Samples collected from source area well CEF-003-07S and downgradient well CEF-003-28S during the Year 5 first semi-annual monitoring event (February 2003) were also analyzed for 1,4-dioxane. The analyses for 2,4-dichlorophenol, BEHP, phenol, and Aroclor-1248 were discontinued after the first year of monitoring because these compounds were not detected. Upgradient wells CEF-003-08S and CEF-003-09I have not been sampled since July 2000 because COC concentrations were consistently less than detection limits. Sampling of wells CEF-003-36S and CEF-003-37I was discontinued after the January 2001 sampling event.

Monitoring began in December 1998, and groundwater monitoring at Site 3 has included ten quarterly and fourteen semi-annual events plus four additional sampling rounds of the source area wells. Thus, there are a total of approximately eleven years of post-RI monitoring data, including 10 years since the AS treatment system was first activated. After the Year 9, second semi-annual sampling event, the BCT decided to change the frequency to annually. The first annual sampling event was conducted in October 2008 as the Year 10 event. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

7.4.3.3 Cost

The groundwater remedial design estimated the capital construction cost for the AS system to be $380,000 and annual operation costs to be $46,600. The actual cost to install the AS system was approximately $400,000, and operational costs were approximately an additional $5,500 the first month and $2,500 per month thereafter. Implementation of long-term monitoring and LUCs was estimated to have an NPW cost of approximately $780,000. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $72,000, including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

7.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 8 during the past review period.

> The remedy at OU 8 is expected to be protective of human health and the environment upon completion. The implementation of the AS and long-term groundwater monitoring program provides a degree of protection of human health and the environment. The planned implementation of the LUCs 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 generally remained constant or slightly decreased over the monitoring period. The AS system has been installed and operated. The results of future groundwater monitoring will be used to evaluate the performance/operation of the AS system.

LUCs will be implemented upon finalization of the LUC RD for Site 3. 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 OPS or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

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

The following recommendations and required actions were developed by the BCT based on the previous five-year review for OU 8:

Previous Recommendation/ Required Action	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program	Semi-annually	Ongoing semi-annually until July 2007, changed to annually for October 2008 event
Implement LUCs	Upon finalization of the LUC RD	The LUC RD was finalized April 22, 2005, and LUCs are in place in the form of recorded deed restrictions.

7.6 FIVE-YEAR REVIEW PROCESS

7.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 8, Site 3 including the ROD, 2003 ESD, the Groundwater Remedial Design, the AS construction completion report, the OPS Demonstration, LUC RD and long-term groundwater monitoring reports. The following section summarizes groundwater results for Site 3 based on a review of associated documents. Groundwater monitoring is ongoing annually at Site 3.

The maximum concentrations of COCs identified in the RI, in January 2004, and in the most recent sampling event are shown in Table 7-1. VOC and SVOC detections from the last five sampling events are presented on Figures 7-3 and 7-4, respectively.

The AS system was installed in accordance with the remedial design. The layout of the wells and the equipment control unit are shown on Figure 7-2, and the conceptual layout of the AS equipment is shown on Figure 7-5.

Twenty-four groundwater sampling events have been conducted since December 1998. The first 10 events were at quarterly intervals. From July 2001 through July 2007, sampling events were at semi-annual intervals, based on the results of the quarterly events and approval from the BCT. The BCT decided to change the sampling frequency to annually at the November 2007 meeting, and the first annual event was conducted for Year 10 in October 2008. Monitoring wells within the plume, upgradient of the plume, and downgradient of the plume were sampled and analyzed for VOCs, SVOCs, and natural attenuation parameters. The analyses for 2,4-dichlorophenol, BEHP, phenol, and Aroclor-1248 were stopped after the first year of sampling because these compounds were not detected. Upgradient wells have not been sampled since July 2000 because concentrations were consistently less than detection limits for all compounds being evaluated.

The concentrations and numbers of contaminants detected at the site have decreased significantly since the RI. In particular, concentrations have been reduced near the source primarily as a result of the operation of the AS system; however, some increases and fluctuations have been observed. Figures 7-6 through 7-9 show VOC concentration trends and Figures 7-10 through 7-13 show SVOC concentration trends in Site 3 wells.

VOCs

At CEF-003-13S, the most contaminated source area well, each period of operation of the AS system resulted in a temporary, large-scale decline in TCE concentrations, with concentration spikes following each shutdown. Concentrations of TCE in the sampling events between the July 2004 and September 2009 have shown less variation than in previous sampling events, but have never dropped to less than the GCTL. Concentrations for other VOCs (1,1,1-TCA, 1,1-DCA, 1,1-DCE, and cis-1,2-DCE) show similar trends, although at lesser concentrations. The ratio of TCE to cis-1,2-DCE has increased since 2002, suggesting that, as expected, AS inhibited the anaerobic biodegradation of TCE and the resultant generation of cis-1,2-DCE. Xylenes, 1,1-DCE, and methylene chloride were also detected at concentrations greater than their respective GCTLs in the most recent sampling event.

Concentrations of TCE, 1,1-DCA, and 1,1-DCE at source area well CEF-003-07S decreased to less than their respective GCTLs during 2005 and the first semi-annual 2006 sampling events, increased during the second semi-annual 2006 event and the 2007 sampling, decreased again to less than GCTLs in October 2008, and remained less than GCTLs in September 2009. In other source area wells (CEF-003-03S, -04S, and -14I), chlorinated VOC concentrations have decreased more consistently since the start of AS and generally have been less than historical highs since 2000. There have been no exceedances of VOCs or SVOCs at these wells since January 2005. At CEF-003-04S, 1,1-DCA and 1,1-DCE have been

detected in recent sampling events below their GCTL, and at CEF-003-14I, TCE has been detected at concentrations less than the GCTL in recent sampling rounds.

The concentrations of COCs in wells immediately downgradient of the source area, CEF-003-38S and CEF-003-39I, have fluctuated since the start-up of the AS system. These wells are 200 feet downgradient from the site and are not directly affected by the AS system. In CEF-003-38S and -39I, concentrations of VOCs have decreased and have been less than GCTLs since January 2002 in CEF-003-38S, and since July 2002 in CEF-003-39I.

Concentrations of contaminants in CEF-003-28S, located approximately 800 feet downgradient of the source area, have been relatively stable over time and are generally still greater than GCTLs. Concentrations of TCE, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and naphthalene have generally decreased from highs detected around July 2000. The presence of both TCE and cis-1,2-DCE suggests that biodegradation of TCE is occurring in this area, and the presence of 1,1-DCE and 1,1-DCA in combination with source area detections of 1,1,1-TCA indicates both abiotic and biological degradation of TCA. The absence of detectable concentrations of 1,1,1-TCA in CEF-003-28S indicates that degradation of this compound is nearly complete by the time source area groundwater reaches this area.

CEF-003-31S is located approximately 1,200 feet downgradient of the source area and just upgradient of Rowell Creek. VOC concentrations in this well were slowly increasing from 1994 to 2001, but have since been stabilizing and/or slightly declining. The presence of cis-1,2-DCE and the almost complete absence of TCE (no significant detections) suggests that significant biodegradation of TCE has occurred upgradient of this location. Similarly, 1,1,1-TCA is absent but its biotic and abiotic breakdown products (1,1-DCA and 1,1-DCE, respectively) are still present at detectable concentrations. Concentrations of the daughter products cis-1,2-DCE, 1,1-DCE, and vinyl chloride remain greater than GCTLs at this well. Benzene concentrations also exceed the GCTL at this well.

CEF-003-WP is a shallow well point installed within Rowell Creek near the CEF-003-31S location during each sampling event. Only breakdown product compounds have been detected at low levels in this well, and only vinyl chloride has been detected at concentrations in excess of its GCTL. The presence of low levels of vinyl chloride in this wellpoint, along with the absence of other compounds that have been detected at significant concentrations in nearby well CEF-003-31S, are an indication that the organic carbon-rich shallow sediments of the wetland/streambed area are attenuating most of the contaminants as they approach the stream. Vinyl chloride is not readily adsorbed to organic carbon and thus passes through the shallow, organic-rich wetland and streambed sediments. There have been a few (9) sampling events where vinyl chloride concentrations exceeded its GCTL, but it has always returned to insignificant concentrations.

SVOCs

In CEF-003-13S, SVOC concentrations have fluctuated, but trends from 1994 to 2009 are downward overall. As is most evident for 1,2-dichlorobenzene (DCB), AS activities caused downward spikes in concentrations with subsequent partial rebound following the shutdown of the sparging system. 1,2-DCB concentrations have decreased from 9,800 µg/L during the RI to 2,860 µg/L and 2280 µg/L during the latest two sampling rounds. 1,3-DCB concentrations decreased from 133 µg/L in 1999 to 74.4 µg/L and 59.2 I µg/L in the most recent sampling events. 1,4-DCB concentrations decreased from 717 µg/L in 1999 to less than 500 µg/L since July 2002 and less than 400 µg/L since August 2005. 2-Methylnaphthalene concentrations decreased from 200 µg/L during the RI to less than 100 µg/L since August 1999, and less than 70 µg/L since July 2006. 4-Methylphenol concentrations decreased from 15 µg/L in 1998 to less than the GCTL (4 µg/L) since July 2002. Naphthalene concentrations decreased from 450 µg/L in the RI to less than 200 µg/L since August 1999.

In CEF-003-07S, SVOC concentrations from 1994 to 2003 show an overall declining trend with no exceedances of GCTLs in the time period from July 2001 through January 2007. AS activities appear to have exerted a major positive influence on SVOC concentrations in the vicinity of this well. There have been two exceedances in the past three sampling events, 6 µg/L 4-methylphenol and 18.9 µg/L naphthalene. Both are slight exceedances, and further sampling will be needed to determine if the concentrations are anomalies or an indication of a rebound. There were no exceedances in the September 2009 event.

As with the other source area wells, the overall trend in SVOC concentrations in CEF-003-14I is downward. There have been no GCTL exceedances at this well since January 2002.

In CEF-003-28S, located approximately 800 feet downgradient from the source area, concentrations of SVOCs have generally been slowly declining over time. Decreases have been greatest for 1,2-DCB, in which concentrations have decreased from an average of 780 µg/L in 1998 to less than 350 µg/L in February 2003, and less than 100 µg/L in the most recent sampling events. 1,3-DCB and 2-methylnaphthalene concentrations have decreased to less than GCTLs since January 2001. Naphthalene concentrations have fluctuated, but have generally decreased, from 79 µg/L in December 1998 to 48.7 µg/L in January 2004, and 11 µg/L in September 2009. Naphthalene is the only SVOC that has exceeded its GCTL in this well since 2001. SVOC concentrations continue to be less than GCTLs in downgradient wells CEF-003-31S and CEF-003-WP.

Site data suggest that destructive and non-destructive natural attenuation mechanisms are occurring at the site. The geochemical data from the first year of monitoring indicated that anaerobic biological

processes were occurring within the source area, and the most recent sampling event returned similar results. When the AS system was operating, DO concentrations in the source area increased, and the groundwater conditions became more favorable to aerobic biological activity. During the most recent monitoring event, DO values indicate aerobic conditions and ORP values point to oxidative conditions in the downgradient area and in surface water.

Natural carbon sources were being utilized as the primary substrate for anaerobic microbial growth at the site. Total organic carbon (TOC) concentrations in the upgradient well are less than 20 mg/L, indicating a limited but sufficient amount of carbon to be used as an anaerobic energy source. Non-destructive mechanisms such as advection, dispersion, sorption, and volatilization also may be contributing to the further reduction of contaminant concentrations at the site.

The following conclusions are based on an evaluation of geochemical data from the site:

- Geochemical conditions within the source area before AS operations were consistent with reductive dechlorination. Dissolved iron and methane concentrations were high and indicative of reducing conditions. Elevated carbon dioxide concentrations were indicative of active biodegradation reactions within the source area. The primary COCs (TCE and 1,1,1-TCA) and their first degradation products (cis-1,2-DCE, and 1,1-DCE / 1,1-DCA, respectively) were abundant. Since the initiation of AS operations, it is unlikely that anaerobic biological degradation is currently occurring in this area. However, anaerobic activity has returned as a reductive factor after the AS system was shut down for a significant amount of time and the aquifer has begun to return to native marginal reducing conditions.

- Geochemical conditions within the mid-plume area are consistent with an area where the aquifer is slightly more aerobic, with concentrations of dissolved iron and methane less than those in the source area. Decreases in the dissolved chloride concentration at well CEF-003-38S suggest dilution. COC concentrations are an order of magnitude lower than in the source zone and show stable or slightly decreasing concentrations over time.

- Geochemical conditions within the discharge area are consistent with reductive dechlorination (elevated methane at well CEF-003-31S) followed by a steeply increasing DO gradient as the plume approaches Rowell Creek. This intersection of reducing and oxidizing environments coupled with the organic-rich sediments provides favorable conditions for various types of reductive and oxidative degradation. Degradation near the discharge area generates few detectable COC concentrations. Vinyl chloride was detected at three wells (CEF-003-06S, CEF-003-31S, and CEF-003-WP) in the last five sampling events. Vinyl chloride is apparently rapidly destroyed in the more aerobic

sediments in the Rowell Creek sediments. This is consistent with the previous report by Chapelle and Bradley (1997).

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 groundwater monitoring program and modified based on recommendations of annual monitoring reports appears to be adequate.

Quarterly, semi-annual, and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 3 are adequate for evaluating the concentration trends of COCs at the site. The Navy is routinely re-evaluating the status of the site to optimize the monitoring for Site 3.

The monitoring system is providing adequate data to evaluate remedy performance and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source, at the perimeter of the AS system zone of influence, and at the downgradient locations. Monitoring of groundwater at the well point immediately adjacent to the creek boundary also provides data to evaluate if the potential exists for adverse impact to the Rowell Creek.

7.6.2 Site Inspection

The site inspection for OU 8 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at OU 8, Site 3 included visual observations of the area, surface water and sediment in Rowell Creek and the wetlands, and the groundwater monitoring wells. The inspection identified that the implementation of the remedy and monitoring program were operating as designed and they are protective of human health and the environment. Access roads to the groundwater monitoring wells are becoming overgrown with vegetation. The surface water is clear in Rowell Creek and the wetlands. The sediment is brown to dark brown silty sand.

TtNUS conducted several site visits at Site 3 as part of the field activities from 1998 through 2004. Activities conducted during 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 Navy has transferred the site and surrounding property to JAA, which continues to use the land as an airport. The land is currently a vacant area, with no residential, commercial, or industrial functions in the flight path of landing aircraft.

Site 3 LUC field inspections have been completed annually by JAA since the transfer of the property, and no issues were discovered as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RD. The five-year review field inspection confirmed the LUC compliance.

7.6.3 Interviews

There were no interviews conducted in the course of the five year review.

7.7 TECHNICAL ASSESSMENT

7.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the ROD, as modified by the ESD.

The implementation of the long-term groundwater monitoring program is ongoing and indicates that natural attenuation is working at the site. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated subsurface soil and groundwater that may pose a risk. The LUCs that are in place include: ,deed restrictions prohibiting use of groundwater, disturbance of sediments in Rowell Creek, excavation of surface and subsurface soils, and the residential, recreational, or agricultural reuse of Site 3.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that are currently in operation (long-term groundwater monitoring and AS/VE) are operating as designed, and the data indicate progress toward meeting the RAOs. AS/VE has been functioning as designed when it is in operation.

7.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

7.7.2.1 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 revised Florida Surface Water Quality Standards (Chapter 62-302, FAC). The site-specific action level changes are from the development of an IBDS for NAS Cecil Field,

Contaminant	ARAR		Source
GROUNDWATER			
2,4-Dichlorophenol	Original*	4 µg/L	Florida Groundwater Guidance Concentration, Chapter 6
	Current	0.5 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels
2-Methylnaphthalene	Original*	100 µg/L	Florida Drinking Water Standard
	Current	20 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels
4-Methylphenol	Original*	35 µg/L	Florida Groundwater Guidance Concentration, Chapter 6
	Previous	4 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels (1999)
	Current	3.5 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels (2005)
Naphthalene	Original*	6.8 µg/L	Florida Groundwater Guidance Concentration, Chapter 6
	Previous	20 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels (1999)
	Current	14 µg/L	FAC 62-777, FL Contaminant Cleanup Target Levels (2005)

* From ROD (Brown and Root Environmental, 1998).

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. The ARAR for naphthalene has changed twice since the ROD was signed. It increased by 13.2 µg/L, then decreased by 6 µg/L, for a net increase. 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. Current protectiveness (until the time of site closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable GCTLs are currently risk based (based on a risk of 1 x 10-6 or an HQ of 1. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on EPA criteria will be conducted and documented in the site close-out report.

The ARARs and site-specific action levels for the other COCs became less stringent since the signing of the ROD and do not affect the protectiveness of the remedial action.

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 4 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 toxic ecological impact on the test species with an approximate 20-fold dilution of groundwater.

Other federal and state ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

7.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RIs. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 8.

7.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

7.7.4 Technical Assessment Summary

According to the data reviewed and the site inspections, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

7.8 ISSUES

No issues were identified during the five-year review while the Navy owned the property. However, when OU 8, Site 3 was transferred to JAA per the FOST, LUCs as defined in the LUC RD, had to be continued at the site. These LUCs are designed to ensure protection of human health and the environment. When the Navy transferred the property to JAA, these LUCs, by way of deed restrictions, notices, or other agreements, were adopted. The current and future land use at this site suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

7.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 8, as no deficiencies were identified during the five-year review.

7.10 PROTECTIVENESS STATEMENT

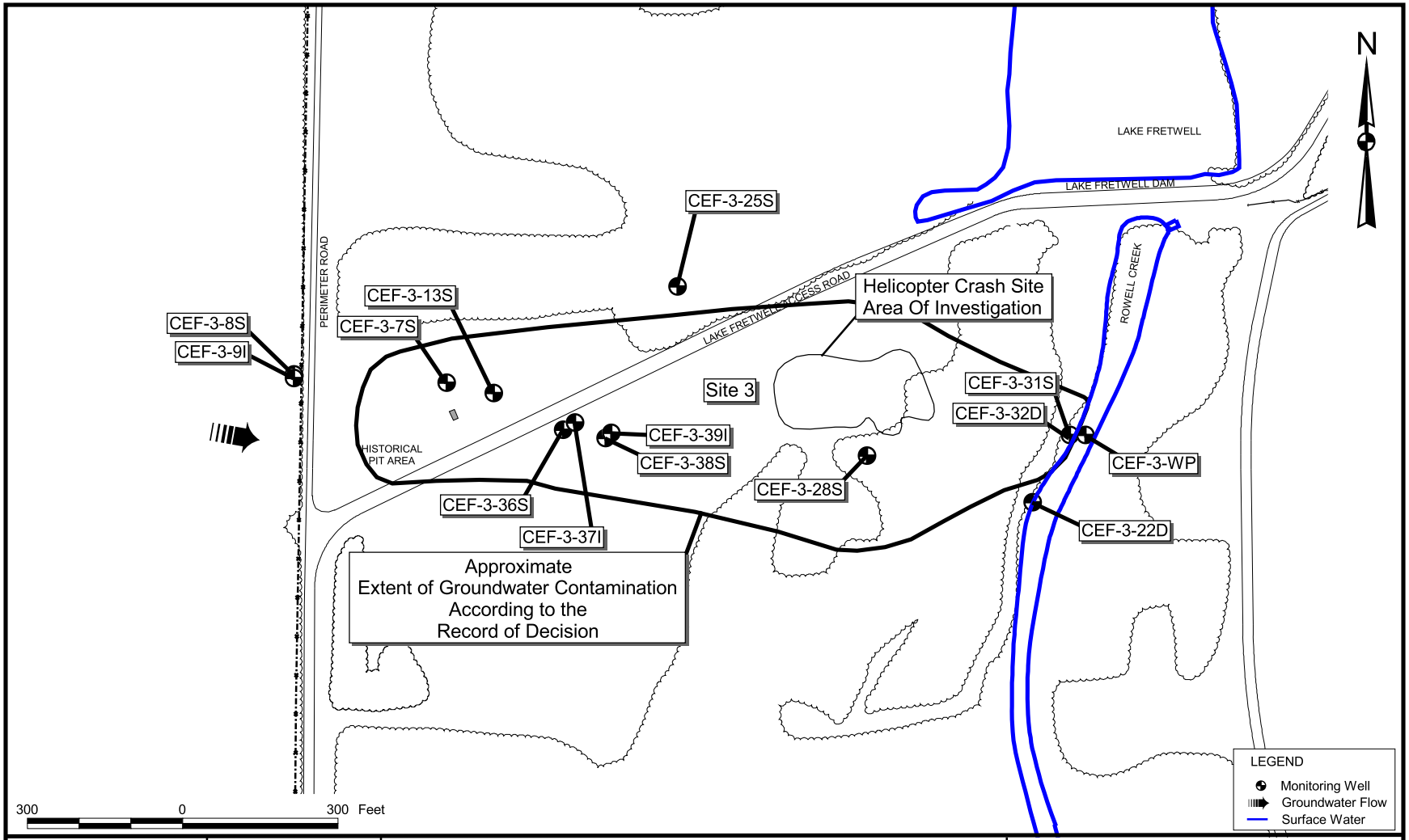
The Site 3 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Source area AS and downgradient natural attenuation continue to be effective in reducing concentrations of contaminants in groundwater, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. AS, natural attenuation, and the associated groundwater monitoring program were implemented as designed, and results indicate progress in achieving cleanup goals. Based on reductions in source area concentrations to less than remedial action levels, the AS has not operated since May 2003. LUCs were implemented by the Navy upon finalization of the LUC RD in April 2005, and in accordance with the LUC RD, are being continued after transfer of Site 3 to JAA per the FOST dated June 2005. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on the remedial activities that have been completed (AS) and that are ongoing (natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 3 have been or will be met.

TABLE 7-1

MAXIMUM CONCENTRATIONS OF CONTAMINANTS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 8, SITE 3
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	Current Regulatory Criteria		Remedial Investigation		January 2004		September 2009	
	FDEP GCTL	U.S. EPA MCL	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
Volatile Organic Compounds (ug/L)								
Benzene	1	5	1 / 30	26	2 / 12	1.7	1 / 12	1.8 I
1,1,1-Trichloroethane	200	200	4 / 30	860	2 / 12	205	1 / 12	192
1,1-Dichloroethane	70	NC	8 / 30	590	9 / 12	287	8 / 12	60.7
1,1-Dichloroethene	7	7	8 / 30	350	6 / 12	261	6 / 12	206
cis-1,2-Dichloroethene	70	70	4 / 30*	1,900*	5 / 12	146	5 / 12	122
trans-1,2-Dichloroethene	100	100	4 / 30*	1,900*	ND	-	ND	-
Trichloroethene	3	5	6 / 30	1,700	5 / 12	569	3 /12	577
Semivolatile Organic Compounds (ug/L)								
1,2-Dichlorobenzene	600	600	4 / 30	9,800	NA	NA	4 / 9	2280
1,3-Dichlorobenzene	10	NC	4 / 30	240	NA	NA	2 / 9	59.2 I
1,4-Dichlorobenzene	75	75	4 / 30	1,300	NA	NA	4 / 9	282
2,4-Dichlorophenol	0.5	NC	1 / 30	5 J	NA	NA	NA	NA
2-Methylnaphthalene	20	NC	8 / 30	200	5 / 9	60.9	2 / 9	50.9 I
4-Methylphenol	4	NC	4 / 30	19	NA	NA	1 / 3	2.4
bis(2-Ethylhexyl) phthalate	6	6	12 / 30	61	NA	NA	NA	NA
Naphthalene	20	NC	11 / 30	450	6 / 9	97.1	4 / 9	135 I
Phenol	10	NC	7 / 30	10	NA	NA	NA	NA
Pesticides/Polychlorinated Biphenyls (μg/L)								
Aroclor-1248	0.5[(4)]	0.5[(4)]	2 / 30	0.79 J	NA	NA	NA	NA

1 Florida Department of Environmental Protection groundwater cleanup target level, Florida Administrative Code (FAC), Chapter 62-777 (FDEP, 1999).
2 United States Environmental Protection Agency Maximum Contaminant Levels (U.S. EPA, 2000).
4 Criterion is for Aroclor mixture.
* Data are for total 1,2-dichloroethene.
ND = Not detected



DRAWN BY MJJ	DATE 13Oct09	SITE LAYOUT OPERABLE UNIT 8, SITE 3 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 7-1 / REV 0

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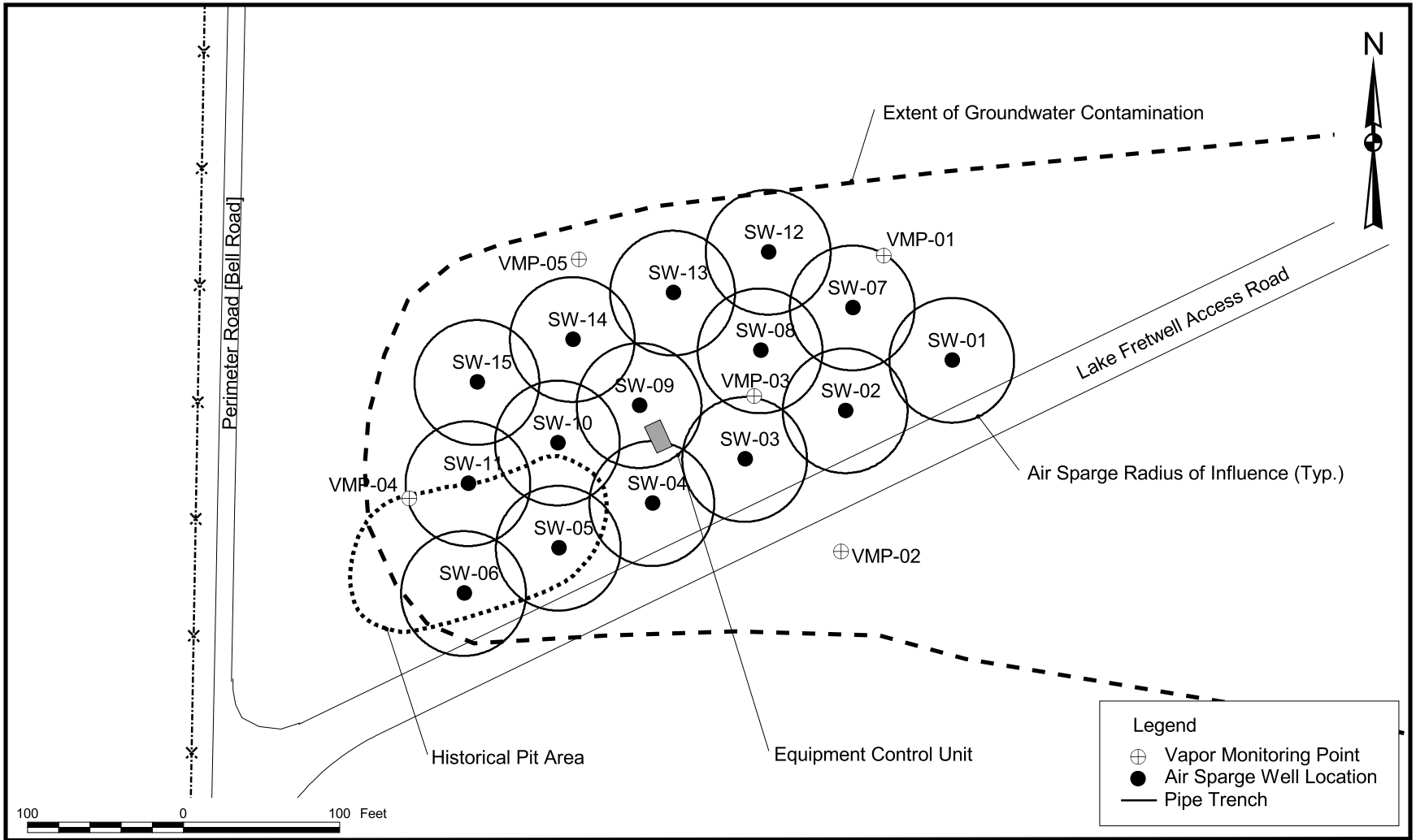

DRAWN BY MJJ	DATE 13Oct09	WELL & EQUIPMENT CONTROL UNIT LAYOUT OPERABLE UNIT 8, SITE 3 FIVE - YEAR REVIEW NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 7-2 / REV 0

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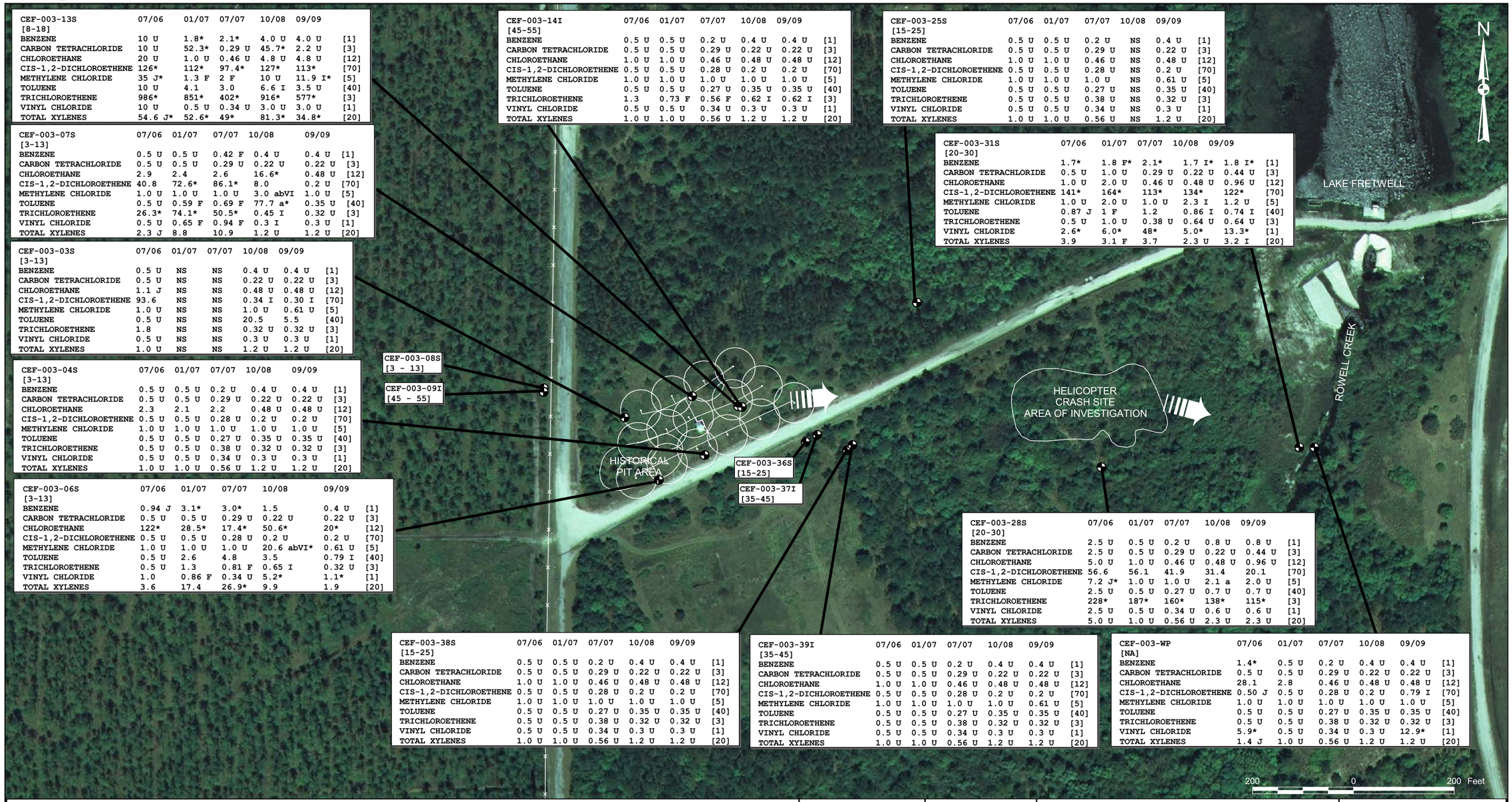
P:\GIS\NAS_CecilField\Chapter-08.apr 16Oct09 MJJ Layout 8-3



CEF-003-13S [8-18]	07/06	01/07	07/07	10/08	09/09	
BENZENE	10 U	1.8*	2.1*	4.0 U	4.0 U	[1]
CARBON TETRACHLORIDE	10 U	52.3*	0.29 U	45.7*	2.2 U	[3]
CHLOROETHANE	20 U	1.0 U	0.46 U	4.8 U	4.8 U	[12]
CIS-1,2-DICHLOROETHENE	126*	112*	97.4*	127*	113*	[70]
METHYLENE CHLORIDE	35 J*	1.3 F	2 F	10 U	11.9 I*	[5]
TOLUENE	10 U	4.1	3.0	6.6 I	3.5 U	[40]
TRICHLOROETHENE	986*	851*	402*	916*	577*	[3]
VINYL CHLORIDE	10 U	0.5 U	0.34 U	3.0 U	3.0 U	[1]
TOTAL XYLENES	54.6 J*	52.6*	49*	81.3*	34.8*	[20]

CEF-003-07S [3-13]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.42 F	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	2.9	2.4	2.6	16.6*	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	40.8	72.6*	86.1*	8.0	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	3.0 abVI	1.0 U	[5]
TOLUENE	0.5 U	0.59 F	0.69 F	77.7 a*	0.35 U	[40]
TRICHLOROETHENE	26.3*	74.1*	50.5*	0.45 I	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.65 F	0.94 F	0.3 I	0.3 U	[1]
TOTAL XYLENES	2.3 J	8.8	10.9	1.2 U	1.2 U	[20]

CEF-003-03S [3-13]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	NS	NS	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	NS	NS	0.22 U	0.22 U	[3]
CHLOROETHANE	1.1 J	NS	NS	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	93.6	NS	NS	0.34 I	0.30 I	[70]
METHYLENE CHLORIDE	1.0 U	NS	NS	1.0 U	0.61 U	[5]
TOLUENE	0.5 U	NS	NS	20.5	5.5	[40]
TRICHLOROETHENE	1.8	NS	NS	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	NS	NS	0.3 U	0.3 U	[1]
TOTAL XYLENES	1.0 U	NS	NS	1.2 U	1.2 U	[20]

CEF-003-04S [3-13]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	2.3	2.1	2.2	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	0.35 U	0.35 U	[40]
TRICHLOROETHENE	0.5 U	0.5 U	0.38 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	1.0 U	1.0 U	0.56 U	1.2 U	1.2 U	[20]

CEF-003-06S [3-13]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.94 J	3.1*	3.0*	1.5	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	122*	28.5*	17.4*	50.6*	20*	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	20.6 abVI*	0.61 U	[5]
TOLUENE	0.5 U	2.6	4.8	3.5	0.79 I	[40]
TRICHLOROETHENE	0.5 U	1.3	0.81 F	0.65 I	0.32 U	[3]
VINYL CHLORIDE	1.0	0.86 F	0.34 U	5.2*	1.1*	[1]
TOTAL XYLENES	3.6	17.4	26.9*	9.9	1.9	[20]

CEF-003-14I [45-55]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	1.0 U	1.0 U	0.46 U	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	0.35 U	0.35 U	[40]
TRICHLOROETHENE	1.3	0.73 F	0.56 F	0.62 I	0.62 I	[3]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	1.0 U	1.0 U	0.56 U	1.2 U	1.2 U	[20]

CEF-003-25S [15-25]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	NS	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	NS	0.22 U	[3]
CHLOROETHANE	1.0 U	1.0 U	0.46 U	NS	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	NS	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	NS	0.61 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	NS	0.35 U	[40]
TRICHLOROETHENE	0.5 U	0.5 U	0.38 U	NS	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	NS	0.3 U	[1]
TOTAL XYLENES	1.0 U	1.0 U	0.56 U	NS	1.2 U	[20]

CEF-003-31S [20-30]	07/06	01/07	07/07	10/08	09/09	
BENZENE	1.7*	1.8 F*	2.1*	1.7 I*	1.8 I*	[1]
CARBON TETRACHLORIDE	0.5 U	1.0 U	0.29 U	0.22 U	0.44 U	[3]
CHLOROETHANE	1.0 U	2.0 U	0.46 U	0.48 U	0.96 U	[12]
CIS-1,2-DICHLOROETHENE	141*	164*	113*	134*	122*	[70]
METHYLENE CHLORIDE	1.0 U	2.0 U	1.0 U	2.3 I	1.2 U	[5]
TOLUENE	0.87 J	1 F	1.2	0.86 I	0.74 I	[40]
TRICHLOROETHENE	0.5 U	1.0 U	0.38 U	0.64 U	0.64 U	[3]
VINYL CHLORIDE	2.6*	6.0*	48*	5.0*	13.3*	[1]
TOTAL XYLENES	3.9	3.1 F	3.7	2.3 U	3.2 I	[20]

CEF-003-28S [20-30]	07/06	01/07	07/07	10/08	09/09	
BENZENE	2.5 U	0.5 U	0.2 U	0.8 U	0.8 U	[1]
CARBON TETRACHLORIDE	2.5 U	0.5 U	0.29 U	0.22 U	0.44 U	[3]
CHLOROETHANE	5.0 U	1.0 U	0.46 U	0.48 U	0.96 U	[12]
CIS-1,2-DICHLOROETHENE	56.6	56.1	41.9	31.4	20.1	[70]
METHYLENE CHLORIDE	7.2 J*	1.0 U	1.0 U	2.1 a	2.0 U	[5]
TOLUENE	2.5 U	0.5 U	0.27 U	0.7 U	0.7 U	[40]
TRICHLOROETHENE	228*	187*	160*	138*	115*	[3]
VINYL CHLORIDE	2.5 U	0.5 U	0.34 U	0.6 U	0.6 U	[1]
TOTAL XYLENES	5.0 U	1.0 U	0.56 U	2.3 U	2.3 U	[20]

CEF-003-38S [15-25]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	1.0 U	1.0 U	0.46 U	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	0.35 U	0.35 U	[40]
TRICHLOROETHENE	0.5 U	0.5 U	0.38 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	1.0 U	1.0 U	0.56 U	1.2 U	1.2 U	[20]

CEF-003-39I [35-45]	07/06	01/07	07/07	10/08	09/09	
BENZENE	0.5 U	0.5 U	0.2 U	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	1.0 U	1.0 U	0.46 U	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.28 U	0.2 U	0.2 U	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	0.61 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	0.35 U	0.35 U	[40]
TRICHLOROETHENE	0.5 U	0.5 U	0.38 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	0.5 U	0.5 U	0.34 U	0.3 U	0.3 U	[1]
TOTAL XYLENES	1.0 U	1.0 U	0.56 U	1.2 U	1.2 U	[20]

CEF-003-WP [NA]	07/06	01/07	07/07	10/08	09/09	
BENZENE	1.4*	0.5 U	0.2 U	0.4 U	0.4 U	[1]
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.29 U	0.22 U	0.22 U	[3]
CHLOROETHANE	28.1	2.8	0.46 U	0.48 U	0.48 U	[12]
CIS-1,2-DICHLOROETHENE	0.50 J	0.5 U	0.28 U	0.2 U	0.79 I	[70]
METHYLENE CHLORIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	[5]
TOLUENE	0.5 U	0.5 U	0.27 U	0.35 U	0.35 U	[40]
TRICHLOROETHENE	0.5 U	0.5 U	0.38 U	0.32 U	0.32 U	[3]
VINYL CHLORIDE	5.9*	0.5 U	0.34 U	0.3 U	12.9*	[1]
TOTAL XYLENES	1.4 J	1.0 U	0.56 U	1.2 U	1.2 U	[20]

LEGEND:

- Monitoring well
- Groundwater Flow
- Surface Water
- * Concentration exceeds target cleanup goal.
- J Estimated concentration.
- U Not detected at or above associated detection limit.
- NA Not analyzed
- ND None detected

```
CEF-016-46I**          02/03
[27-32]
1,1,1-TRICHLOROETHANE  3.1/2.5 [200]
```

- Sample ID
- Sample Date
- Well Screen Interval, feet below ground surface
- Groundwater Cleanup Target Level (GCTL)
- Detected Concentration in ug/L, * indicates GCTL exceedance
- Parameter

Notes: 1. Duplicate sample results reported as sample/duplicate.

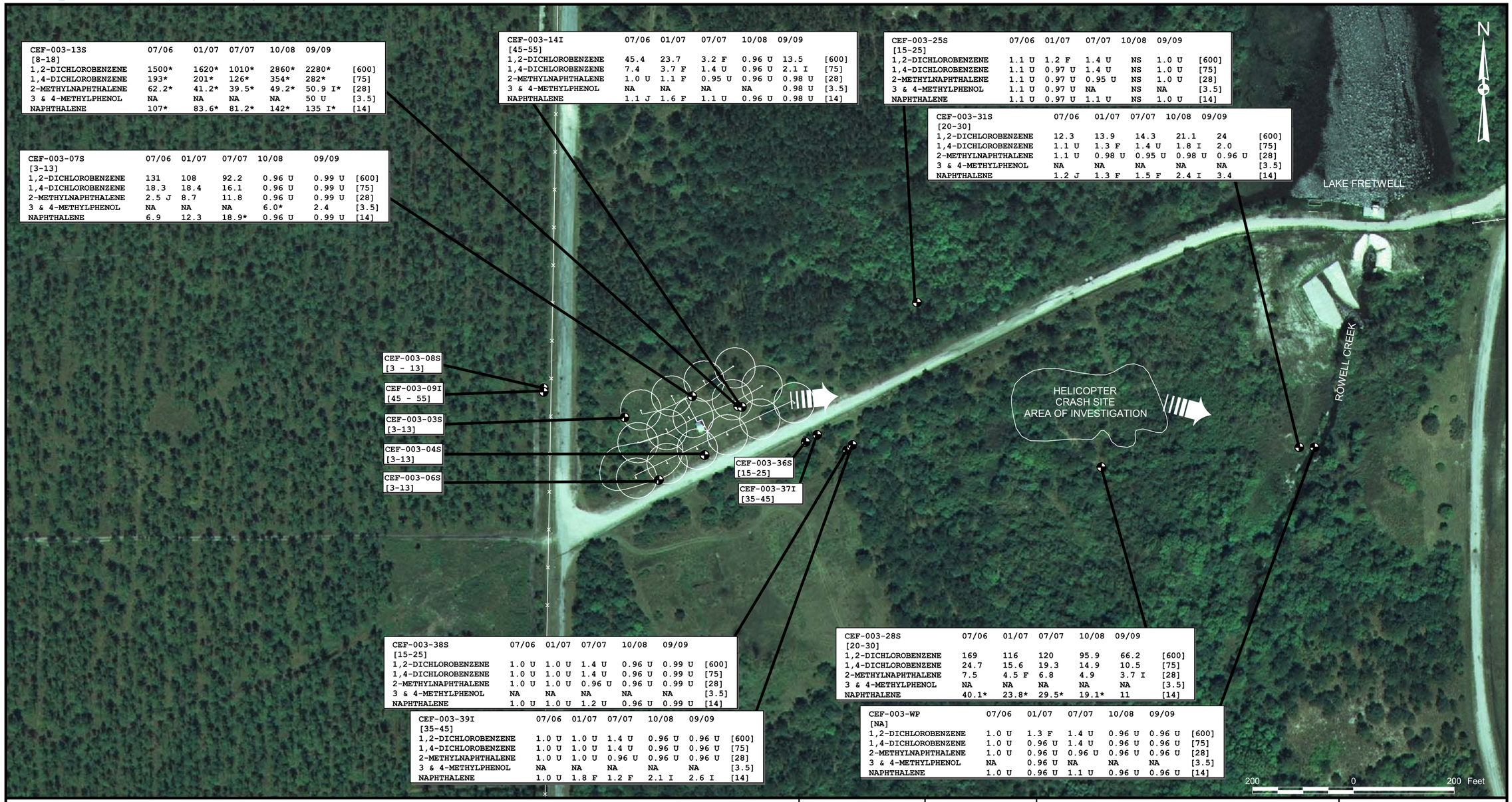
DRAWN BY	DATE
MJJ	15Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
OPERABLE UNIT 8, SITE 3
FIVE - YEAR REVIEW
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 7-3	REV. 0

P:\GIS\NAS_CecilField\Chapter-08.apr 16Oct09 MJJ Layout 8-4



CEF-003-13S	07/06	01/07	07/07	10/08	09/09	
[8-18]						
1,2-DICHLOROBENZENE	1500*	1620*	1010*	2860*	2280*	[600]
1,4-DICHLOROBENZENE	193*	201*	126*	354*	282*	[75]
2-METHYLNAPHTHALENE	62.2*	41.2*	39.5*	49.2*	50.9 I*	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	50 U	[3.5]
NAPHTHALENE	107*	83.6*	81.2*	142*	135 I*	[14]

CEF-003-07S	07/06	01/07	07/07	10/08	09/09	
[3-13]						
1,2-DICHLOROBENZENE	131	108	92.2	0.96 U	0.99 U	[600]
1,4-DICHLOROBENZENE	18.3	18.4	16.1	0.96 U	0.99 U	[75]
2-METHYLNAPHTHALENE	2.5 J	8.7	11.8	0.96 U	0.99 U	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	6.0*	2.4	[3.5]
NAPHTHALENE	6.9	12.3	18.9*	0.96 U	0.99 U	[14]

CEF-003-14I	07/06	01/07	07/07	10/08	09/09	
[45-55]						
1,2-DICHLOROBENZENE	45.4	23.7	3.2 F	0.96 U	13.5	[600]
1,4-DICHLOROBENZENE	7.4	3.7 F	1.4 U	0.96 U	2.1 I	[75]
2-METHYLNAPHTHALENE	1.0 U	1.1 F	0.95 U	0.96 U	0.98 U	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	0.98 U	[3.5]
NAPHTHALENE	1.1 J	1.6 F	1.1 U	0.96 U	0.98 U	[14]

CEF-003-25S	07/06	01/07	07/07	10/08	09/09	
[15-25]						
1,2-DICHLOROBENZENE	1.1 U	1.2 F	1.4 U	NS	1.0 U	[600]
1,4-DICHLOROBENZENE	1.1 U	0.97 U	1.4 U	NS	1.0 U	[75]
2-METHYLNAPHTHALENE	1.1 U	0.97 U	0.95 U	NS	1.0 U	[28]
3 & 4-METHYLPHENOL	1.1 U	0.97 U	NA	NS	NA	[3.5]
NAPHTHALENE	1.1 U	0.97 U	1.1 U	NS	1.0 U	[14]

CEF-003-31S	07/06	01/07	07/07	10/08	09/09	
[20-30]						
1,2-DICHLOROBENZENE	12.3	13.9	14.3	21.1	24	[600]
1,4-DICHLOROBENZENE	1.1 U	1.3 F	1.4 U	1.8 I	2.0	[75]
2-METHYLNAPHTHALENE	1.1 U	0.98 U	0.95 U	0.98 U	0.96 U	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	1.2 J	1.3 F	1.5 F	2.4 I	3.4	[14]

CEF-003-38S	07/06	01/07	07/07	10/08	09/09	
[15-25]						
1,2-DICHLOROBENZENE	1.0 U	1.0 U	1.4 U	0.96 U	0.99 U	[600]
1,4-DICHLOROBENZENE	1.0 U	1.0 U	1.4 U	0.96 U	0.99 U	[75]
2-METHYLNAPHTHALENE	1.0 U	1.0 U	0.96 U	0.96 U	0.99 U	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	1.0 U	1.0 U	1.2 U	0.96 U	0.99 U	[14]

CEF-003-39I	07/06	01/07	07/07	10/08	09/09	
[35-45]						
1,2-DICHLOROBENZENE	1.0 U	1.0 U	1.4 U	0.96 U	0.96 U	[600]
1,4-DICHLOROBENZENE	1.0 U	1.0 U	1.4 U	0.96 U	0.96 U	[75]
2-METHYLNAPHTHALENE	1.0 U	1.0 U	0.96 U	0.96 U	0.96 U	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	1.0 U	1.8 F	1.2 F	2.1 I	2.6 I	[14]

CEF-003-28S	07/06	01/07	07/07	10/08	09/09	
[20-30]						
1,2-DICHLOROBENZENE	169	116	120	95.9	66.2	[600]
1,4-DICHLOROBENZENE	24.7	15.6	19.3	14.9	10.5	[75]
2-METHYLNAPHTHALENE	7.5	4.5 F	6.8	4.9	3.7 I	[28]
3 & 4-METHYLPHENOL	NA	NA	NA	NA	NA	[3.5]
NAPHTHALENE	40.1*	23.8*	29.5*	19.1*	11	[14]

CEF-003-WP	07/06	01/07	07/07	10/08	09/09	
[NA]						
1,2-DICHLOROBENZENE	1.0 U	1.3 F	1.4 U	0.96 U	0.96 U	[600]
1,4-DICHLOROBENZENE	1.0 U	0.96 U	1.4 U	0.96 U	0.96 U	[75]
2-METHYLNAPHTHALENE	1.0 U	0.96 U	0.96 U	0.96 U	0.96 U	[28]
3 & 4-METHYLPHENOL	NA	0.96 U	NA	NA	NA	[3.5]
NAPHTHALENE	1.0 U	0.96 U	1.1 U	0.96 U	0.96 U	[14]

LEGEND:

- Monitoring well
- Groundwater Flow
- Surface Water
- * Concentration exceeds target cleanup goal.
- J Estimated concentration.
- U Not detected at or above associated detection limit.
- NA Not analyzed
- ND None detected

```
CEF-016-46I**          02/03
[27-32]
1,1,1-TRICHLOROETHANE  3.1/2.5 [200]
```

- Sample ID
- Sample Date
- Well Screen Interval, feet below ground surface
- Groundwater Cleanup Target Level (GCTL)
- Detected Concentration in ug/L, * indicates GCTL exceedance
- Parameter

Notes: 1. Duplicate sample results reported as sample/duplicate.

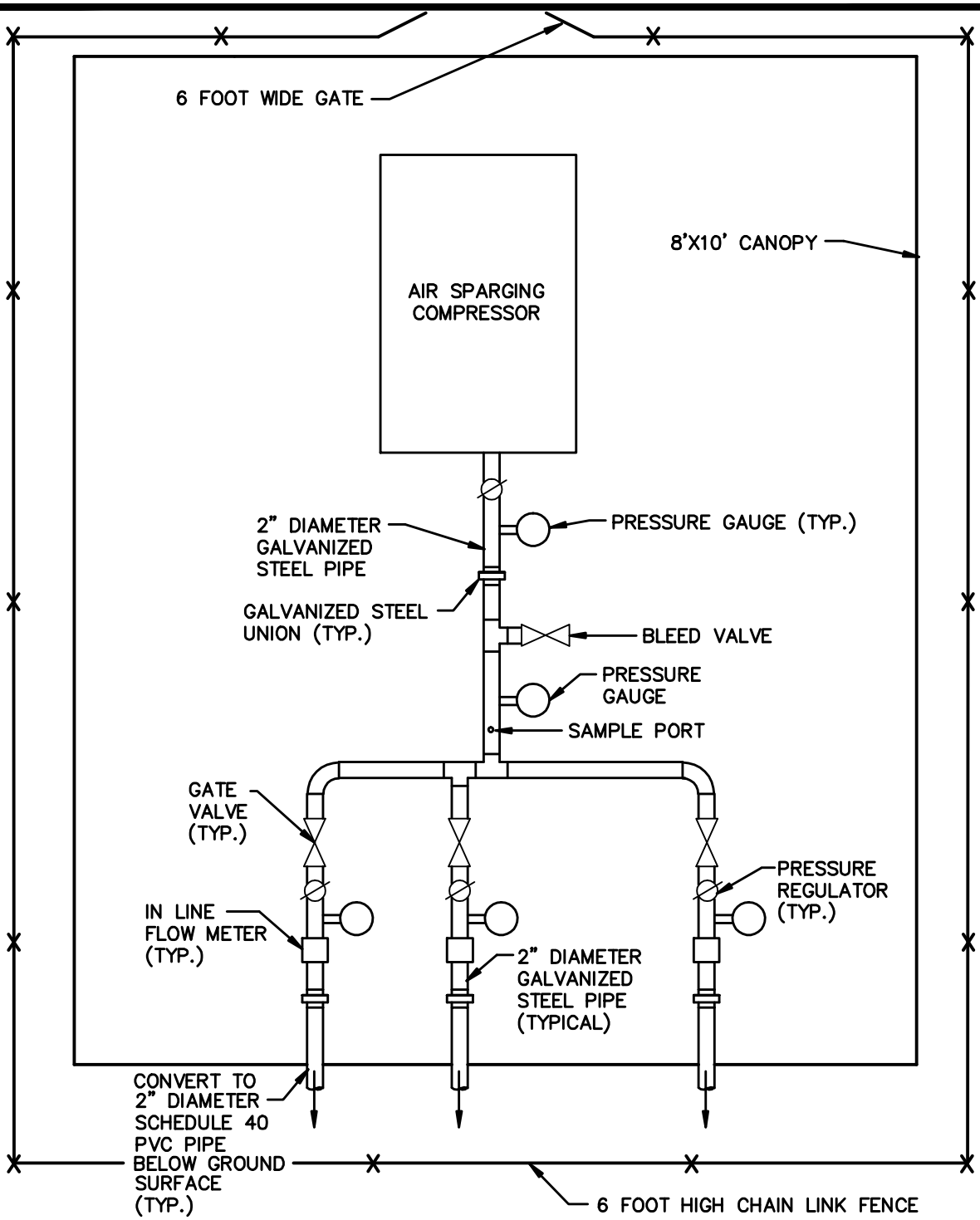
DRAWN BY	DATE
MJJ	30Dec04
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

SEMIVOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
OPERABLE UNIT 8, SITE 3
FIVE - YEAR REVIEW
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 7-4	REV. 0

ACAD: 0989CP07.dwg 10/13/09 CK PIT



DRAWN BY CK DATE 10/13/09	CONCEPTUAL AIR SPARGING EQUIPMENT LAYOUT OPERABLE UNIT 8, SITE 3 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989	
CHECKED BY DATE		OWNER NO. 0000	
REVISED BY DATE		APPROVED BY DATE	
SCALE NOT TO SCALE		DRAWING NO. FIGURE 7-5	REV. 0

FORM CADD NO. SDIV-AV.DWG - REV 1 - 9/10/98

FIGURE 7-6

VOC CONCENTRATION TRENDS IN CEF-3-13S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

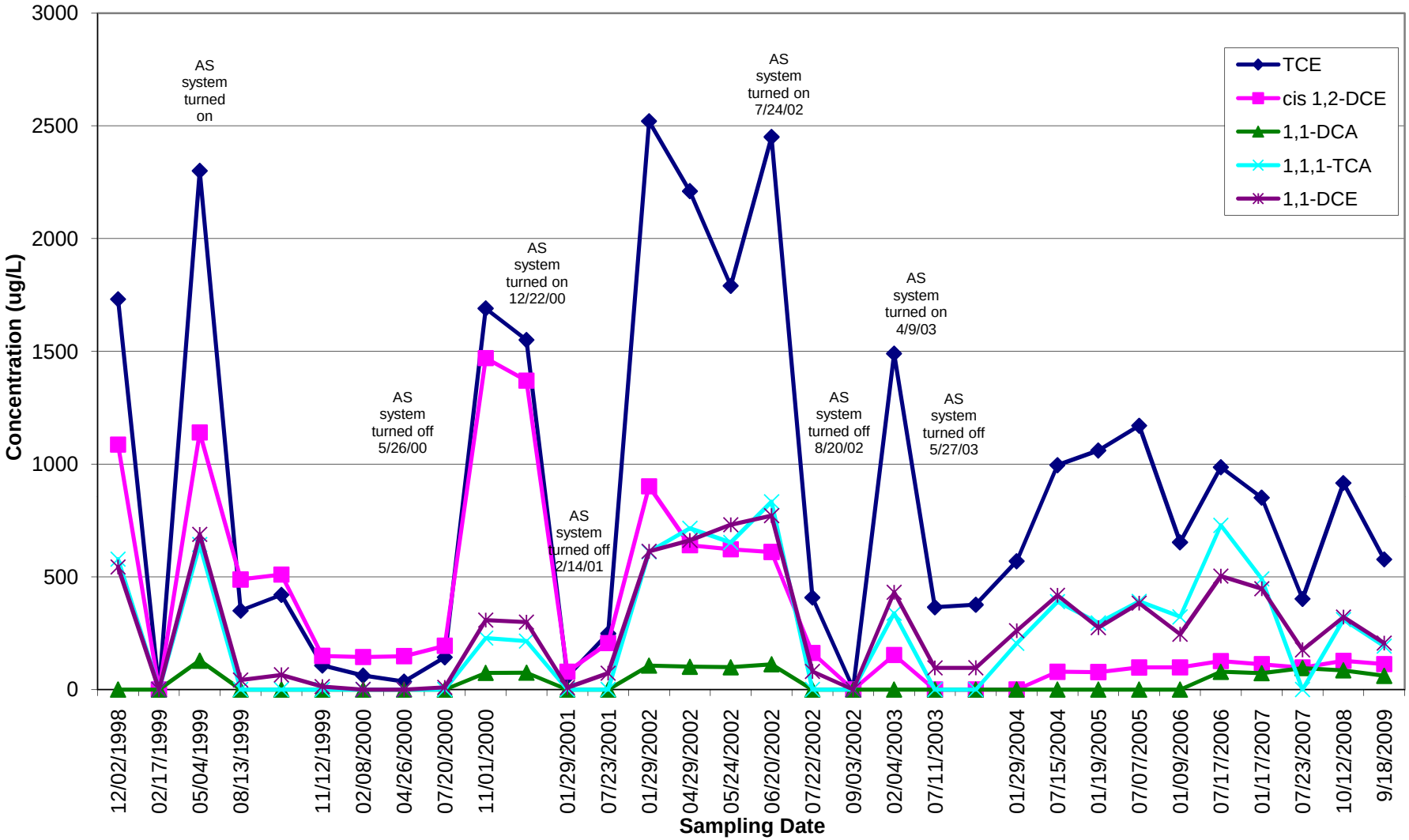


FIGURE 7-7

VOC CONCENTRATION TRENDS IN CEF-3-07S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

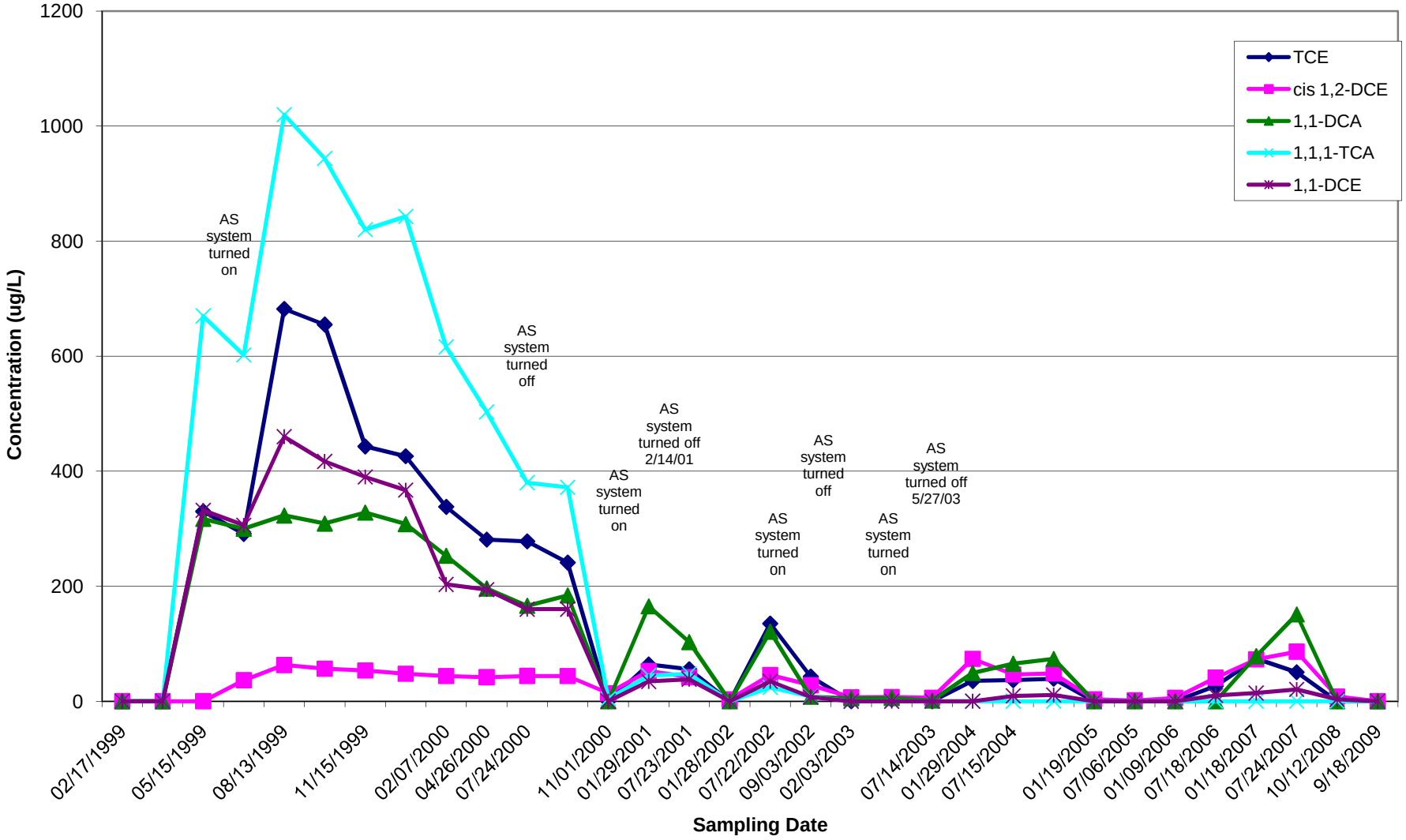


FIGURE 7-8

VOC CONCENTRATION TRENDS IN CEF-3-28S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

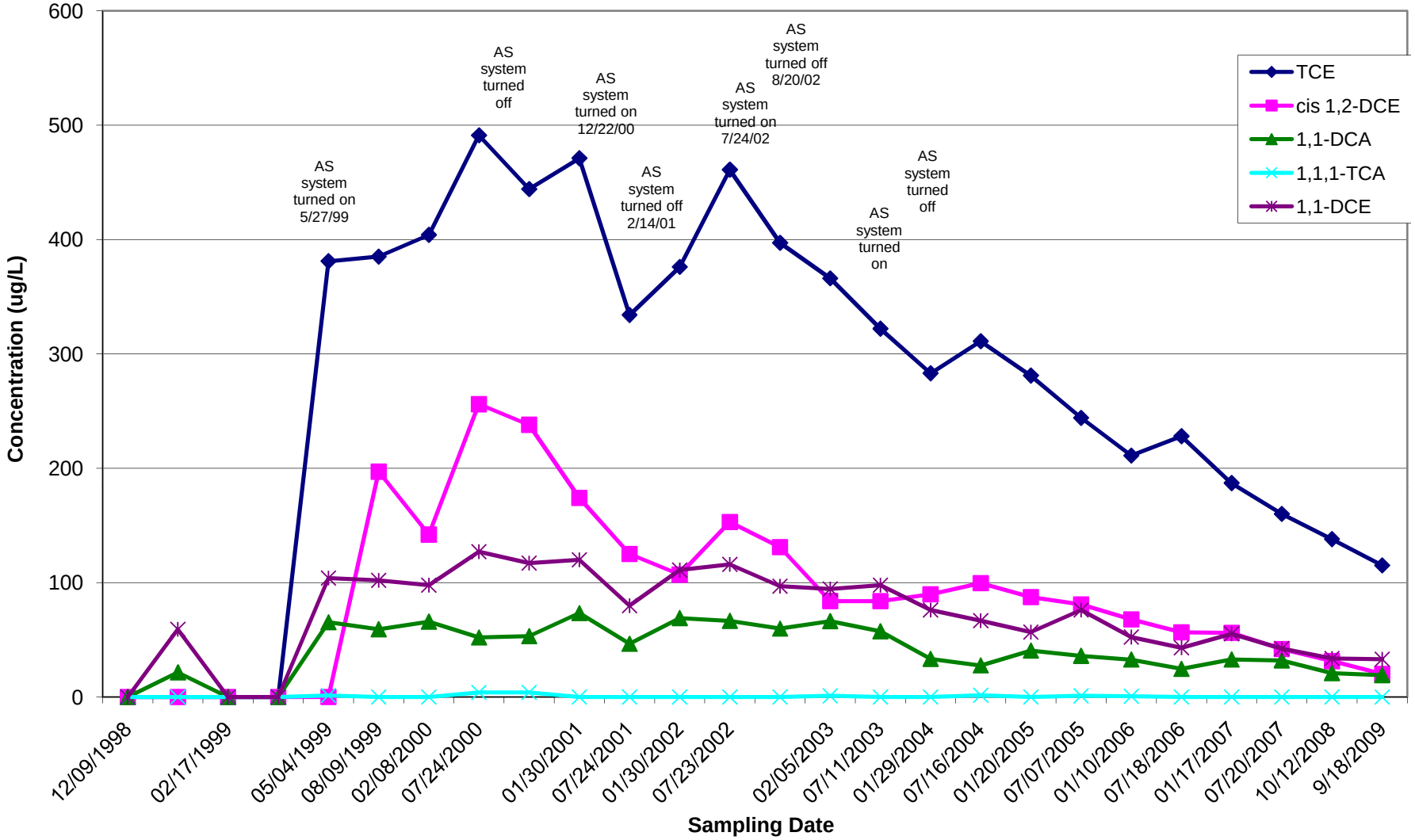


FIGURE 7-9

VOC CONCENTRATION TRENDS IN CEF-3-31S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

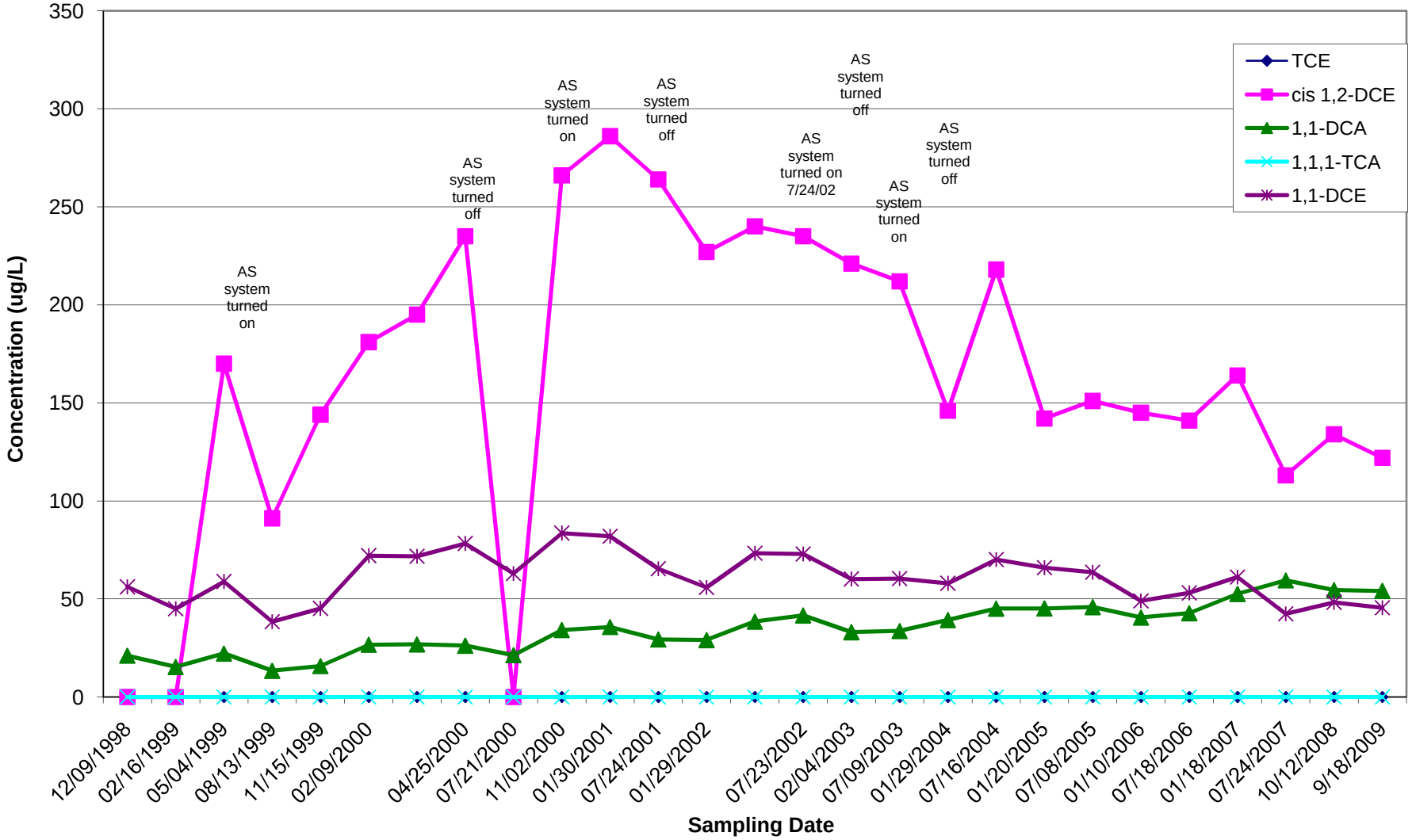


FIGURE 7-10

SVOC CONCENTRATION TRENDS IN CEF-3-13S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

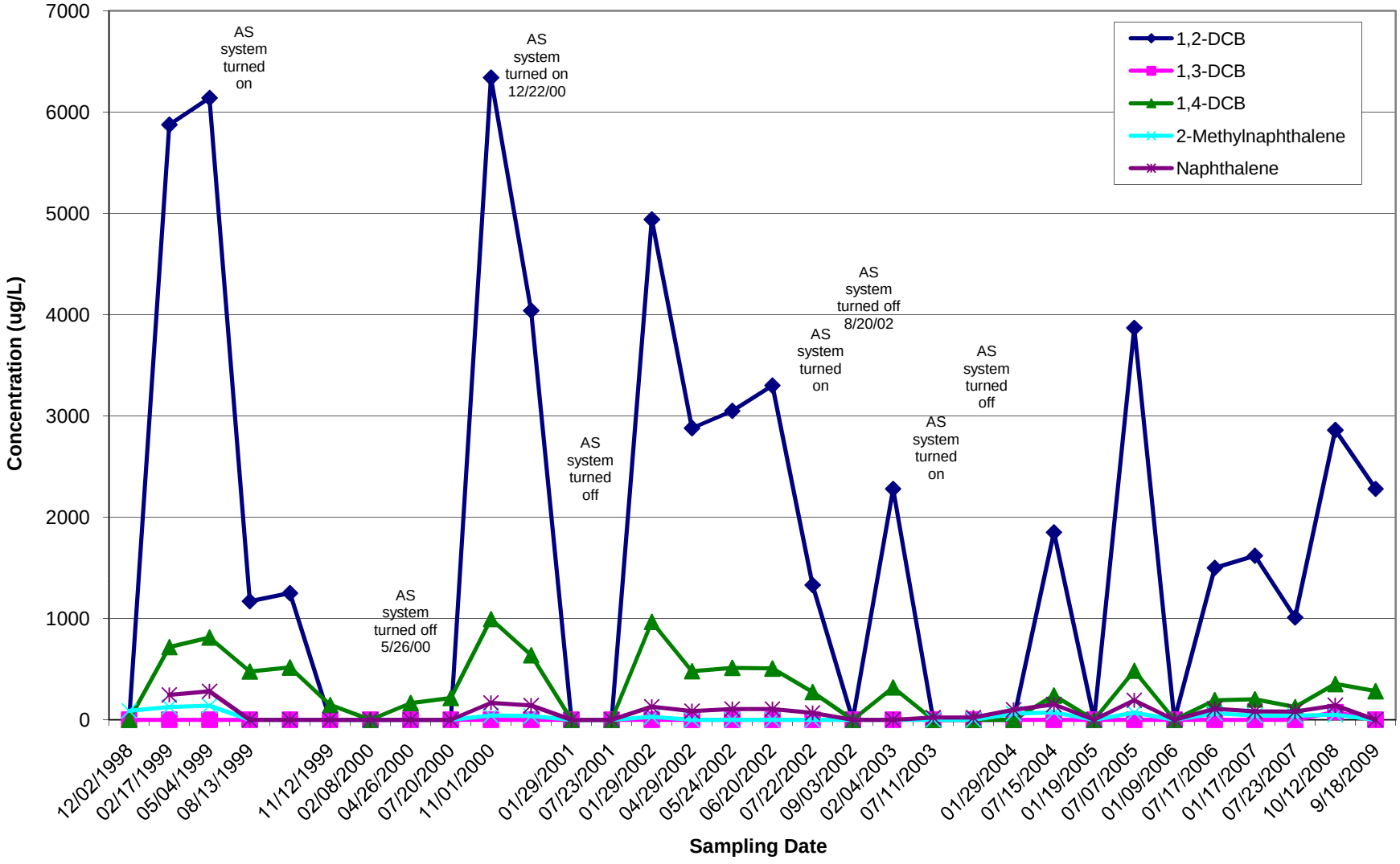


FIGURE 7-11

SVOC CONCENTRATION TRENDS IN CEF-3-07S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

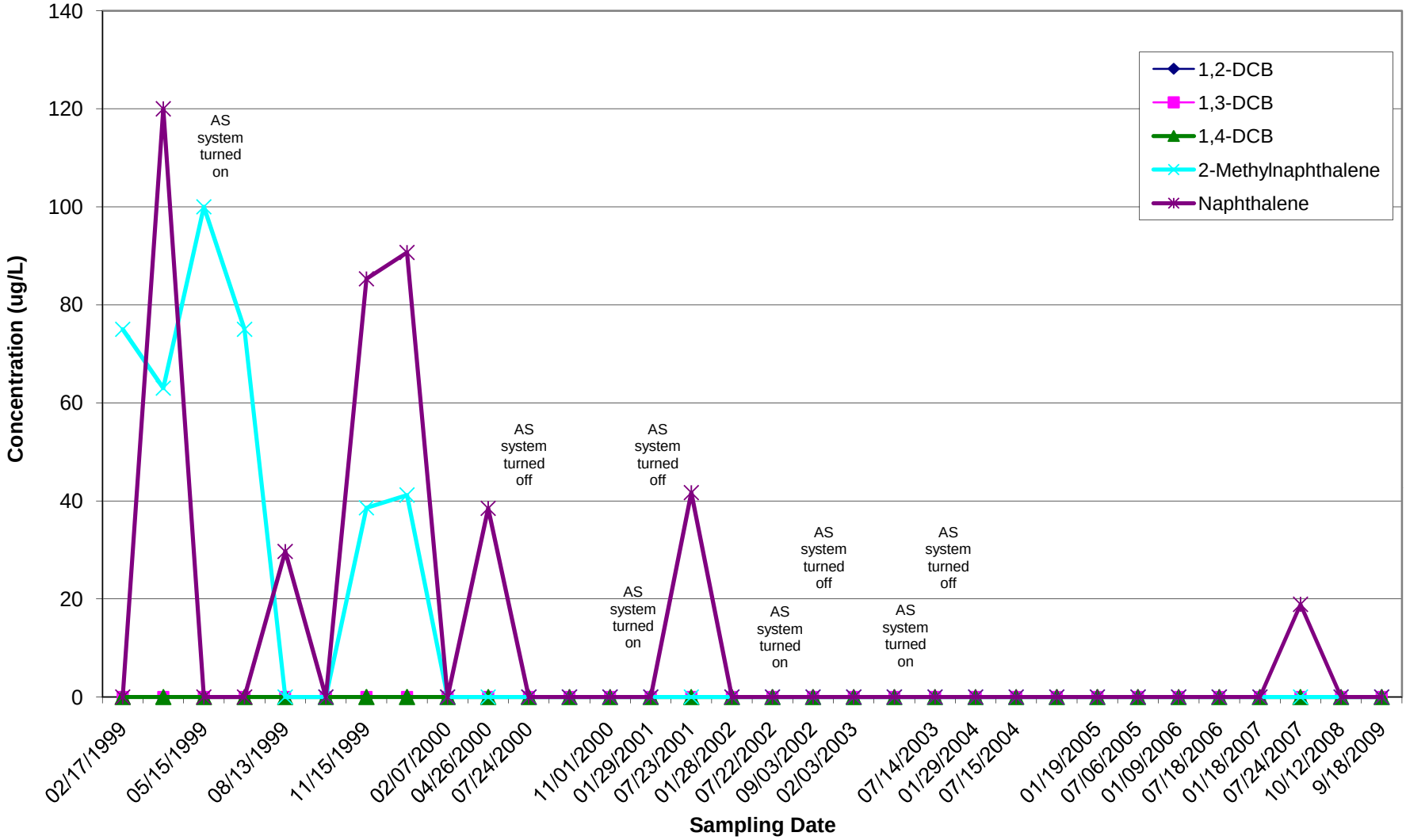


FIGURE 7-12

SVOC CONCENTRATION TRENDS IN CEF-3-14I
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

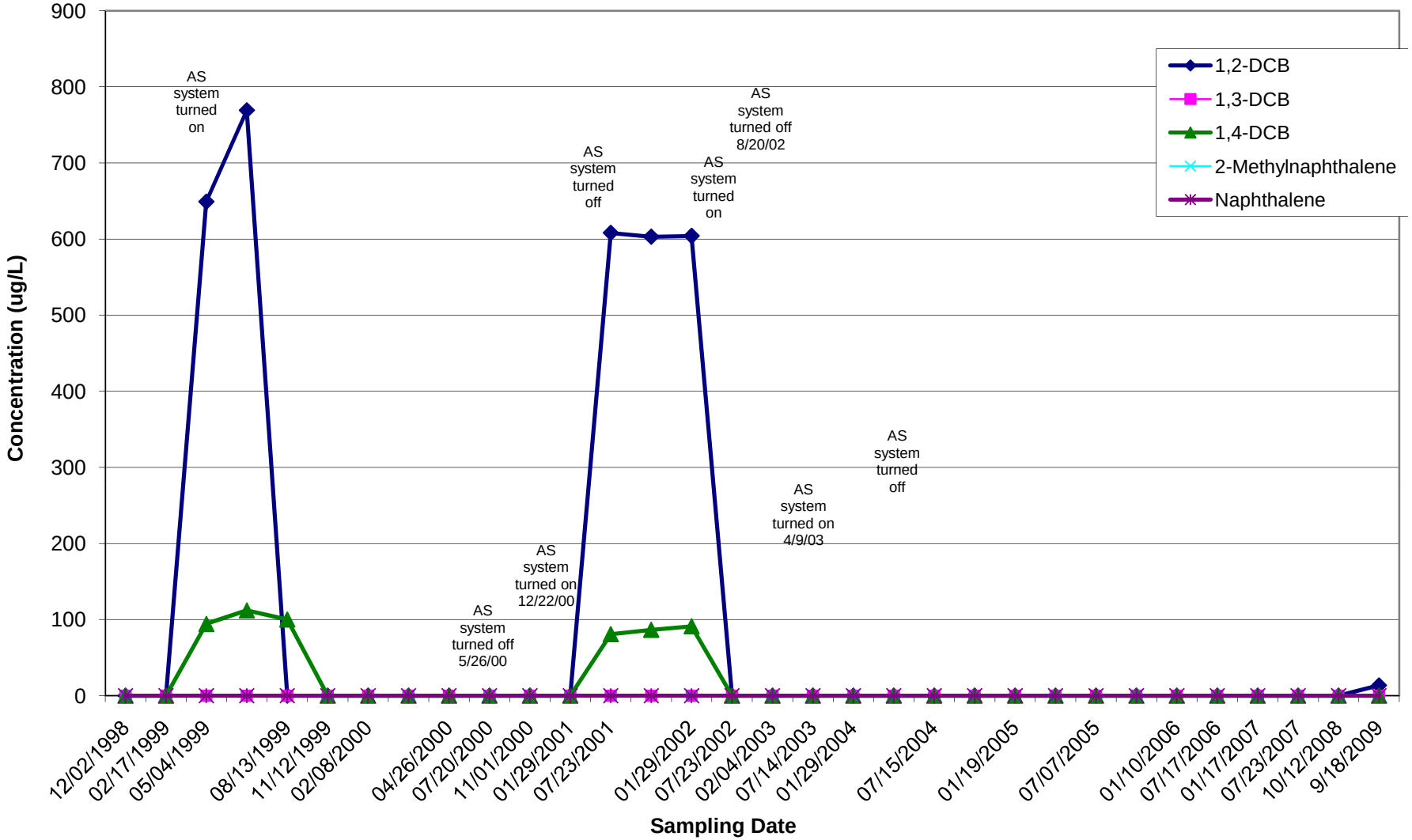
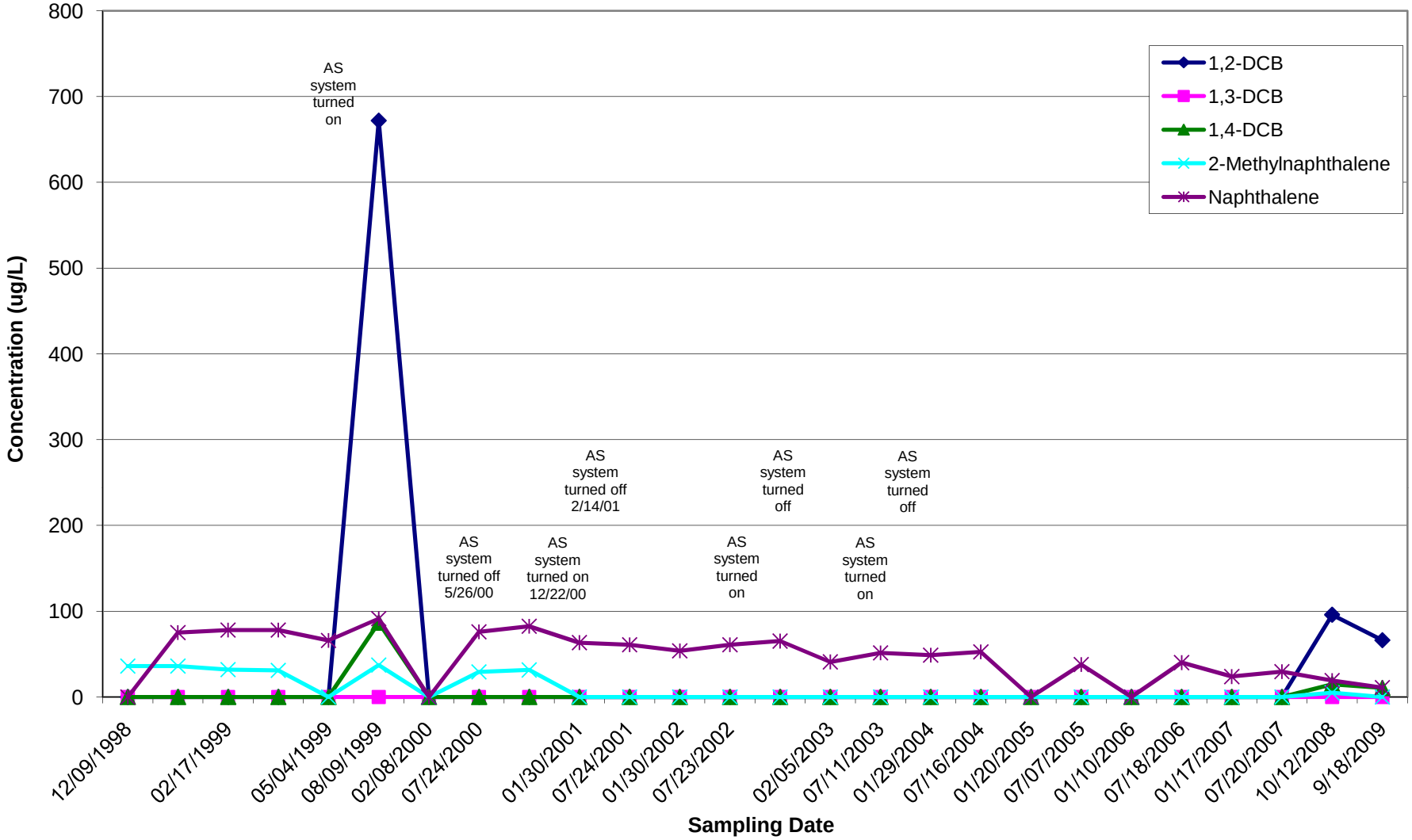


FIGURE 7-13

SVOC CONCENTRATION TRENDS IN CEF-3-28S
OPERABLE UNIT 8, SITE 3
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



8.0 OPERABLE UNIT 9, SITES 36 AND 37, 57, 58, AND 59

8.1 INTRODUCTION

Implementation of the remedial actions at OU 9, Sites 36 and 37 began in 2001. The five-year review consists of an approximate 8-year period of data and provides a current status update for OU 9, Sites 36 and 37. Sites 36 and 37 were evaluated in the previous five-year review, but a more detailed analysis of data from Sites 36 and 37 will be completed during this review.

Implementation of the remedial actions at OU 9, Sites 57 and 58 began in 2003. This five-year review consists of an approximate 6-year period of data and provides a current status update for OU 9, Sites 57 and 58. Sites 57 and 58 were not evaluated in the previous five-year review because the ROD for these sites was not finalized until February 2005, after the previous review had been prepared.

Implementation of the remedial actions at OU 9, Site 59 began in August 2006. This five-year review consists of an approximate 3-year period of data and provides a current status update for OU 9, Site 59. 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. Site 59 was not evaluated in the previous five-year review because the ROD for the site had not been signed at that time.

This five-year review is being conducted as a matter of policy at Site 57 (Day Tank 1 and Building 824/824A area), Site 58 (Building 312), and Site 59 (Aircraft and Maintenance Hangars TCE Plumes), and as a statutory review at Sites 36 and 37 (Control Tower TCE Plume and Hangars 13, 14 DCE plume), because even after groundwater cleanup levels are achieved, unrestricted reuse and unrestricted exposure to soils will remain unacceptable.

8.2 SITE CHRONOLOGY

A list of important historical events and relevant dates for OU 9 is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Construction of Site 37 buildings	1941 to 1982
Construction of Site 36 buildings	1943 to 1968
Construction of Site 57 buildings	1955 to 1993
Construction of Site 58 buildings	1957 to 1989
Construction of Site 59 buildings	1959 to 1989

Event	Date
South Fuel Farm (SFF) operated adjacent to Site 36	1940s to 1950s
Three refueling systems constructed at Site 37	1940s to 1950s
Refueling systems operated at Site 37	1940s to 1999
Day Tank 2 operated adjacent to Site 36	1957 to 1996
Contamination Assessment (CA) performed at SFF	1990 to 1991
CA Addendum completed for SFF groundwater	1996
Remedial Action Plan (RAP) submitted for SFF	1996
Free-product recovery action completed at Day Tank 2	1996 to 1997
Site Assessment Study performed for Day Tank 2	1997 to 1998
Bioventing and biosparging system installed at SFF	1998
RI for Sites 36 and 37 soil and groundwater	1998 to 1999
FS for Sites 36 and 37 soil and groundwater	1999 to 2000
Proposed Plan for Sites 36 and 37 groundwater	2000
ROD for Sites 36 and 37 groundwater	2001
Contaminated soil south of Hangar 14 at Site 37 remediated under Petroleum Program	2001
Remedial Design for AS systems completed at Sites 36 and 37	2001
Groundwater monitoring at Sites 36 and 37	2001 – ongoing semi-annually
AS systems installed at Sites 36 and 37	2001 to 2002
RI for groundwater at Sites 57 and 58	2002
AS systems O&M at Sites 36 and 37	2002 – ongoing
Groundwater monitoring at Sites 57 and 58	2003 – ongoing
ESD for LUCs, Sites 36 and 37	November 2003
RI for Site 59 groundwater	2004 to 2006
ROD for groundwater at Sites 57 and 58	2005
OPS Demonstration for Sites 36 and 37	May 2006
LUC RDs for Sites 57 and 58	May 2006
LUC RD for Sites 36 and 37	June 2006
Southern Pilot-scale in-situ bioremediation test at Site 59	August 2006 to March 2007
FS for Site 59 groundwater	2007
Sites 36 and 37, 57 and 58 FOSTs	June 1, 2007
Proposed Plan for Site 59 groundwater	2007
DPT investigation of Sites 36/37 Hot Spot 3	2007
ROD for Site 59 groundwater	2008
Full Scale In-Situ biological treatment at Site 59	2008 – ongoing
Groundwater monitoring at Site 59	2007 – ongoing
LUC RD Site 59	June 2009
Sites 36 and 37 AS system expansion	August 2009

8.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 9, Sites 36 and 37, 57, 58, and 59. Figures 8-1 through 8-4 show the relative locations and associated features of Sites 36 and 37, 57, 58, and 59, respectively. The Sites 36 and 37 plumes overlapped and occupied approximately 67 acres at the time of the RI (see Figure 8-5). The Site 57 petroleum plume occupied approximately 3.1 acres and the TCE plume occupied approximately 1.1 acres at the time of the RI (see Figures 8-6 and 8-7). The Site 58 plume occupied approximately 0.4 acres at the time of the RI (see Figure 8-8). At the time of the RI, the Site 59 northern plume occupied approximately 1.9 acres, and the southern plume occupied approximately 1 acre at the 30-foot depth made up of three hot spots and the surrounding contamination (see Figure 8-9A). At the 50-foot depth, the northern plume covered approximately 1.9 acres and the southern plume occupied approximately 2.6 acres at the time of the RI (see Figure 8-9B). At the 70- to 80-foot depth, the northern plume and southern plume coalesce into a single plume that covered approximately 3.4 acres at the time of the RI (see Figure 8-9C). At the top of rock (TOR) depth, the single plume covered approximately 0.4 acres at the time of the RI (see Figure 8-9D).

Land and Resource Use/History of Contamination

OU 9 includes the groundwater contamination identified at Sites 36 and 37, Site 57, Site 58, and Site 59.

Sites 36 and 37

Sites 36 and 37 are located side by side immediately north of the East-West Runway and south of Crossover Street (formerly Second Street). Buildings in this area have been primarily associated with maintenance and servicing of aircraft. Roads, taxiways, runways, and parking aprons cover most of the area. A relatively large (22-acre) unpaved and grass-covered area lies between the two sites. There are also a few grass-covered areas between taxiways and runways. No disposal facilities were located on the sites. The probable sources of contamination were leaks from tanks or pipelines, spills, and poor housekeeping practices associated with the fueling system, SFF, and Day Tank 2.

Buildings at Site 36 were generally constructed from 1943 to 1968. Several fuel storage tanks, known collectively as the SFF, operated adjacent to Site 36 in the 1940s and 1950s and were removed in 1994. An above-ground fuel storage tank known as Day Tank 2 also operated adjacent to Site 36 from 1957 to 1996, and was dismantled and removed in 1997. Site 36 consists of a groundwater plume contaminated with aromatic and chlorinated VOCs located south of the Control Tower (Building 82).

Most buildings at Site 37 were constructed from 1941 to 1982. Three refueling systems were located south of Hangars 13 and 14. Two of these systems were built in the 1940s and were fed from the former SFF. The third system, also known as the East-West High-Speed Refueling System, was built in the late 1950s and was fed from the former Day Tank 2. Site 37 consists of a groundwater plume contaminated with aromatic and chlorinated VOCs, and also has elevated concentrations of dissolved iron and manganese. The plume is located south of Hangars 13 and 14.

At the time of the RI, the Sites 36 and 37 contaminant plumes overlapped and covered an area of about 67 acres extending in a south-southeast direction towards the intersection of the East-West and North-South Runways. There was also a relatively small area of soil contaminated with aromatic VOCs south of Hangar 14 at Site 37. This area was remediated under the FDEP Petroleum Program. No other contaminated soil was identified at OU 9, Sites 36 and 37.

Site 57

Site 57 is located in the northwestern portion of the Main Base, west of the North-South Runway. Buildings in this area have been primarily associated with aircraft maintenance and servicing and storage of parts. Site 57 also includes Day Tank 1, which was a 200,000-gallon jet fuel above-ground storage tank (AST) which was removed in 1999. Day Tank 1 is being investigated as part of the Petroleum Program and will not be evaluated in this review. The probable sources of contamination were leaks from tanks or pipelines, spills, and poor housekeeping practices associated with the storage of hazardous materials and Day Tank 1.

Buildings at Site 57 were generally constructed from 1955 to 1993. An above-ground fuel storage tank known as Day Tank 1 first operated at Site 57 in 1955. Site 57 consists of a groundwater plume contaminated with aromatic and chlorinated VOCs, TRPH, and PAHs located south of Building 825 and east of Building 824A.

At the time of the RI the Site 57 petroleum plume covered an area of about 3.1 acres extending in a south-southeast direction from the eastern side of Building 846 toward the area east of Building 824A. The petroleum plume extended approximately 750 feet to the southeast and has an average width of approximately 225 feet. The TCE plume at the time of the RI covered approximately 1.1 acres and extended approximately 250 feet by 180 feet. There was also an area of free product, approximately 350 square feet in area, delineated during the RI located east of the Day Tank 1 excavation area.

Site 58

Site 58 is located in the northwestern portion of the Main Base, west of the North-South Runway. Site 58 includes Building 312 and 312LS and the adjacent land areas. Building 312 was a corrosion control facility, and associated structures included a hydraulic lift, an aircraft wash rack, an oil-water separator, and a waste oil underground storage tank (UST). All of these structures have been removed from the site. Building 312LS is a lift station that serves Building 312. The probable sources of contamination were runoff from the aircraft wash rack.

Buildings at Site 58 were constructed from 1957 to 1989. Site 58 consists of a groundwater plume contaminated with naphthalene and TRPH, defined by naphthalene concentrations greater than 20 µg/L. This plume is located southeast of Building 312 and is approximately 100 feet by 60 feet in size. The lone TRPH exceedance is encompassed by the naphthalene plume.

A limited area of the drainage ditch was found to have concentrations of PAHs in excess of the FDEP direct contact residential criteria, based on a single sediment sample. No other sediment samples collected downstream had PAH exceedances.

Site 59

Site 59 is located in the Main Base area of NAS Cecil Field, near the end of the north-south runways. A number of buildings are associated with Site 59, including Buildings 324, 334, 339, 811, 814, 815, 837N, 885, and 1845. Two sanitary sewer lift stations, an oil-water separator, and Potential Source of Contamination (PSC) 56 are also associated with the site.

Buildings at Site 59 were built between 1959 and 1989, and they served a variety of functions from a sheet metal plant to a jet engine testing facility. Petroleum contamination from the Jet Engine Test Cell (JETC) is being address by the FDEP Petroleum Program and is not discussed under the IR program.

Site 59 consists of two groundwater plumes that are contaminated with TCE at concentrations that exceed FDEP GCTLs. The contamination is likely a result of past spills, leaks, and/or poor waste-handling practices at the site.

The size, shape, and orientation of the TCE plumes vary at the measured depths. At the 30-foot depth, the northern plume covered approximately 82,000 square feet at the time of the RI and is centered west of Building 818, extending southeast from just north of Building 324 to Building 1845. The southern plume at the 30-foot depth covered approximately 42,000 square feet at the time of the RI and is oriented approximately east-west between Buildings 1845 and 815. At the 50-foot depth, the northern plume has a

more east-west orientation, but it is still centered just west of Building 818 and has approximately the same area. The position of the southern plume at the 50-foot depth shifts to encompass most of Building 1845 and extends to Building 815; its orientation is northwest-southeast which is different from its east-west orientation at the 30-foot depth. The area covered by this plume was approximately 115,000 square feet at the time of the RI. At the 70- to 80-foot depth, the plumes unite to form a single area extending from southeast of Building 324 to underneath Building 1845, with a northwest-southeast orientation; the center of the plume shifts toward the northwestern corner of Building 1845. This plume covered approximately 150,000 square feet at the time of the RI. In the 120-foot TOR zone, the single plume decreased in size to approximately 18,500 square feet at the time of the RI, had the same general orientation as in the 70- to 80-foot zone, and was centered at the northwestern corner of Building 1845.

Initial Response and Basis for Taking Action

Sites 36 and 37, 57, 58, and 59 were not identified in the 1985 IAS by Envirodyne Engineers or the base-wide RFI conducted by HLA in 1988. Sites 36 and 37 contamination was discovered when VOC contamination was detected near Hangars 13 and 14 during groundwater sampling conducted in 1996 as part of a flightline area study. Groundwater sampling in 1997 and 1998 associated with a Day Tank 2 site assessment study also detected BTEX and TCE contamination in this area. Subsequent sampling was conducted to delineate the extent of this VOC contamination, and SVOC contamination was also detected.

Contamination was first detected at Site 57 in 1994 during the Phase II Investigation. Benzo(a)pyrene (BaP) and heptachlor were detected in soil at levels exceeding human health screening criteria, and aluminum, iron, and manganese in groundwater were detected at levels greater than state and federal MCLs. Subsequent sampling in 1996 determined that the north side of Building 824 was likely affected by a release of contaminants, and that excavation and further sampling were needed at the site.

The Site 58 area was designated as requiring further investigation during the 1994 EBS because of the presence of the UST, friable asbestos building materials, an outside satellite hazardous waste accumulation point, and stressed vegetation. The Site Assessment Report (SAR) (1996) identified arsenic, iron, and manganese contamination, and a work plan was prepared in 1999 to further sample groundwater at the site.

At the Site 59 area, PCBs were a concern during the EBS, but they were not detected during the 1997 Phase II investigation. During a due diligence investigation conducted at Building 324 in 2003, TCE was detected at concentrations exceeding the FDEP GCTL, which required further investigation and action.

8.4 REMEDIAL ACTIONS

8.4.1 Remedy Selection

The purpose of remedial action at OU 9 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 36 and 37, 57, 58, and 59. The RAOs for OU 9, Sites 36 and 37 were published in the ROD for Sites 36 and 37, Operable Unit 9 in January 2001; the RAOs for OU 9, Sites 57 and 58 were published in the ROD for Sites 57 and 58, Operable Unit 9 in September 2005; and the RAOs for OU 9, Site 59 were published in the ROD for Site 59, Operable Unit 9 in April, 2008. These RAOs were based on an evaluation of site conditions, risks, and legal requirements (ARARs).

8.4.1.1 OU 9, Sites 36 and 37

The three RAOs identified in the ROD for OU 9, Sites 36 and 37 groundwater were developed to address groundwater contamination detected during various investigations that posed potential unacceptable risks to human receptors if the groundwater is used as a potable water source. The contaminated groundwater may also migrate to surface water drainage ditches and eventually to Sal Taylor Creek causing adverse effects on aquatic organisms. The RAOs were:

- Prevent unacceptable human health risks from exposure to contaminated groundwater at Sites 36 and 37.
- Prevent contaminant migration from groundwater to surface water at Site 36.
- Restore surficial aquifer quality at Sites 36 and 37 to meet PRGs.

The selected remedy for OU 9, Sites 36 and 37 groundwater consists of in-situ remediation with AS treatment for three highly contaminated areas of groundwater designated as hot spots, monitored natural attenuation (MNA) of the remainder of the contaminant plumes, LUCs, and long-term groundwater monitoring.

The ROD indicated that the AS systems for hot spots and NA for the remainder of the plumes would require 24 to 92 years to achieve PRGs.

8.4.1.2 OU 9, Sites 57 and 58

The RAOs identified in the ROD for OU 9, Sites 57 and 58 were developed to address groundwater contamination detected during various investigations that posed potential unacceptable risks to human receptors if the groundwater is used as a potable water source. The RAOs were:

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

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

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

The selected remedy for OU 9, Sites 57 and 58 groundwater consists of LUCs, NA, and long-term monitoring to verify that no unacceptable contaminant migration is occurring and that NA is effectively lowering contaminant concentrations over time.

The ROD indicated that the NA of the plumes would require approximately 18 years to achieve PRGs at Site 57, and 3 years to achieve PRGs at Site 58.

8.4.1.3 OU 9, Site 59

The RAOs identified in the ROD for OU 9, Site 59 were developed to address groundwater contamination detected during various investigations that posed potential unacceptable risks to human receptors if the groundwater is used as a potable water source. The RAOs were:

- Prevent unacceptable risk from exposure to groundwater with concentrations of chlorinated VOCs in excess of their respective FDEP GCTLs.

- Restore groundwater quality at Site 59 to meet drinking water standards based on FDEP classification of the aquifer as a potential source of drinking water (Class G-II).

The selected remedy for OU 9, Site 59 groundwater consists of in-situ biological treatment of TCE hot spots, NA of less concentrated areas of the TCE plumes, LUCs, and long-term groundwater monitoring.

The ROD indicated that the in-situ biological treatment systems for hot spots and NA for the remainder of the plume would require approximately 57 years to achieve PRGs.

The remedies selected for OU 9, Sites 36, 37, 57, 58, and 59 were considered protective of human health and the environment and cost effective. The remedies will achieve all ARARs in the future. LUCs will be implemented to restrict the use of the surficial aquifer groundwater until the ARARs are met, and

groundwater monitoring will be performed to evaluate the progress of remediation and to verify that no unacceptable contaminant migration is taking place.

8.4.2 Remedy Implementation

8.4.2.1 OU 9, Sites 36 and 37

AS System

The Groundwater Remedial Design for the installation and operation of the AS systems was completed in 2001. Design parameters for the systems were determined based on information from the operation of the AS systems operated at OU 7, Site 16 and OU 8, Site 3 at NAS Cecil Field. Benzene and TCE were selected as the compounds most representative of the hot spots. The remedial system objectives selected for the AS systems were to reduce benzene concentrations to less than 1,000 µg/L at Hot Spots 1 and 3, and to reduce TCE concentrations to less than 100 µg/L at Hot Spot 2. These cleanup goals were selected using engineering judgment, fate and transport modeling results, technology limitations, and to be protective of surface water in Sal Taylor Creek, where benzene and TCE could ultimately discharge. Modeling and conservative assumptions estimated that it would take the AS system between 1 and 5 years to achieve the remedial system objectives at all three hot spots. It was also estimated that after attaining the benzene and TCE cleanup goals in the hot spots, it will take NA processes another 24 years to reduce the benzene and TCE concentrations in the source area and downgradient plume to the FDEP GCTLs of 1 µg/L and 3 µg/L, respectively.

The AS systems to treat Hot Spots 2 and 3 in the Sites 36 and 37 groundwater plumes were constructed by CH2MHill, the RAC for the Navy, in accordance with the Groundwater Remedial Design. The design called for an AS system to be installed at Hot Spot 1; however, prior to construction activities, monitoring results in October 2001 indicated that the AS system benzene cleanup objective of 1,000 µg/L had already been achieved through NA. As a result, the BCT determined that the AS system would not be constructed at Hot Spot 1.

The Hot Spot 2 system commenced operation on April 22, 2002, and the Hot Spot 3 system began operating on June 17, 2002. The layouts of the as-built AS systems for Hot Spots 2 and 3 are illustrated on Figure 8-10, and well installation and piping details are presented on Figure 8-11. Details of the remedial action are provided in the Interim Remedial Action Report for Operable Unit 9, Sites 36 and 37, the Construction Completion Report for the Installation of Air Sparging System for Sites 36 and 37 (Hot Spots 1, 2, and 3), and the OPS Demonstration Report for OU 9, Sites 36 and 37 Groundwater.

Groundwater Monitoring

Long-term groundwater monitoring is being conducted at Sites 36 and 37 in accordance with the ROD, the Groundwater Remedial Design, the Long-Term Monitoring Plan, and recommendations of the annual reports. Ten quarterly and eleven semi-annual groundwater sampling events have been conducted at Sites 36 and 37 since January 2001. The BCT decided at the February 2009 meeting that Site 37 source area wells should be sampled on a quarterly basis when the AS system is running, and this sampling began in December 2009.

Land Use Controls

LUCs required at Sites 36 and 37 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring or remediation system(s).
- Prohibit the breaching of the storm sewer line that intersects the contaminated groundwater plume.

An ESD for multiple sites was finalized in November 2003 that modified the ROD for Sites 36 and 37 to support implementation of these LUCs by providing specific LUC provisions as an enforceable part of the ROD.

The LUC requirements took effect upon finalization of the LUC RD for Sites 36 and 37 in June 2006, and remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Sites 36 and 37 property, as required by FDEP. Therefore, the LUCs have remained in effect after the transfer of the property to JAA per the FOST, dated June 1, 2007. The LUCs will continue to be applicable to any subsequent owners.

8.4.2.2 OU 9, Sites 57 and 58

Groundwater Monitoring

Long-term groundwater monitoring is being conducted at Sites 57 and 58 in accordance with the ROD, the Groundwater Remedial Design, the Long-Term Monitoring Plan, and recommendations of the annual reports. The long-term monitoring programs at Sites 57 and 58 began in April 2003. Fourteen groundwater sampling events have been conducted at Site 57 and eleven events have been conducted at Site 58 over six years.

Land Use Controls

LUCs required at Sites 57 and 58 to ensure protection of human health and the environment are documented in two separate LUC RDs, which, upon finalization, implemented the associated LUCs until the properties were transferred. The LUC RDs included the following LUC objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the sites (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes).
- Maintain the integrity of any existing or future monitoring or remediation system(s).

The LUC requirements went into effect upon finalization of the LUC RD for Site 57 and the LUC RD for Site 58 on May 5, 2006, and they remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Sites 57 and 58 properties, as required by FDEP. Therefore, the LUCs have remained in effect after the conveyance of the properties to JAA on June 1, 2007. LUCs will also apply to any subsequent owners.

8.4.2.3 OU 9, Site 59

In-Situ Biological Treatment System

The Remedial Design for the installation and operation of the in-situ biological treatment systems was completed in 2008. Design parameters for the recirculation systems were determined based on information from the pilot studies performed at Site 59 in 2006 and 2007. The remedial system objectives selected for the biological treatment system were to reduce the concentration of TCE to less than the cleanup goal, 3 µg/L. This cleanup goal was selected using engineering judgment, fate and transport modeling results, technology limitations, and to be protective of possible receptors that could come in contact with groundwater at Site 59. Modeling and conservative assumptions estimated that it would take the biological treatment system between 6 and 12 months to achieve the remedial system objective at all three hot spots.

The in-situ biological treatment systems to treat Hot Spots 2A, 2B, and 3 in the Site 59 groundwater plumes were constructed by CH2MHill, the RAC for the Navy, in accordance with the Remedial Design. The Hot Spot 2A, Hot Spot 2B, and Hot Spot 3 systems commenced operation in November 2008. The layouts of the as-built in-situ biological treatment systems for Hot Spots 2A, 2B, and 3 are illustrated on Figures 8-12 through 8-14, respectively. Details of the remedial action are provided in the OPS Demonstration Report for Operable Unit, Site 59 and the Construction Completion Report for Site 59.

Groundwater Monitoring

Long-term groundwater monitoring is being conducted at Site 59 in accordance with the ROD, the Groundwater Remedial Design, the Long-Term Monitoring Plan, and recommendations of the annual reports. Six quarterly groundwater sampling events have been conducted at Site 59.

Land Use Controls

LUCs required at Site 59 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit all uses of groundwater from the surficial aquifer underlying the site (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes).
- Maintain the integrity of any existing or future monitoring or remediation system(s).

The LUC requirements went into effect upon finalization of the LUC RD for Site 59 on June 23, 2009. The Navy currently owns this property and conducts inspections to verify that the LUCs are not being violated. LUC objective s and LUC requirements will be incorporated into the Quitclaim deed when the Navy transfers the Site 59 property, as required by FDEP, and thus, LUCs will also apply to any subsequent owners.

8.4.3 System Operations/Operation and Maintenance

8.4.3.1 OU 9, Site 36 and 37

AS/VE System

O&M and performance monitoring of the AS systems were conducted by CH2MHill in accordance with the O&M Manual for the first year of operation (i.e., until the end of the second quarter of 2003). The results of the O&M activities have been documented in quarterly, semi-annual, and annual reports. CH2MHill turned over O&M activities for the AS systems to Ellis Environmental Group (EEG) starting in the third quarter of 2003. EEG reported O&M data for the systems from the third quarter of 2003 through the third quarter of 2006. Operations and monitoring at Hot Spot 2 were discontinued in February 2006; therefore, the July 2006 through September 2006 O&M report discusses O&M at Hot Spot 3 only. The system in Hot Spot 3 was then turned off in October 2006. During the period from July 1, 2004 through June 30, 2009, the Hot Spot 2 AS system operated for 8,401 hours out of a possible 43,824 hours, and the Hot Spot 3 AS system operated for 9,225 hours out of a possible 43,824 hours.

System downtime resulted from system startup adjustments and testing, power interruptions, manual shut downs for groundwater sampling events, and performance of required O&M activities on system equipment. The O&M reports provide more detail about the reasons and durations of downtimes for Hot Spots 2 and 3.

Manual shut downs for the quarterly groundwater sampling events contributed significantly to the lower operational performance of the systems. The lower flow rates during the initial period of operation negatively impacted the areas treated by the systems by reducing the radius of influence (ROI) of each well. The monitoring interval was changed from quarterly to semi-annually after the April 2003 sampling event. When the system is on, sampling was conducted quarterly from April 2003 to present, but sampling is conducted semi-annually when the system was down.

The pressure and flow rate monitoring results are detailed in the O&M reports submitted by CH2MHill and EEG. The design air flow rates were not achieved at each well by the AS systems during the initial period of performance (Year 1). Several significant adjustments were made to the AS systems during this time in order to achieve the design flow rates at each of the wells. The most current flow rate data (third quarter 2006) indicates that the AS system at Hot Spot 3 is generally performing as designed. Minor differences in actual and design air flow rates are attributable to minor differences in actual field conditions versus assumed design conditions.

The AS system at Hot Spot 2 was turned off in February 2006, and remained off until August 2009. The AS system at Hot Spot 3 was turned off in October 2006 and also remained off until August 2009. During the period of time when the AS systems were turned off, additional monitoring wells were installed within and sidegradient of the Hot Spot 3 source area, and system maintenance and retrofitting were required as well. The AS system was expanded in the area of Site 37 and the system was restarted in August 2009.

<u>AS System Supplemental Performance Evaluation</u>

TtNUS conducted a supplemental performance evaluation in May 2003 to determine the following:

- If the injection of air was effectively stripping VOCs
- If the AS systems were operating as designed
- The effective range of the sparge wells

The conclusions of the evaluation were:

- Contaminants are being stripped from the groundwater based on the analysis of air samples collected at the sites, and based on analyses of groundwater collected from selected sparge wells.

- The ROI of the intermediate wells is about 30 feet, which is consistent with the design.

- Oxygen is being transferred to the groundwater, but the oxygen may be used up by respiration before traveling very far from the injection wells.

- Air flow rates and pressures were observed to be operating at (or were adjusted to) design levels.

Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted at Sites 36 and 37 in accordance with the ROD, the Groundwater Remedial Design, the Long-Term Monitoring Plan, and recommendations of the annual reports. The monitoring is being completed to assess the effectiveness of the AS systems, the potential for continued migration of the downgradient edge of the contaminant plumes, and the efficacy of NA. Monitoring began in January 2001 and includes 10 quarterly events and 11 semi-annual events. Quarterly groundwater monitoring was conducted from the initiation of the program through the second quarter of Year 3 (April 2003) of the program. Semi-annual sampling began in November 2003 and is ongoing. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume are sampled and analyzed for the COCs. The maximum concentrations of COCs identified in the RI and during the most recent sampling event are shown in Tables 8-1 and 8-2. When the AS systems are on, sampling for that hot spot is performed quarterly.

The monitoring system is operating as designed, remedy performance is being measured on a regular basis, and preliminary data indicate that the plumes are contained and that the required remedial objectives are likely to be attained in accordance with the remedy design. The current and future land use is aviation flightline activities. The Navy is regularly re-evaluating the status of the site to optimize the monitoring program for Sites 36 and 37. The monitoring frequency is specified in the recommendations of the annual groundwater reports for Sites 36 and 37. Based on previous monitoring results, the BCT changed the sampling frequency from quarterly to semi-annually beginning in November 2003. Quarterly sampling is to continue only when the hot spot treatment systems are on, and only for the wells within the hot spots. Ten new wells were added to the monitoring program for the October 2008 sampling event to address the movement of the plume around Hot Spot 3. Groundwater monitoring is expected to continue for 30 years. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

Cost

The ROD presented the estimated cost of the selected remedy as $2,729,000 over a period of 30 years. The actual cost of installing the two AS systems for the remediation of Hot Spots 2 and 3 was $1,807,981, and the ongoing annual O&M cost of these systems is approximately $300,000. The system was expanded at Site 37 in 2009, at a cost of $85,000, with additional wells installed at a cost of $55,000. The cost of system repairs and retrofitting for the AS system was $210,000. The monitoring wells used for the implementation of the long-term groundwater monitoring were installed as part of the RI. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $523,000, including long-term monitoring sampling and analysis and treatment system operation. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

8.4.3.2 OU 9, Site 57 and 58

Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted at Sites 57 and 58 in accordance with the ROD, the Groundwater Remedial Design for each site, and recommendations of the annual reports. The monitoring is being completed to assess the potential for migration of the downgradient edge of the contaminant plumes and the efficacy of NA. Monitoring began in April 2003 and includes 4 quarterly events and 10 semi-annual events at Site 57; and 4 quarterly events, 4 semi-annual events, and 3 annual events at Site 58. Quarterly groundwater monitoring was conducted from the initiation of the program through the end of the first year (January 2004) of the program for both sites. At Site 57, semi-annual sampling began in July 2004 and is ongoing. At Site 58, semi-annual sampling began in July 2004 and continued through the second semi-annual, Year 3 sampling (February 2006). Annual sampling began in February 2007 and is ongoing. At both sites, monitoring wells within the plumes, upgradient of the plumes (background), and downgradient of the plumes were sampled and analyzed for the COCs.

At Sites 57 and 58, the monitoring systems are operating as designed, remedy performance is being measured on a regular basis, and preliminary data indicate that the plumes are contained and that the required remedial objectives are likely to be attained in accordance with the remedy design. The current and future land use is aviation flightline activities. The Navy is regularly re-evaluating the status of the site to optimize the monitoring program for Sites 57 and 58. The monitoring frequency is specified in the recommendations of the annual groundwater reports for Sites 57 and 58. Groundwater monitoring is expected to continue for 20 years. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

Cost

The ROD presented the estimated cost of the selected remedy as $524,000 over a period of 20 years. The monitoring wells used for the implementation of the long-term groundwater monitoring were installed as part of the RI. The actual cost to conduct the first year of groundwater monitoring at Site 57, consisting of 24 monitoring wells, over four quarterly rounds, was $121,242. Approximately $12,000 of this cost was a one-time capital expenditure for the preparation of Groundwater Remedial Design Work Plan. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $159,000 at Site 57 and $46,500 at Site 58, with both figures including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

8.4.3.3 OU 9, Site 59

In-Situ Biological Treatment System

O&M and performance monitoring of the biological treatment systems were conducted by TtNUS in accordance with the ROD and RD for the first year of operation. The results of the O&M activities have been documented in quarterly and annual reports. The full-scale system design was based on the Pilot Study performed at Site 59. The full-scale systems were activated mid-November 2008, and have been operating reliably and as intended since start-up. Shutdowns have not occurred for any reasons other than routine maintenance. Over the first 5 months of operation, according to the OPS Demonstration report, approximately 1,600 pounds, 2,800 pounds, and 4,200 pounds of sodium lactate have been injected in Hot Spots 2A, 2B, and 3, respectively. These quantities correspond to those determined in the system design.

Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted at Site 59 in accordance with the ROD, the Remedial Design, the Groundwater Remedial Design Work Plan for Long-Term Monitoring, and recommendations of the quarterly reports. The monitoring is being completed to assess the effectiveness of the biostimulation remedial systems, the potential for continued migration of the downgradient edge of the contaminant plumes, and the efficacy of NA. Monitoring began in October 2007 and includes six quarterly events. Quarterly groundwater monitoring was conducted from the initiation of the program and is ongoing. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume are sampled and analyzed for the COCs.

The monitoring system is operating as designed, remedy performance is being measured on a regular basis, and preliminary data indicate that the plume is contained and that the required remedial objectives

are likely to be attained in accordance with the remedy design. The current and future land use is aviation flightline activities. The Navy is regularly re-evaluating the status of the site to optimize the monitoring program for Site 59. The monitoring frequency is specified in the recommendations of the groundwater reports for Site 59. Based on previous monitoring results, the BCT decided that a new well should be installed to the west of Hot Spot 2B and added to the monitoring program. The well was installed and sampled as part of the most recent (August 2009) sampling event. Groundwater monitoring is expected to continue for 57 years. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

Cost

The ROD presented the estimated cost of the selected remedy as $2,245,000 over a period of 57 years. The actual cost of installing the three biostimulation remedial systems for the remediation of Hot Spots 2A, 2B, and 3 was approximately $2,010,000, and the first annual O&M cost of these systems was approximately $488,000. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $467,000, including long-term monitoring sampling and analysis and treatment system operation. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

8.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

OU 9, Sites 57, 58, and 59 were not included in the previous five-year review. The protectiveness statement from the Second Five Year review, below, details the standing of OU 9 during the past review period.

> The remedy at OU 9, Sites 36 and 37 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. Implementation of the LUCs 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 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 generally remained constant or slightly decreased over the monitoring period. The AS systems have been installed and are in operation, and the results of future groundwater monitoring will be used to evaluate the performance of the AS systems.

LUCs will be implemented before the transfer of the property to JAA. The Navy will temporarily retain control of OU 9, Sites 36 and 37 and will transfer the property when it has determined that the remedial action is OPS or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

The remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that are currently in operation (AS and 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 ROD for OU 9, Sites 36 and 37 has been met or will be met.

The recommendations and follow-up actions developed by the BCT based on the previous five-year review for OU9, Sites 36 and 37 are:

Previous Recommendation/ Required Actions	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program.	Semi-annually	Long-term monitoring continuing semi-annually at Sites 36 and 37 when the treatment system is off, and quarterly when the system is on. Most recent sampling in March 2009.
Implement LUCs.	Upon finalization of the LUC RD	The LUC RD was finalized June 29, 2006 and LUCs are in place by recorded deed at Sites 36 and 37.

8.6 FIVE-YEAR REVIEW PROCESS

8.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for OU 9, Sites 36 and 37, 57, 58, and 59 including the RODs, November 2003 ESD, remedial designs, treatment system technical memoranda and completion reports, long-term groundwater monitoring reports, and OPS Reports.

Also, a shallow VOC plume is present beneath several buildings at OU 9; therefore, the Navy evaluated the potential for vapor intrusion in these buildings. The results were presented in the submission entitled "Potential Indoor Air Evaluation Locations due to underlying contaminated groundwater at NAS Cecil Field," February 2001. This report concluded that groundwater contamination was not identified at levels greater than the Connecticut Groundwater Standards for Protection of Indoor Air in any residential areas. Therefore, vapor intrusion at OU 9 is not a concern, and any possible indoor air contamination would likely be due to building activities and is not attributable to groundwater contamination.

The following sections summarize groundwater results for Sites 36 and 37, 57, 58, and 59 based on a review of associated documents. Groundwater monitoring is ongoing at Sites 36 and 37, 57, 58, and 59.

8.6.1.1 OU 9, Sites 36 and 37

Groundwater samples were collected and analyzed for selected COCs (VOCs, SVOCs, TRPH, and inorganics) and NA parameters. The COCs are:

- BTEX.
- Tetrachloroethene (PCE).
- 1,1,2-TCA.
- TCE.
- 1,2-DCA.
- 1,1-DCA.
- 1,1-DCE.
- cis-1,2-DCE.
- Vinyl chloride.
- Naphthalene.
- 1-Methylnaphthalene.
- 2-Methylnaphthalene.
- 2-Methylphenol.
- 3-Methylphenol.
- 4-Methylphenol.
- Iron.
- Manganese.

Contaminant trends in the source area were evaluated to determine whether the AS remedial process selected for OU 9, Sites 36 and 37 is reducing contaminant levels in groundwater at the hot spots. The contaminant trends in the areas surrounding the hot spots were also evaluated to determine the status of contaminant migration from the source areas. Data collected during the RI through October 2008 were used to evaluate trends. VOC, SVOC, TRPH, and inorganic data for the last four monitoring events for the shallow, upper intermediate, lower intermediate, and deep zones of the surficial aquifer are presented on Figures 8-15 to 8-21. Trends for concentrations of certain VOCs and SVOCs in hot spot wells and wells downgradient of the hot spots are presented in Appendix C.

Hot Spot 1

Trends of COCs in the groundwater in and around Hot Spot 1 are monitored in upgradient well CEF-342-01I, well CEF-342-03I located within the hot spot, downgradient well pair CEF-342-06S/CEF-342-07I and sidegradient well clusters CEF-36-23S/CEF-36-24I/CEF-342-2DA and CEF-36-38I/CEF-36-39I.

CEF-342-01I: Xylenes and benzene are the only VOCs that have exceeded GCTLs since monitoring began at this well. The only exceedance of xylenes was 22.2 µg/L, slightly greater than the GCTL 20 µg/L, detected in July 2002. Concentrations of benzene exceeded the GCTL of 1 µg/L before the beginning of the LTMP and have not exceeded the GCTL since April 2001. Concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene all had exceedances early in the monitoring program, but have not exceeded their GCTLs since May 2004. TRPH and manganese concentrations have not exceeded GCTLs at this well during the LTMP; however, dissolved iron has been detected at concentrations exceeding its GCTL during every sampling event in which it has been analyzed.

CEF-342-03I: Concentrations of VOCs, SVOCs, and TRPH within Hot Spot 1 exhibited a downward trend during a majority of the monitoring period. Benzene concentrations detected at CEF-342-03I have been detected at concentrations greater than the GCTL for the entirety of the LTMP, but are decreasing consistently, from 2,180 µg/L during the RI to 19.5 µg/L during the October 2008 sampling event. The benzene concentration had rebounded to 1,790 µg/L in November 2003, but it has decreased steadily since December 2003. The cause of the rebound was unknown, and additional monitoring is necessary to evaluate possible trends. As expected, xylenes concentrations followed a similar trend as benzene concentrations. Xylenes, detected at 1,250 µg/L during the RI, decreased to 24.1 µg/L in April 2007, but did increase greatly to 1,100 µg/L, near the RI concentration, in November 2003 and May 2004. Concentrations of ethylbenzene have not exceeded the GCTL since December 2003. See Appendix C for trends.

Concentrations of SVOCs and TRPH detected in CEF-342-03I during the later monitoring events were generally lower than the concentrations detected during the RI and earlier monitoring events (2001). Concentrations of naphthalene in groundwater in this well decreased to less than the GCTL during the July 2002 (average) and October 2002 sampling events. The GCTLs for naphthalene compounds changed in 2005 (see Section 8.7.2.1). Naphthalene concentrations at this well were detected at levels greater than the new GCTL, 14 µg/L, from February 2003 through May 2006. There have been no exceedances since May 2006. Concentrations of 1-methylnaphthalene, 2-methylnaphthalene, inorganics, and TRPH remained less than their respective GCTLs throughout the LTMP to date.

CEF-342-06S and CEF-342-07I: Well pair CEF-342-06S/CEF-342-07I is located downgradient of Hot Spot 1 and CEF-342-03I. Benzene concentrations in this well fluctuated during the monitoring program with concentrations ranging from less than detection limits to as high of 84.4 µg/L at CEF-342-06S in May 2002. All of the benzene concentrations were greater than the GCTL of 1 µg/L during both 2008 sampling events, although concentrations at CEF-342-06S were non-detects or estimated concentrations from October 2006 through October 2007. TCE concentrations have been less than the GCTL of 3 µg/L at CEF-342-06S since November 2003, but continue to exceed the GCTL at CEF-342-07I. However, the TCE concentration is decreasing. PCE concentrations have decreased from 827 µg/L in February 2002 to 9.5 µg/L in October 2008. See Appendix C for trends.

SVOCs, TRPH, and inorganics are not monitored at these wells.

CEF-36-23S, CEF-36-24I, and CEF-342-2DA: There was one exceedance of VOCs (TCE) in CEF-36-23S and CEF-36-24I during the LTMP to date: 46.8 µg/L of TCE was detected in a duplicate sample in November 2004. Sampling for VOCs was cancelled at CEF-36-24I after the November 2004 sampling. Chlorinated VOCs and BTEX were not detected in sidegradient wells CEF-36-23S and CEF-36-24I during the RI for the first 3 years of long-term monitoring. TRPH was also not detected during the first 3 years of sampling in CEF-36-24I (CEF-36-23S was not analyzed for TRPH). In CEF-342-2DA, the deep well sidegradient of Hot Spot 1, benzene, PCE, and TCE concentrations have fluctuated and are typically greater than the GCTLs. Benzene concentrations exceeded the GCTL during all but four sampling events and the October 2008 concentration was the highest recorded at the well, 14 µg/L. TCE was detected during all monitoring rounds, and a majority of the concentrations exceeded the GCTL (3 µg/L), including a concentration of 17.3 µg/L detected in October 2008. PCE was not detected in this well from October 2001 through May 2004, and then it increased through April 2007, reaching a maximum of 169 µg/L (estimated). The most recent concentration was 90.3 µg/L. Cis-1,2-DCE and trans-1,2-DCE were also detected in this well during a majority of the sampling events.

CEF-36-38I and CEF-36-39I: Wells CEF-36-38I and CEF-36-39I are sidegradient of Hot Spot 1 and downgradient of Hot Spot 3. BTEX compounds were detected, but chlorinated VOCs were not, in the upper intermediate well CEF-36-38I. BTEX concentrations in this well fluctuated during the monitoring program with no significant trends. Benzene and xylenes concentrations have been greater than GCTLs in CEF-36-38I during every sampling event. The ethylbenzene concentration in CEF-36-38I increased significantly to 519 µg/L in May 2002 from a previous maximum of 10.2 µg/L, but decreased in subsequent rounds and has not exceeded its GCTL since that event. BTEX and two chlorinated VOCs (TCE and cis-1,2-DCE) were detected in the lower intermediate well CEF-36-39I. Concentrations of benzene and TCE have been equal to or greater than GCTLs in CEF-36-39I during all sampling events,

and xylenes concentrations have exceeded GCTLs in the majority of events, but have been less than GCTLs in the two most recent events.

Hot Spot 2

The Hot Spot 2 AS system began operating on April 22, 2002 prior to the May 2002 sampling event, and was turned off from February 2006 through August 2009. Trends of COCs at Hot Spot 2 were evaluated using data collected from wells within, downgradient, and sidegradient of the hot spot. Wells within Hot Spot 2 include the well pair CEF-342-13I/CEF-342-14D and well CEF-342-17D. Downgradient wells include paired wells CEF-342-19I/CEF-342-20D and CEF-36-33D, and sentinel well cluster CEF-36-35S/CEF-36-36I/CEF-36-37D. Sidegradient wells include CEF-36-27I (lower intermediate) and CEF-36-41I (upper intermediate). CEF-36-27I and CEF-36-41I are also downgradient of Hot Spot 3. Hot Spot 1 is upgradient of Hot Spot 2.

CEF-342-13I: Benzene concentrations decreased from 110 µg/L (average) during the RI to 1.1 µg/L during the February 2002 sampling event, fluctuated until returning to 1.1 µg/L in May 2004, and then were less than GCTLs from November 2004 through October 2005. In the last two monitoring events, benzene concentrations have rebounded to 1.2 µg/L. Concentrations of ethylbenzene, toluene, and xylenes also fluctuated during the monitoring program. Xylenes were also detected at concentrations in excess of their respective FDEP GCTL during the monitoring program, but have not exceeded this value since April 2003. TCE has typically fluctuated between non-detect and estimated concentrations, but did have two exceedances in February and April 2003. See Appendix C for trends.

CEF-342-14D: Concentrations of benzene and TCE at CEF-342-14D have fluctuated throughout the monitoring program and do not show any obvious trends. Both have exceeded their GCTLs in every sampling event. There are no other VOCs with exceedances at this well. Concentrations of cis-1,2-DCE in well CEF-342-14D have also fluctuated but always remained less than the GCTL. See Appendix C for trends.

CEF-342-17D: Benzene concentrations were low (less than 9 µg/L) until May 2006, when they reached 19.3 µg/L and have generally increased since. Benzene concentrations have been greater than its GCTL in all sampling events other than April 2001, when it was not detected. TCE concentrations have exceeded the GCTL during all sampling events, and the concentrations have exhibited an overall decreasing trend. Cis-1,2-DCE concentrations are typically detected at this well, but have never exceeded the GCTL. See Appendix C for trends.

CEF-342-19I and CEF-342-20D: Benzene concentrations in CEF-342-19I and CEF-342-20D remained relatively constant throughout the monitoring period with concentrations in CEF-342-19I generally less

than the FDEP GCTL (1 µg/L), and concentrations in CEF-342-20D greater than 10 µg/L but less than 20 µg/L. However, in the past three sampling events (October 2007, April 2008, and October 2008), benzene concentrations in CEF-342-19I have increased to greater than the GCTL with concentrations of 4.4, 18.7, and 86.4 µg/L, respectively. In contrast, TCE concentrations in these wells consistently increased from the RI sampling event to November 2004. TCE concentrations in CEF-342-19I increased from approximately 1 µg/L during the RI to 46.8 µg/L in November 2004. It is likely that this trend is the result of TCE that migrated from Hot Spot 2 prior to installation and operation of the AS system. Concentrations of TCE in CEF-342-20D increased from 1.5 µg/L (November 1998) to 50.9 µg/L (April 2007). Since reaching their peak, concentrations of TCE have steadily decreased in each well, but continue to exceed the GCTL. See Appendix C for trends.

CEF-36-33D: In downgradient well CEF-36-33D, concentrations of TCE increased during the monitoring program until April 2007 (26.4 µg/L) and have decreased in the last three events while remaining greater than the GCTL. Benzene concentrations increased from 1.2 µg/L in January 1999 to 69.5 µg/L in the most recent sampling event. The increasing trend will probably continue until the contamination existing in the groundwater prior to the AS system installation and operation moves through the aquifer or is attenuated by NA processes. See Appendix C for trends.

CEF-36-35S, CEF-36-36I, and CEF-36-37D: No significant COC concentrations were detected in the groundwater at the sentinel well cluster CEF-36-35S/CEF-36-36I/CEF-36-37D, located downgradient of CEF-36-33D, during the monitoring program.

CEF-36-41I: Sidegradient well CEF-36-41I is screened in the upper intermediate zone of the surficial aquifer. Benzene, ethylbenzene, and xylenes were detected for the first time in this well in July 2002. Benzene concentrations in the well have ranged from a high of 151 µg/L in October 2002 to a low of 0.58 µg/L in May 2004, with the most recent concentration being 6.6 µg/L. The ethylbenzene and xylene concentrations have remained less than GCTLs during the monitoring program. There was one xylenes exceedance detected in November 2004. No chlorinated VOCs have been detected in this well.

CEF-36-27I: Concentrations of BTEX constituents in downgradient well CEF-36-27I, screened in the lower intermediate zone, fluctuated during the monitoring program but generally decreased from the levels reported in the RI. Benzene and xylenes concentrations, however, have consistently exceeded their respective GCTLs, but neither had exceedances in October 2008. Chlorinated VOCs were not detected in this well.

Hot Spot 3

The Hot Spot 3 AS system began operation on June 17, 2002, approximately 7 weeks prior to the July 2002 sampling event, and was turned off from October 2006 through August 2009. Trends of COCs in groundwater at Hot Spot 3 were evaluated using data collected from wells upgradient, within, downgradient, and sidegradient of the hot spot. Well pair CEF-13-15I/ CEF-13-16D and well CEF-37-23S are located upgradient of Hot Spot 3. Wells within Hot Spot 3 include well clusters CEF-13-05S/ CEF-13-06I/ CEF-13-07D and CEF-13-08S/CEF-13-09I. Downgradient wells include CEF-37-24S and CEF-36-29S/CEF-36-30I. Wells near the groundwater divide west of Hot Spot 3 include CEF-13-01S/CEF-13-02I, CEF-13-10S, CEF-13-12S/CEF-13-13I, and CEF-233-01S. Well CEF-43-45 is located sidegradient of Hot Spot 3.

<u>CEF-013-15I, CEF-013-16D, and CEF-037-23S:</u> COCs have typically not been detected in upgradient well pair CEF-13-15I/CEF-13-16D during the monitoring program. Toluene and xylenes were sporadically detected (two or fewer detections) at low concentrations (less than 1 µg/L) in well CEF-13-15I. No COCs were detected in well CEF-13-16D. Toluene was detected once in CEF-37-23S at 1.6 µg/L in October 2002. There was one TCE exceedance at CEF-037-23S in April 2005, but all other chlorinated VOCs samples have been non-detects.

<u>CEF-013-05S:</u> Benzene concentrations were greater than the AS system goal of 1,000 µg/L from the beginning of monitoring through April 2003 and in April 2005. Concentrations of benzene have declined overall since the AS system began operation in June 2002 to a concentration of 86.4 µg/L in the latest round of sampling. Concentrations of ethylbenzene, toluene, and xylenes also showed similar trends as benzene, in that concentrations have been steadily decreasing since the AS system began operation. Ethylbenzene and toluene have not exceeded their GCTLs since October 2005, and xylenes were detected at concentrations less than the GCTL in April and October 2007, but increased to 90.9 µg/L in April 2008 and 40.5 µg/L in October 2008. The chlorinated VOCs 1,1-DCE, 1,1-DCA, TCE, and vinyl chloride were also detected in well CEF-13-05S at levels greater than their GCTLs on occasion. 1,1-DCE was detected at concentrations exceeding the GCTL most often. It was detected consistently at concentrations in excess of the FDEP GCTL (7 µg/L) from October 2002 through November 2006, and exceeded again in April 2008. See Appendix C for trends.

The concentrations of SVOCs such as 1- and 2-methylnaphthalene and naphthalene in CEF-13-05S fluctuated but remained greater than their respective FDEP GCTLs from the RI through February 2003. Their concentrations have steadily declined since the October 2002 sampling event, probably in response to the operation of the AS system. Concentrations of 1- and 2-methylnaphthalene have not exceeded their GCTLs since February 2003, but naphthalene was detected at concentrations greater than its GCTL from May 2004 through April 2005. During the last three events, naphthalene was less than the GCTL

(see Figure 8-19). The COCs 2-methylphenol and 3&4-methlyphenol were also detected in well CEF-13-05S during the monitoring program. Their concentrations have fluctuated above and below their FDEP GCTLs. The concentrations from the May 2004 sampling round were the last concentrations greater than the FDEP GCTLs. Iron and manganese concentrations in well CEF-13-05S were generally consistent throughout the monitoring program, and they continued to be significantly less than RI concentrations. The dissolved and total iron and manganese results were comparable indicating limited interference from suspended solids.

CEF-013-06I: BTEX and chlorinated VOCs were detected in CEF-13-06I, the intermediate source area well, at concentrations in excess of their FDEP GCTLs throughout the monitoring program. Neither benzene nor TCE were detected in excess of their system goals (1,000 µg/L and 100 µg/L, respectively). Concentrations of BTEX and chlorinated VOCs have fluctuated during the monitoring program and most show no clear trends. 1,1-DCE and 1,1-DCA were detected at the highest concentrations of any of the VOCs. The concentration of 1,1-DCE increased from the level detected during the RI (3,560 µg/L) to near 30,000 µg/L during most of the 2002 sampling events, but has decreased to 308 µg/L in October 2008. The increased concentrations detected in 2002 may have resulted from the mobilization of the contaminant during initial testing and startup of the AS system. The subsequent decrease is probably related to the long-term operation of the Hot Spot 3 AS system. 1,1-DCA concentrations have remained relatively constant until November 2003, and have decreased overall since that event. 1,1-DCA was detected at 54 µg/L during the most recent sampling event, which is less than the GCTL. See Appendix C for trends.

3&4-Methylphenol was not detected in CEF-13-06I during the RI, but has been detected at concentrations ranging from 5.6 µg/L to 14.1 µg/L, which are in excess of the GCTL (4 µg/L), during Years 2 to 4 of the monitoring program. 3&4-Methylphenol concentrations have been less than detection limits for the last three sampling events, as shown on Figure 8-19. Iron concentrations increased from approximately 7,500 µg/L in 1998 (RI) to greater than 30,000 µg/L in 2002, subsequently decreased to near 20,000 µg/L by the end of 2003, but increased significantly in November 2004 and have since fluctuated. Manganese concentrations also increased from the levels detected during the RI, exceeding both the GCTL and IBDS value for the first time in 2002. The manganese concentrations have increased fairly steadily, with a concentration of 1,590 µg/L detected in October 2008. The dissolved and total iron and manganese results were comparable indicating limited contributions from suspended solids.

CEF-013-07D: The deep source area well, CEF-013-07D, has had one sampling round with significant detections of COCs. During April 2008 sampling, 1,1-DCE, benzene, and xylenes were all detected at concentrations exceeding their GCTLs in original and duplicate samples, while no COCs have been detected at significant concentrations during any other sampling events.

CEF-013-08S: BTEX and SVOCs were the primary COCs detected in well CEF-13-08S, located in the downgradient portion of the plume. Benzene, ethylbenzene, and xylenes concentrations have been greater than GCTLs in every sampling event, and toluene exceeded its GCTL in every sampling event besides the one in April 2005. The concentrations of BTEX have generally fluctuated during the monitoring program, but have shown a decreasing trend over the past three sampling events. The decreasing trends of BTEX concentrations indicate that the AS system is working to volatilize COCs in the vicinity of well CEF-013-08S. 1,2-DCA was the only chlorinated VOC detected in this well, and it was detected only once in October 2002at 27.4 µg/L, which is in excess of its GCTL of 3 µg/L. Naphthalene and TRPH concentrations remained greater than GCTLs for the entirety of the monitoring program to date. 1- and 2-methylnaphthalene have typically exceeded the GCTLs as well, but concentrations decreased significantly during April 2003 and May 2004 to April 2005. However, the concentrations rebounded to previous levels after both decreases and continue to have exceedances. See Appendix C for trends.

CEF-013-09I: This well, which is paired with CEF-13-08S, is located in the downgradient portion of the plume. Benzene concentrations in the well exceeded the GCTL in all rounds, but the concentrations decreased to near the GCTL (1 µg/L) several times during the monitoring period including the last event. Concentrations of xylenes in this well also routinely exceeded its GCTL.

CEF-37-24S, CEF-36-29S, and CEF-36-30I: Spikes in benzene concentrations occurred in downgradient well CEF-37-24S during the July 2001, May 2002, and May 2004 sampling events, but concentrations have been less than detection limits during the last four sampling events. No significant concentrations of COCs were detected in downgradient wells CEF-36-29S or CEF-36-30I during the monitoring program.

CEF-36-25I and CEF-36-40I: Toluene was the only COC detected in well CEF-36-25I, and toluene, TCE, and xylenes were the only COCs detected in CEF-36-40I. These wells are located downgradient of Hot Spots 1, 2, and 3. Each of the COCs was detected only once at low concentrations (less than 1 µg/L) in each well, and no COCs have been detected at concentrations greater than detection limits during the last three sampling events.

CEF-037-025 through CEF-037-039: Among the new wells installed within and sidegradient of the Hot Spot 3 source area, 9 of 15 wells had exceedances of benzene and total xylenes in October 2008. Two of these nine wells also had exceedances of toluene, and one well had an exceedance of ethylbenzene. The maximum benzene concentration in the most recent event was 4,760 µg/L in CEF-037-30, which also had the highest ethylbenzene concentration (797 µg/L) and the highest xylenes concentration (4,430 µg/L). The highest toluene concentration was detected at CEF-037-26 (436 µg/L), which also had

exceedances of benzene, ethylbenzene, and xylenes. These wells were not analyzed for SVOCs or NA parameters. More data will need to be collected at these wells in order to determine accurate trends.

Conclusions Regarding Groundwater Monitoring

With the exception of the November 2003 and May 2004 concentrations in CEF-342-03I, benzene concentrations in Hot Spot 1 wells have remained less than the system remedial objective of 1,000 µg/L during the first 8 years of monitoring. These monitoring results support the BCT decision not to install the Hot Spot 1 portion of the AS system. Storm water outfall sampling conducted during the RI, when the benzene concentration in CEF-342-03I (2,180 µg/L) was greater than the AS system remedial objective, indicated that groundwater discharge to storm sewers did not adversely impact surface water quality at the outfall. Since that time, benzene concentrations in this well have remained less than 2,180 µg/L, supporting the determination that outfall sampling is not required. Downgradient of Hot Spot 1, the concentration of PCE in well CEF-342-07I unexpectedly increased from 17.7 µg/L during the RI to 827 µg/L during the February 2002 sampling event. However, the last 12 rounds of data (October 2002 to November 2007) indicate that concentrations of PCE are generally decreasing, and the October 2008 concentration (9.6 µg/L) was to lowest to date. PCE contamination also appears to be localized at CEF-342-07I because the compound has not been detected at other downgradient wells. Moreover, reductive dechlorination appears to be occurring in this area based on detections of PCE degradation products (i.e., TCE and cis-1,2-DCE). Benzene and TCE concentrations also continue to exceed GCTLs at CEF-342-07I. At CEF-342-02DA, just north (sidegradient) of Hot Spot 1, concentrations of benzene, TCE, and PCE continue to exceed GCTLs.

TCE concentrations in Hot Spot 2 groundwater fluctuated during the early portion of the monitoring program but then decreased to less than the system remedial objective of 100 µg/L after the startup of the AS system and remain less than this level. Since the end of 2006, concentrations of benzene and TCE in CEF-342-14D and CEF-342-17D, within Hot Spot 2, and CEF-342-20D and CEF-036-33D, downgradient of the hot spot, have generally been increasing. It is possible that the downgradient increases are the result of contamination that migrated from Hot Spot 2 prior to installation and during operation of the AS system. This increasing trend will probably continue until the contamination existing in the groundwater prior to the AS system installation and operation moves through the aquifer or is degraded by NA processes. Dissolved iron concentrations continued to be elevated in wells CEF-342-13I, CEF-342-14D, CEF-342-17D and CEF-342-20D with no discernible trend between rounds. COC concentrations in sentinel wells CEF-36-35S, CEF-36-36I, and CEF-36-37D were less than GCTLs despite the increasing concentrations of benzene and TCE in the deep downgradient wells. CEF–342-20D was previously designated as the downgradient compliance well, but can no longer function in that role because of high levels of contamination. Wells CEF-036-33 and CEF-036-37D are both further downgradient than CEF-342-20D, and there have been no exceedances at CEF-036-37D,

COC concentrations in Hot Spot 3 have had decreasing trends since the start-up of the AS system, with the exception of CEF-013-8S. Benzene concentrations in this well increased from October 2005 through 2007, but decreased in 2008, and the October 2008 concentration (1,680 µg/L) was significantly less than the RI concentration (4,070 µg/L), although still greater than the system remedial action level. Concentrations of the other BTEX components in CEF-013-8S have generally followed a similar pattern. Benzene concentrations were also greater than the system action level in CEF-037-29 and -30, new wells installed within the hot spot downgradient of CEF-013-8S. The October 2008 benzene concentration in CEF-037-30, screened between the shallow and upper intermediate zones, was the maximum detected in Hot Spot 3. At CEF-013-5S, also within the hot spot, BTEX concentrations increased in October 2007 and 2008 after decreasing since 2005, but 2008 concentrations were significantly less than during the RI. Benzene concentrations in this well have been less than the system remedial objective since April 2005. In intermediate source area well CEF-013-6I, concentrations of chlorinated and non-chlorinated COCs have fluctuated since the RI but generally decreased in 2008. Year 8 concentrations of 1,1-DCE (773 and 308 µg/L) continue to exceed the GCTL but are significantly less than the maximum detected concentration (31,400 µg/L in May 2002). At CEF-233-1S and CEF-037-26, shallow wells north of Hot Spot 3 and outside of the treatment area, 2008 BTEX concentrations exceeded GCTLs. The Hot Spot 3 AS system was not operational from October 2006 to August 2009 because of a significant system failure. System modifications to allow deeper injection of air are underway based on the results of 2007 investigations and data from new wells installed in the area in 2008 (CEF-037-25 through CEF-037-39).

In general, contaminant concentrations have been decreasing in wells located in the areas being air sparged indicating that the AS systems are performing as designed.

Natural Attenuation Evaluation

The following conclusions summarize the NA evaluation of Sites 36 and 37:

- Geochemical conditions within and downgradient of the hot spot areas indicate mildly to moderately reducing conditions and biological activity. The geochemical environment is not optimal for either the degradation of petroleum hydrocarbons (which are most efficiently degraded under aerobic conditions) or chlorinated solvents (which typically are more efficiently degraded under more strongly reducing conditions), but does allow for biodegradation of both types of contaminants. There is evidence that contaminant destruction is occurring through biological and abiotic processes; however, the rate of contaminant degradation is variable.

- Concentrations of COCs in groundwater remain greater than FDEP GCTLs, but benzene and TCE concentrations have, with only a few exceptions, decreased to less than the remedial system cleanup

goals at the hot spots. If the portion of the plume associated with Hot Spot 1 expands, the AS system for Hot Spot 2 is positioned to intercept and treat this contamination. The portion of the plume attributable to Hot Spot 2 appears to be migrating to the southeast and forms the leading edge of the composite plume. Concentrations in the downgradient area are expected to begin to tail off as the effects of the source area AS activities reach the downgradient areas and as biological degradation progresses. The portion of the plume attributable to Hot Spot 3 appears to be stable, as concentrations in downgradient wells located between Hot Spot 1 and Hot Spots 2 and 3 remain consistent to slowly declining.

- The ongoing AS activities will promote aerobic biodegradation processes in the source area, as well as provide for direct volatilization of VOCs. Aerobic biodegradation is an efficient process for destroying petroleum hydrocarbon contaminants as well as some chlorinated solvents.

8.6.1.2 OU 9, Sites 57 and 58

Groundwater samples were collected and analyzed for selected COCs (VOCs, SVOCs, TRPH, and inorganics) and NA parameters. The COCs are:

Site 57

- BTEX.
- Naphthalene.
- 1-Methylnaphthalene.
- 2-Methylnaphthalene.
- TRPH.
- TCE.
- 1,1-DCA.
- 1,1-DCE.
- Cis-1,1-DCE.

Site 58

- Xylenes.
- 1,1,1-TCA.
- 1,1-DCA.
- 1,1-DCE.
- Naphthalene.
- TRPH.

Site 57

The following section summarizes groundwater results for Site 57 based on a review of associated documents. Groundwater monitoring is ongoing semi-annually at Site 57.

The maximum concentrations of COCs identified in the RI and during the most recent sampling event are shown in Table 8-3. VOC, PAH, and TRPH detections from the last four sampling events are presented on Figures 8-22 through 8-23, respectively. The concentrations and numbers of COCs detected at the site have decreased significantly since the RI, particularly near the source.

Petroleum Plume

Historically, the highest concentrations of BTEX and naphthalene compounds have occurred in source area well CEF-293-11, but all of these chemicals decreased in concentration significantly between August 2007 and February 2009, the most recent sampling event. Toluene (86 µg/L to 5 µg/L), ethylbenzene (130 µg/L to 21 µg/L), and all naphthalene compounds decreased to less than their respective GCTLs. Total xylenes concentrations decreased from 510 µg/L to 67 µg/L in the 18 month time period. During the most recent (February 2009) sampling event, COC concentrations decreased or remained non-detect in all of the shallow zone wells. Source/plume core wells and wells outside of the plume boundary in the intermediate zone have shown consistent or increasing COC concentrations historically, including the most recent sampling event. There were no COCs detected in the deep zone well during the February 2009 sampling event, and only once has a COC even been detected at the deep zone well.

DO concentrations measured at shallow zone source area wells indicate aerobic conditions, and carbon dioxide and alkalinity measurements also indicate aerobic biological activity within the shallow part of the petroleum plume. DO concentrations indicated anaerobic conditions at other locations. Methane has generally decreased steadily in the petroleum plume, indicating that the strongly reductive conditions of methanogenesis are most likely not occurring. In the deep zone, NA parameters indicate a shift towards anaerobic degradation of chlorinated COCs. DO concentrations have fluctuated between aerobic and anaerobic conditions, but anaerobic conditions have been more prevalent in recent sampling. Carbon dioxide and alkalinity measurements during Years 5 and 6 sampling have indicated less biological activity. In the sentinel wells, DO concentrations have been fluctuating, and carbon dioxide and alkalinity values indicate decreased biological activity.

Chlorinated Solvents Plume

COC concentrations have historically been the highest in the shallow zone wells CEF-293-19 and CEF-824A-14S. Concentrations of COCs at CEF-293-19 have decreased steadily since monitoring began, to the point that all COCs were less than their GCTLs for the first time in January 2008 and there have been no exceedances at that well since January 2008. COC concentrations at CEF-824A-14S increased from January 2001 to January 2007, but have decreased to approximately half the January 2007 reported concentrations in the past two years. COC concentrations have also increased in shallow zone wells CEF-824A-08S, CEF-824A-07S, and CEF-824A-22S, which are all downgradient of the source wells. COCs were detected at concentrations less than their respective GCTLs at shallow zone wells CEF-824A-10S, CEF-293-20, CEF0824A-09S, and CEF-293-21. Chlorinated COCs have not been identified at concentrations exceeding GCTLs in the intermediate zone wells.

DO concentrations measured in the shallow zone wells within the source area during Year 6 indicate a shift towards more aerobic conditions. Ferrous iron concentrations also indicate that iron-reducing conditions may be present, but sulfate concentrations continue to increase, indicating that sulfate-reducing conditions are not present. Methane concentrations are elevated in the source area and have been throughout the history of monitoring the plume, so methanogenesis may be occurring. Carbon dioxide and alkalinity measurements also indicate increased biological activity. Downgradient wells near the source do not clearly indicate aerobic or anaerobic conditions, and sulfate- and iron-reducing conditions do not appear to be present. Further downgradient, there seems to be a slight tilt towards anaerobic conditions as supported by DO, carbon dioxide, alkalinity, and methane concentrations.

Site 58

The following section summarizes groundwater results for Site 58 based on a review of associated documents. Groundwater monitoring is ongoing annually at Site 58.

The maximum concentrations of COCs identified in the RI are shown in Table 8-4. VOC, PAH and TRPH detections from the last four sampling events are presented on Figures 8-24 and 8-25, respectively. The concentrations and numbers of COCs detected at the site have decreased significantly since the RI, particularly near the source.

CEF-B312-01S

Concentrations of volatile COCs in well CEF-B312-01S, within the source area of the Naphthalene Plume, remained less than GCTLs and were generally consistent with previously detected levels during the January 2009 sampling. The petroleum-related VOCs, ethylbenzene, xylenes, and toluene, in CEF-B312-01S were detected at concentrations considerably less than their respective GCTLs in January 2009. Naphthalene concentrations decreased greatly since Year 5, from 634 µg/L to 253 µg/L. However, 253 µg/L is still greater than the GCTL. 1-Methylnaphthalene and 2-methylnaphthalene were not detected in CEF-B312-01S at concentrations greater than GCTLs in Year 6.

CEF-312-01

Naphthalene concentrations have varied throughout the monitoring program at CEF-312-01, increasing significantly during the fourth quarter Year 1 sampling event, then decreasing during Year 2 to just slightly greater than the concentrations detected during the RI, followed by decreasing concentrations in Year 3, increasing in Year 4, decreasing in Year 5 , and finally, increasing in Year 6. The concentration has been greater than the GCTL for the term of the monitoring program to date. In the most recent sampling, concentrations reached approximately three times the GCTL. In well CEF-312-01, 1-methylnaphthalene

and 2-methylnaphthalene have been detected at concentrations significantly less their respective GCTLs during Year 5 sampling and prior sampling events. TRPH concentrations have fluctuated around the GCTL since Year 3, but all TRPH concentrations were found to be less than the GCTL. TRPH was detected in CEF-312-01 in Year 6, but had decreased compared to Year 5.

CEF-B312-08S

This was the only well in which exceedances of chlorinated VOCs were detected during the September 2001 RI sampling event. Concentrations of several chlorinated VOCs at this well increased to levels greater than GCTLs during Year 2 for the first time since the beginning of long-term monitoring. Year 3 concentrations for chlorinated VOCs were less than GCTLs and were significantly less than Year 2 concentrations. Low concentrations of chloroethane and 1,1-DCA, were reported in February of the Year 4 event. 1,1,2,2-Tetrachloroethane was detected at a concentration slightly above the GCTL during the Year 5 sampling event. In the Year 6 sampling event, 1,1,2,2-tetrachloroethane concentration was less than the Year 5 concentration but still slightly exceeded the GCTL. Naphthalene concentrations increased to levels exceeding the GCTL during Year 5, and concentrations remained the same in Year 6. TRPH concentrations have fluctuated around the GCTL since Year 3, but were found to be less than the GCTL in Year 6. It was the first time since the RI that TRPH concentrations were found to be significantly less than the GCTL at CEF-B312-08S.

CEF-B312-03S

Naphthalene compound concentrations increased to greater than their respective GCTLs after dropping below them in Year 5. Upon resampling in April 2009, the concentrations of all three naphthalene compounds decreased significantly and were again less than their respective GCTLs. TRPH concentrations have fluctuated around the GCTL since Year 3, but were less than the GCTL in Year 6. TRPH in CEF-B312-03S increased in concentration in Year 6 as compared to Year 5, but was still less than the GCTL.

CEF-B312-06S

PAH concentrations in this well have been less than the GCTL and continued to be significantly less than GCTLs during Year 6.

CEF-B312-15I

During the most recent sampling event, the concentrations of the three naphthalene compounds at this well were all greater than detection limits for the first time since the RI. 1-Methylnaphthalene and 2-methylnaphthalene concentrations were well less than their GCTLs, but naphthalene concentrations

were significantly greater than its GCTL. In the resampling event in April 2009, all three naphthalene compound concentrations were again less than detection limits.

CEF-B312-09S

PAH concentrations have been less than detection limits throughout the long-term monitoring program at this well.

CEF-B312-07S

PAH concentrations have been less than detection limits throughout the long-term monitoring program at this well.

CEF-B312-02S

Naphthalene compounds were detected in this well during the Year 5 event, but at concentrations significantly less than their respective GCTLs. In Year 6, 1-methylnaphthalene and 2-methylnaphthalene concentrations decreased to less than detection limits, and naphthalene decreased to less than the laboratory MDL but greater than the practical quantitation limit (PQL).

NA parameters were not analyzed during the most recent (Year 6) sampling event based on the recommendation in the Year 5 annual Long-Term Monitoring Report. The recommendation was based on NA parameters at Site 58 being consistent with anaerobic biological activity in the source area for the first 5 years of monitoring.

The monitoring system is providing adequate data to evaluate remedy performance at Sites 57 and 58 and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source, at the perimeter of the plumes, and at downgradient locations.

8.6.1.3 OU 9, Site 59

The following section summarizes groundwater results for Site 59 based on a review of associated documents. Groundwater monitoring is ongoing quarterly at Site 59 and TCE is the only COC.

The maximum concentrations of TCE identified in the RI, immediately before startup of the in-situ bioremediation systems, and in November 2008 are shown in Table 8-5. VOC detections in each zone are presented on Figures 8-26 through 8-29. The in-situ bioremediation systems installation was conducted in accordance with the remedial design. The layout of the wells and the equipment building

are shown on Figures 8-12, 8-13, and 8-14. Trends in the concentration of certain VOCs are presented in Appendix C.

30-Foot Zone

Concentrations of TCE were not detected in wells CEF-059-027-035, and CEF-059-019-032 during the Year 1 sampling events and the most recent sampling event, first Quarter, Year 2 in May 2009. TCE was not detected in February 2009 at CEF-059-011-033, and was not detected in May 2009. TCE was also less than the detection limit at CEF-059-001-028. TCE concentrations in well CEF-059-017-028 decreased throughout Year 1 sampling, but increased to 0.78 μg/L in May 2009; however, the concentration was estimated. Well CEF-059-013-032 had low concentrations of TCE, but was less than its GCTL. TCE concentrations have increased in samples obtained from wells CEF-059-026-035 and CEF-059-004-033 during the Year 1 sampling events, and continued to increase in the first Year 2 event. Wells CEF-059-003-035, CEF-059-NG-02I, and CEF-059-NG-12I all exhibited decreasing concentrations of TCE in May 2009, and the concentration of TCE in CEF-059-NG-12I decreased to less than the GCTL. Vinyl chloride was also detected in one well, but was less than the GCTL.

50-Foot Zone

TCE was not detected in wells CEF-059-001-053, CEF-059-009-053, CEF-059-011-053, and CEF-059-019-051 during Year 1 sampling events or in May 2009. TCE concentrations decreased during the February 2009 sampling event in groundwater samples obtained from wells CEF-059-003-053, CEF-059-005-053, CEF-059-012-053, and CEF-059-NG-02D, and continued to decrease in May 2009, while concentrations of TCE at wells CEF-059-NG-12D, and CEF-059-004-053 decreased in May 2009 after previously increasing. TCE concentrations increased in samples obtained from wells CEF-059-016-053, CEF-059-013-53 during the most recent sampling event. Cis-1,2-DCE and methylene chloride were detected in a few samples collected during May 2009, but concentrations were less than GCTLs.

70/80-Foot Zone

TCE was not detected in wells CEF-059-001-083, CEF-059-009-083, CEF-059-014-083, CEF-059-006-078, or CEF-059-019-078 during February 2009, or May 2009. TCE concentrations decreased in groundwater samples obtained from well CEF-059-003-073 during the February 2009 sampling event, and also continued to decrease in May 2009. The TCE concentration decreased to less than the GCTL in well CEF-059-004-073 in February 2009, but increased in May 2009. The only monitoring well where the TCE concentration increased during the fourth quarter of Year 1 was CEF-059-005-073, which increased to 238 µg/L. The TCE concentration has increased at this well during

all sampling events to date. Methylene chloride and cis-1,2-DCE were detected in a few wells in May 2009, but all concentrations were less than the GCTLs.

Top of Rock

There have been no detections of TCE during the long-term monitoring program at monitoring well CEF-059-004-112.

Natural Attenuation Parameters

NA parameters are also evaluated at Site 59, and indicate the presence of anaerobic conditions. DO concentrations have indicated anaerobic conditions in February and May 2009, after previously indicating mildly aerobic conditions. Based on May 2009 ORP values, the conditions are not currently favorable for reductive chlorination across the site, but are favorable in source areas. Carbon dioxide, sulfate, and alkalinity measurements indicate that degradation is occurring in source areas.

Quarterly and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 59 are adequate for evaluating the concentration trends of TCE and its daughter products at the site. The Navy is routinely re-evaluating the status of the site to optimize the monitoring for Site 59.

The monitoring system is providing adequate data to evaluate remedy performance and it is being sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source, at the perimeter of the in-situ bioremediation system zone of influence, and at downgradient locations.

8.6.2 Site Inspection

The site inspection for OU 9 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at OU 9, Sites 36 and 37, 57, 58, and 59 included visual observations of the area, groundwater monitoring wells, and AS and biostimulation remedial systems. TtNUS conducted several site visits at Sites 36 and 37, 57, 58, and 59 as part of the field activities in 1998 to the present. Activities conducted during the site visits included construction monitoring of the AS and biostimulation remedial systems installation, groundwater sampling, and site walkovers. No unusual observations were documented during these site visits. The inspection identified that the implementation

of the remedies and monitoring programs at the OU9 Sites were operating as designed and are protective of human health and the environment.

The land use for the sites has remained unchanged. The Navy transferred Sites 36 and 37, 57, and 58 to JAA per the FOST dated June 1, 2007, and a FOST is being prepared for Site 59. LUC objectives and use restrictions outlined in the LUC RDs were included in the Deed for Sites 36 and 37, 57, and 58, and will be included in the Deed for Site 59.

Sites 36 and 37, 57, and 58 LUC field inspections have been completed annually by JAA since the transfer of the properties, and no issues were discovered as identified on the LUC Inspection Form submitted by JAA in accordance with the LUC RDs. The five-year review field inspections confirmed LUC compliance.

Site 59 LUC inspections have been completed annually by the Navy and will continue to be until the property is transferred. No issues have been reported to date.

8.6.3 Interviews

There were no interviews conducted in the course of the five year review.

8.7 TECHNICAL ASSESSMENT

8.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions, and the results of the site inspections indicate that the remedy is functioning as intended by the RODs for each site.

Sites 36 and 37

The implementation of the AS portion of the remedy at Sites 36 and 37 began in 2001. The implementation of the long-term groundwater monitoring program is ongoing and indicates that AS and NA are working at the site. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk. Based on the completed and ongoing activities, the intent and goals of the ROD for Sites 36 and 37 are in the process of being met.

Sites 57 and 58

The implementation of the long-term groundwater monitoring program began in April 2003, is ongoing, and indicates that NA is working at the site. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk. Based on the completed and ongoing activities, the intent and goals of the ROD for Sites 57 and 58 are in the process of being met.

Site 59

The implementation of the biostimulation portion of the remedy at Site 59 began in 2008. The implementation of the long-term groundwater monitoring program is ongoing and indicates that biological treatment and NA are working at the site, but there has not yet been enough data to provide accurate trends. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated groundwater that may pose a risk.

The remedial actions are being implemented at all OU 9 sites as designed and include measures that prevent exposure. The remedial actions that are currently in operation (treatment systems and groundwater monitoring) are operating as designed, and the data indicate progress toward meeting the RAOs. Based on the completed and ongoing activities, the intent and goals of the ROD for Site 59 are in the process of being met.

8.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

8.7.2.1 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).

SITES 36 AND 37

Contaminant	ARAR		Source
GROUNDWATER			
3&4-Methylphenol	Original*	4 µg/L	FDEP GCTL (May 1999)
	Current	3.5 µg/L	FDEP GCTL (April 2005)
1-Methylnaphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	28 µg/L	FDEP GCTL (April 2005)
2-Methylnaphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	28 µg/L	FDEP GCTL (April 2005)
Naphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	14 µg/L	FDEP GCTL (April 2005)
Manganese	Original*	150 µg/L	Twice average background concentration
	Current	150 µg/L	IBDS value

* From ROD (TtNUS, 2001).

SITE 57

Contaminant	ARAR		Source
GROUNDWATER			
1-Methylnaphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	28 µg/L	FDEP GCTL (April 2005)
2-Methylnaphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	28 µg/L	FDEP GCTL (April 2005)
Naphthalene	Original*	20 µg/L	FDEP GCTL (May 1999)
	Current	14 µg/L	FDEP GCTL (April 2005)

* From ROD (TtNUS, 2005).

SITE 58

Contaminant	ARAR		Source
GROUNDWATER			
Naphthalene	ROD	20 µg/L	FDEP GCTL (May 1999)
	Current	14 µg/L	FDEP GCTL (April 2005)

* From ROD (TtNUS, 2005).

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARARs for 3&4-methylphenol and naphthalene in groundwater have decreased since the RODs for Sites 36 and 37, and Site 57 and 58 were signed. These new contaminant cleanup target levels rely upon health-based risk assessments and have become more stringent since the signing of the ROD. This change will not affect the protectiveness of the remedial design but it may require additional time or resources to complete the remedial action because groundwater with 3&4-methylphenol and naphthalene contamination remains on-site at Site 36 and 37, and groundwater with naphthalene contamination remains at Sites 57 and 58. Compared to the current concentrations of 3&4-methylphenol and naphthalene on-site, and the slight changes that were made to the ARARs for each COC, the amount of additional time required to meet the ARARs is expected to be minimal.

Other federal and state ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

8.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RIs. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 9, Sites 36 and 37, and Sites 57, 58 and 59.

8.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

8.7.4 Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy for each site is functioning as intended by the RODs. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

8.8 ISSUES

No issues were identified during the five-year review while the Navy owned the property. However, when OU 9, Sites 36 and 37, 57, and 58 were transferred to JAA, LUCs needed to be implemented by JAA. These LUCs, by way of recorded deed restrictions, notices, or other agreements, were adopted by JAA. The current and future land use at the sites suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met. A FOST is currently being prepared for the transfer of Site 59. The LUCs at the site will be implemented by JAA upon transfer.

8.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 9, as no deficiencies were identified during the five-year review.

8.10 PROTECTIVENESS STATEMENT

Sites 36/37

The Sites 36 and 37 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Hot spot AS and downgradient NA continue to make progress toward meeting remedial goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. AS, NA, and the associated groundwater monitoring program were implemented as designed (with exceptions as noted in Section 8.4.2), and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in 2006, and in accordance with the LUC RD, are being continued after transfer of Sites 36 and 37 to JAA per the FOST dated June 1, 2005. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (AS, NA, groundwater monitoring, and LUCs), the intent and goals for the ROD for Sites 36 and 37 have been or will be met.

Sites 57 and 58

The Site 57 and Site 58 remedy are expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. NA continues to be effective in reducing concentrations of contaminants in groundwater at both sites, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. The NA and associated groundwater monitoring programs were implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in May 2006, and in accordance with the LUC RD, are being continued after transfer of Sites 57 and 58 to JAA per the FOST dated June 1, 2007. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-

based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (NA, groundwater monitoring, and LUCs), the intent and goals for the ROD for Sites 57 and 58 have been or will be met.

Site 59

The Site 59 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Hot spot in-situ biological treatment and downgradient NA continue to make progress toward meeting remedial goals, and implementation of LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. Biological treatment, NA, and the associated groundwater monitoring program were implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in June 2009, and in accordance with the LUC RD, will be continued after transfer of Site 59 to JAA. LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (in-situ biological treatment, NA, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 59 have been or will be met.

TABLE 8-1

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER - SITE 36
OPERABLE UNIT 9, SITES 36
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	Current Regulatory Criteria			Remedial Investigation		May 2004		October 2008	
	FDEP GCTL	U.S. EPA MCL	IBDS Value	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (ug/L)									
Shallow Wells									
Benzene	1	5	NC	3 / 16	57	1 / 4	3.5	1 / 4	4.6
Ethylbenzene	30	700	NC	1 / 16	116	ND	-	ND	--
Tetrachloroethene	3	5	NC	1 / 16	0.16 J	ND	-	ND	--
Toluene	40	1,000	NC	1 / 16	22.2	ND	-	ND	--
Trichloroethene	3	5	NC	2 / 16	8.7	ND	-	1 / 4	0.52 J
Xylenes, Total	20	10,000	NC	1 / 16	602	ND	-	ND	--
cis-1,2-Dichloroethene	70	70	NC	2 / 16	3.5	ND	-	1 / 4	0.79 J
Intermediate Wells									
Benzene	1	5	NC	10 / 13	2,180	5 / 11	1,260	7 / 12	86.4
Ethylbenzene	30	700	NC	5 / 13	63.7	3 / 11	27.3	3 / 12	2.9
Tetrachloroethene	3	5	NC	1 / 16	17.7	1 / 11	262	1 / 12	9.5
Toluene	40	1,000	NC	4 / 16	31.6	1 / 11	21	1 / 12	2.5 J
Trichloroethene	3	5	NC	2 / 16	12.6	3 / 11	32.8	3 / 12	85.3
Xylenes, Total	20	10,000	NC	5 / 16	1,250	4 / 11	1,085	6 / 12	494
cis-1,2-Dichloroethene	70	70	NC	2 / 16	8	1 / 11	3.9	3 / 12	9.6
Deep Wells									
Benzene	1	5	NC	11 / 14	18.4	5 / 6	12.7	6 / 7	69.5
Toluene	40	1,000	NC	1 / 14	1.2	ND	-	ND	--
Trichloroethene	3	5	NC	7 / 14	128	5 / 6	22.6	6 / 7	53.7
cis-1,2-Dichloroethene	70	70	NC	7 / 14	6.6	5 / 6	7.3	6 / 7	7.1
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)									
1-Methylnaphthalene	20	NC	NC	1 / 4	2.36	2 / 2	23.5	2 / 2	6.1
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)									
Shallow Wells									
TRPH, mg/L	5	NC	NC	3 / 13	14.3	ND	-	NA	-
Intermediate Wells									
TRPH, mg/L	5	NC	NC	5 / 11	6.73	1 / 2	2.40	1 / 1	255
INORGANICS, ug/l									
Shallow Wells									
Iron, total	300	NC	7,760	7 / 8	8,650	NA	-	NA	-
Manganese, total	50	NC	150	7 / 8	28.9	NA	-	NA	-
Intermediate Wells									
Iron, total	300	NC	7,760	9 / 9	1,360	NA	-	1 / 2	204,00
Manganese, total	50	NC	150	7 / 9	10.5	NA	-	1 / 1	379
Deep Wells									
Iron, total	300		7,760	9 / 9	729	NA	-	3 / 3	686,000
Manganese, total	50	NC	150	9 / 9	81.3	NA	-	3 / 3	4,940

TABLE 8-2

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER - SITE 37
OPERABLE UNIT 9, SITE 37
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	Current Regulatory Criteria			Remedial Investigation		May 2004		October 2008	
	FDEP GCTL	U.S. EPA MCL	IBDS Value	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration	Frequency of Detection	Maximum Concen-tration
VOLATILE ORGANIC COMPOUNDS (ug/L)									
Shallow Wells									
1,1-Dichloroethane	70	NC	NC	1 / 13	1.1	1 / 8	90.2	1 / 8	1.3
1,1-Dichloroethene	7	7	NC	1 / 13	1.4	1 / 8	217	1 / 8	4
Benzene	1	5	NC	6 / 13	7,340	3 / 8	2,265	3 / 8	1,680
Ethylbenzene	30	700	NC	6 / 13	946	3 / 8	877	3 / 8	486
Toluene	40	1,000	NC	6 / 13	6,290	2 / 8	1,232	4 / 8	56
Xylenes, Total	20	10,000	NC	7 / 13	4,780	3 / 8	4,125	4 / 8	2,810
cis-1,2-Dichloroethene	70	70	NC	1 / 13	0.93	ND	-	ND	-
Intermediate Wells									
1,1,2-Trichloroethane	5	5		2 / 13	56.2	ND	-	1 / 5	2.9
1,1-Dichloroethane	70	NC	NC	2 / 13	772	1 / 8	1,060	1 / 5	54
1,1-Dichloroethene	7	7	NC	2 / 13	3,640	1 / 8	7,980	1 / 5	308
1,2-Dichloroethane	3	5	NC	2 / 13	36.6	ND	-	1 / 5	1.9
Benzene	1	5	NC	7 / 13	53	4 / 8	38.1	3 / 5	4.6
Ethylbenzene	30	700	NC	4 / 13	13.7	3 / 8	154	1 / 5	51.9
Toluene	40	1,000	NC	4 / 13	137	4 / 8	258	3 / 5	3.4
trans-1,2-Dichloroethene	100	100	NC	2 / 13	68.6	ND	-	1 / 5	4.2
Trichloroethene	3	5		2 / 13	1.1	1 / 8	20.9	ND	--
Vinyl Chloride	1	2	NC	2 / 13	27.4	ND	-	1 / 5	1.9
Xylenes, Total	20	10,000	NC	6 / 13	133	4 / 8	475	3 / 5	268
cis-1,2-Dichloroethene	70	70	NC	2 / 13	104	2 / 8	111	1 / 5	7.3
Deep Wells									
Benzene	1	5	NC	1 / 11	2.8	ND	-	ND	-
Xylenes, Total	20	10,000	NC	3 / 11	16.5	1 / 2	13.8	ND	-
cis-1,2-Dichloroethene	70	70	NC	1 / 11	2.5	ND	-	ND	-
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)									
Shallow Wells									
1-Methylnaphthalene	20	NC	NC	3 / 7	47.1	2 / 2	13.9	3 / 3	36.4
2-Methylnaphthalene	20	NC	NC	3 / 7	67.1	1 / 2	17.5	3 / 3	43.4
2-Methylphenol	35	NC	NC	1 / 7	11	3 / 3	38.6	0 / 4	--
3&4-Methylphenol	4	NC	NC	2 / 7	34.2	1 / 3	5.6	0 / 4	--
Naphthalene	20	NC	NC	3 / 7	202	2 / 2	83	3 / 3	166
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)									
Shallow Wells									
TRPH	5	NC	7,760	7 / 10	16.2	1 / 1	8.8	2 / 2	7540
Intermediate Wells									
TRPH	5	NC	NC	5 / 9	0.806	NA	-	NA	-
INORGANICS (ug/L)									
Shallow Wells									
Iron, total	300	NC	7,760	6 / 6	17,500	1 / 1	1,260	3 / 3	3,430
Manganese, total	50	NC	150	5 / 6	237	1 / 1	8.2	3 / 3	14.5
Intermediate Wells									
Iron, total	300	NC	7,760	8 / 8	8,010	1 / 1	156,000	1 / 1	188,000
Manganese, total	50	NC	150	5 / 8	55	1 / 1	510	1 / 1	1,590
Deep Wells									
Iron, total	300	NC	7,760	6 / 6	10,800	NA	-	NA	-
Manganese, total	50	NC	150	5 / 6	82	NA	-	NA	-

TABLE 8-3

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER - SITE 57
OPERABLE UNIT 9, SITE 57
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

	Remedial Investigation		February 2009	
PARAMETER	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**
VOLATILE ORGANIC COMPOUNDS (ug/L)				
Benzene	11 / 41	0.87 J - 248	6 / 23	26
Toluene	7 / 41	1.0 J - 59.6	5 / 23	15
Ethylbenzene	11 / 41	1.0 J - 151	8 / 23	34
Total Xylenes	13 / 41	1.9 J - 549	8 / 23	85
cis-1,2-Dichloroethene	5 / 41	0.94 J - 825	6 / 23	250
trans-1,2-Dichloroethene	2 / 41	0.52 J - 5.1	NA	NA
1,1-Dichloroethene	2 / 41	5 - 33.8	2 / 23	25
1,1-Dichloroethane	7 / 41	1.1 J - 97.2	ND	--
Tetrachloroethene	2 / 41	1.0 J - 1.5 J	NA	NA
Trichloroethene	5 / 41	0.84 J - 43	4 / 23	21
POLYNUCLEAR AROMATIC HYDROCARBONS (ug/L)				
Acenaphthene	1 / 41	2.4 J	NA	NA
1-Methylnaphthalene	13 / 41	0.93 J - 145	9 / 23	44 V
2-Methylnaphthalene	12 / 41	1.6 J - 172	9 / 23	59
Naphthalene	15 / 41	1.2 J - 354	10 / 23	98 V
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)				
TRPH	23 / 41	15	5 / 11	23

For wells CEF-293-11, CEF-824A-01Sa, CEF-824A-07S, CEF-824A-11S, CEF-824A-21I, and CEF-824A-22S, December 2001 VOC, PAH, and TRPH results were used for RI values.

TABLE 8-4

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER - SITE 58
REMEDIAL INVESTIGATION DATA
OPERABLE UNIT 9, SITE 58
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

	Remedial Investigation		January 2009	
PARAMETER	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**
VOLATILE ORGANIC COMPOUNDS (ug/L)				
Toluene	2 / 18	1.6 J	NA	NA
Ethylbenzene	3 / 18	1.9 J	NA	NA
Total Xylenes	4 / 18	8.7	2 / 2	8.7
1,1-Dichloroethene	2 / 18	1.8 J	0 / 2	--
1,1-Dichloroethane	10 / 18	24.1	2 / 2	1.3
1,1,1-Trichloroethane	1 / 18	66.1	0 / 2	--
Vinyl Chloride *			0 / 2	--
POLYNUCLEAR AROMATIC HYDROCARBONS (ug/L)				
1-Methylnaphthalene	4 / 18	5.1	NA	NA
2-Methylnaphthalene	2 / 18	4.7	NA	NA
Naphthalene	9 / 18	156	7 / 9	380
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)				
TRPH	9 / 18	9	4 / 4	4.74

December 2001 VOC results were used for well CEF-B312-08S.
* Not included as a COC in the RI, but added after being detected in the sentinel well in excess of the GCTL during Year 1 sampling.

NA = Not Analyzed

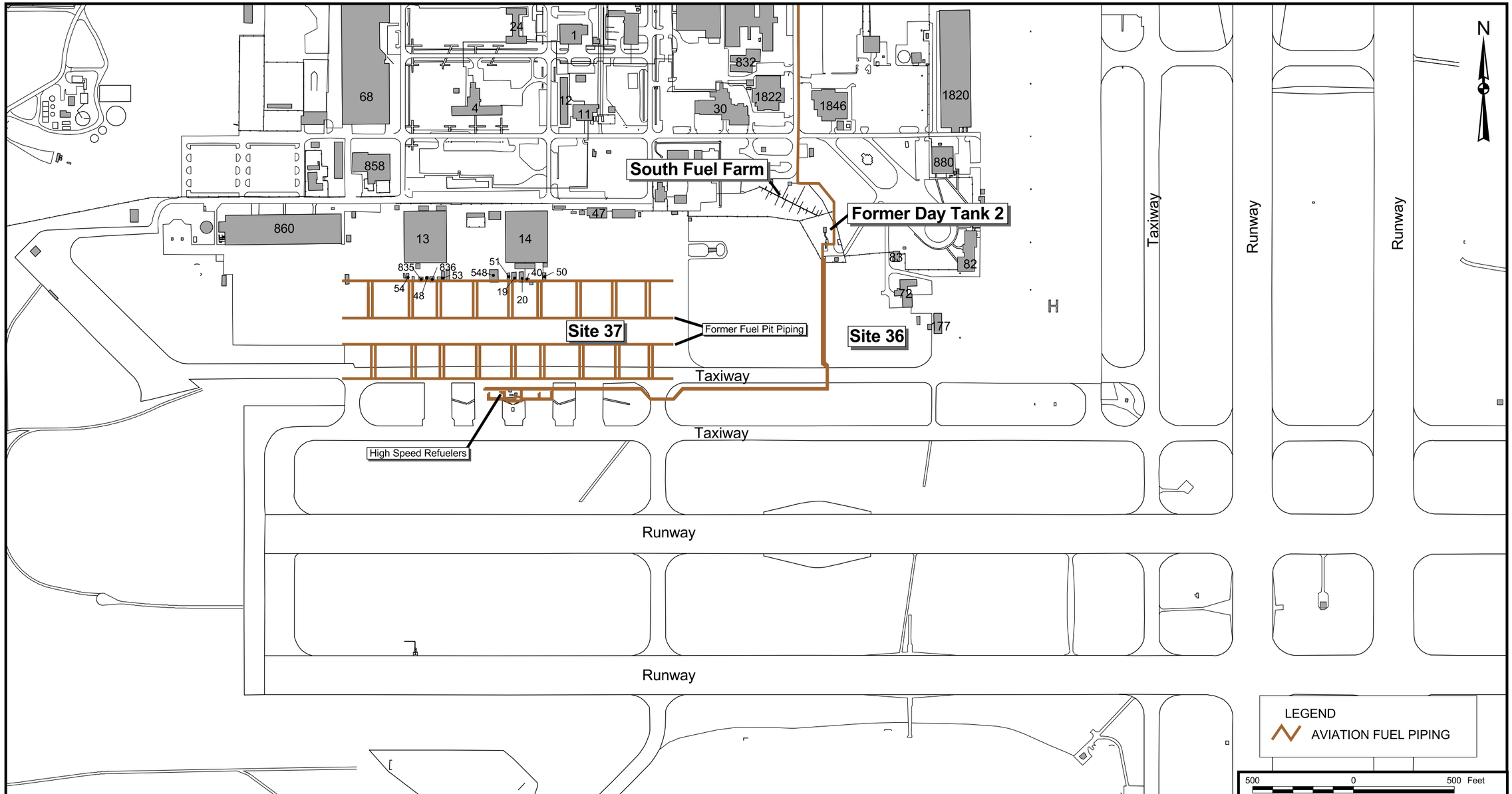
TABLE 8-5

MAXIMUM CONCENTRATIONS OF CHEMICALS OF CONCERN IN GROUNDWATER - SITE 59
OPERABLE UNIT 9, SITE 59
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

	Remedial Investigation		May 2009	
PARAMETER	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**	**FREQUENCY OF DETECTION**	**MAXIMUM DETECTION**
VOLATILE ORGANIC COMPOUNDS (ug/L)				
Acetone	6 / 60	16.9 J	NA	NA
Bromodichlormethane	2 / 60	0.75 J	NA	NA
Carbon disulfide	1 / 60	2.7	NA	NA
Chloroform	11 / 60	5.35	NA	NA
Chloromethane	3 / 60	2.2	NA	NA
1,1-Dichloroethene	2 / 60	0.87 J	NA	NA
cis-1,2-Dichloroethene	15 / 60	6.1	10 / 33	91.1
Ethylbenzene	1 / 60	2	NA	NA
Methylene chloride	1 / 60	5.8 J	9 / 33	5.9 I
Toluene	16 / 60	2.3	NA	NA
Trichloroethene	21 / 60	1,810	19 / 33	1130
Vinyl chloride	1 / 60	0.68 J	ND	--

Sample and duplicate are considered one sample, with average used for ranges and averages of detections. If a sample or duplicate result is non-detect, one-half the detection limit is used for ranges and averages of detections.
If a well was sampled more than once, only the most recent results were used.
J - Estimated concentration.
NA = Not Analyzed

P:\GIS\NAS_CecilField\Chapter-09.apr 13Oct09 MJJ Layout 9-1



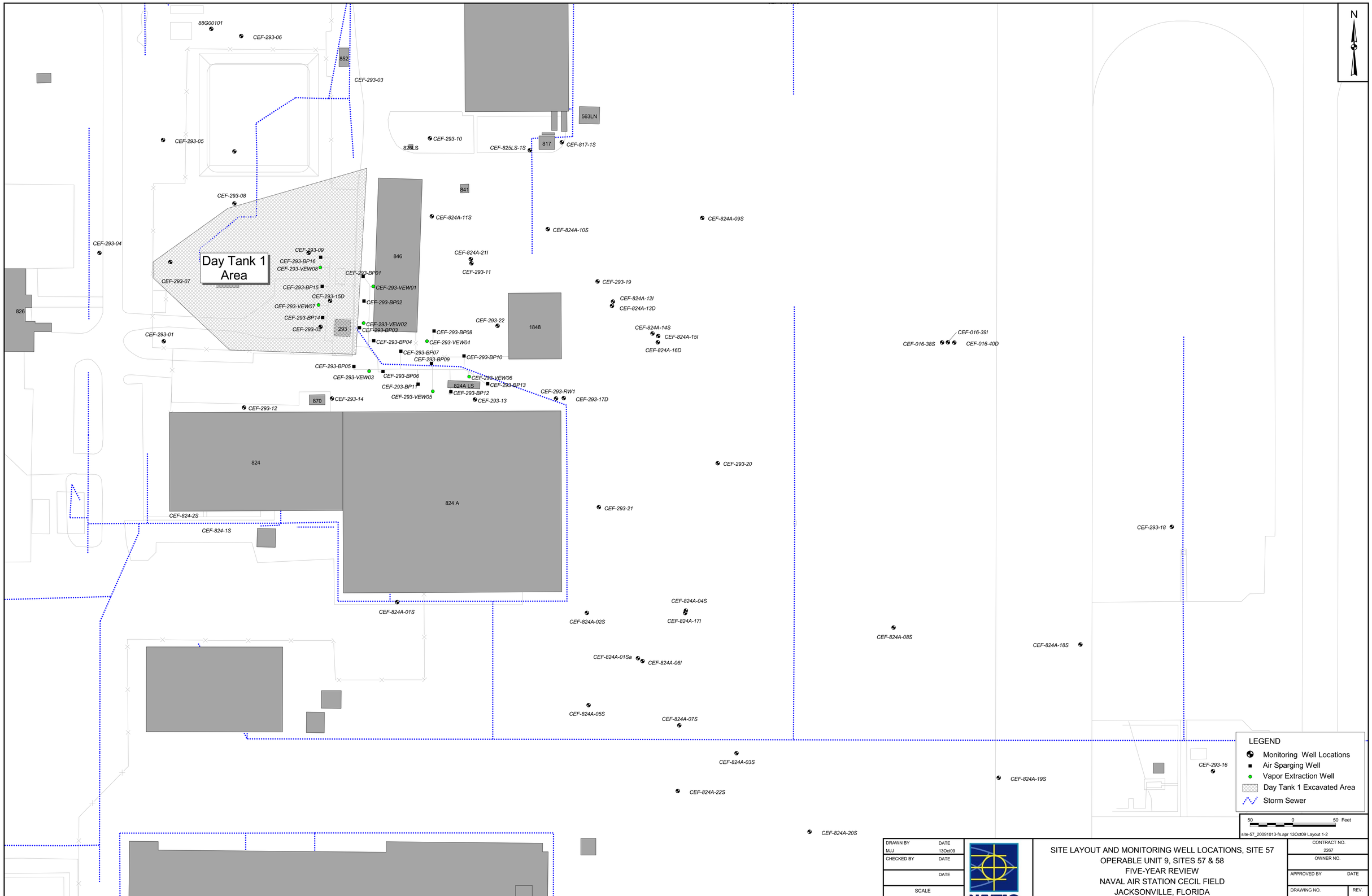
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

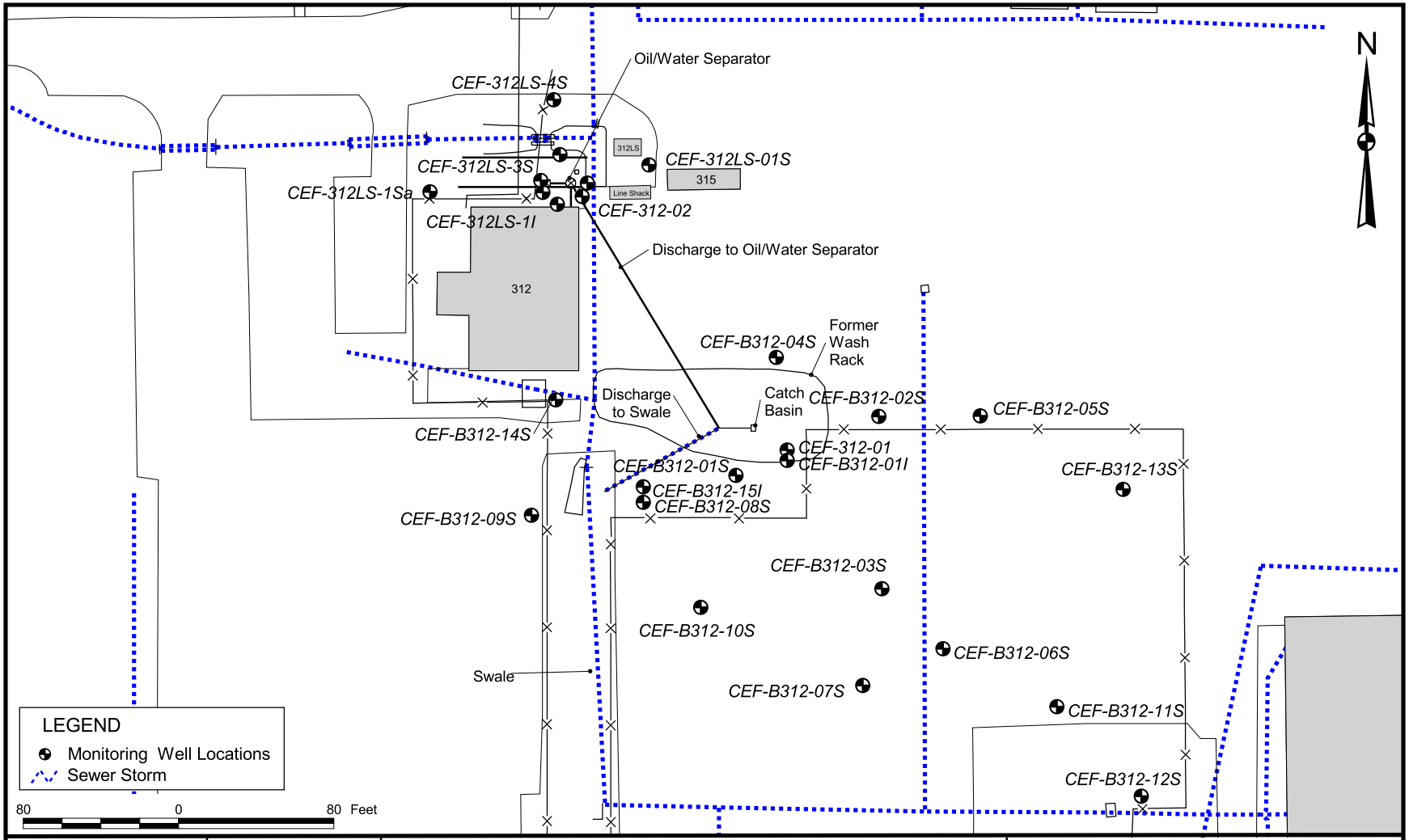
DRAWN BY MJJ	DATE 29Dec04
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

GENERAL SITE ARRANGEMENT
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-1	REV. 0


N
88G00101
CEF-293-06
852
CEF-293-03
563LN
CEF-293-05
CEF-293-10
825LS
CEF-825LS-1S
817
CEF-817-1S
CEF-293-08
841
CEF-824A-11S
CEF-824A-09S
CEF-824A-10S
CEF-293-04
Day Tank 1 Area
CEF-293-09
CEF-293-BP16
CEF-293-VEW08
846
CEF-824A-21I
CEF-293-11
CEF-293-BP01
CEF-293-07
CEF-293-19
CEF-293-BP15
CEF-293-VEW01
CEF-293-15D
CEF-824A-12I
CEF-824A-13D
CEF-293-BP02
CEF-293-VEW07
826
CEF-293-BP14
CEF-293-VEW02
CEF-293-22
1848
CEF-824A-14S
CEF-293-02
293
CEF-293-BP03
CEF-293-BP08
CEF-824A-15I
CEF-016-39I
CEF-293-01
CEF-293-BP04
CEF-293-VEW04
CEF-016-38S
CEF-016-40D
CEF-824A-16D
CEF-293-BP07
CEF-293-BP09
CEF-293-BP10
CEF-293-BP05
CEF-293-VEW03
CEF-293-BP06
CEF-293-VEW06
CEF-293-BP11
CEF-293-BP13
824A LS
CEF-293-RW1
CEF-293-VEW05
CEF-293-BP12
CEF-293-17D
870
CEF-293-14
CEF-293-13
CEF-293-12
824
824 A
CEF-293-20
CEF-293-21
CEF-824-2S
CEF-824-1S
CEF-293-18
CEF-824A-04S
CEF-824A-01S
CEF-824A-02S
CEF-824A-17I
CEF-824A-08S
CEF-824A-18S
CEF-824A-01Sa
CEF-824A-06I
CEF-824A-05S
CEF-824A-07S
CEF-824A-03S
CEF-293-16
CEF-824A-19S
CEF-824A-22S
CEF-824A-20S
LEGEND
Monitoring Well Locations
Air Sparging Well
Vapor Extraction Well
Day Tank 1 Excavated Area
Storm Sewer
50 0 50 Feet
site-57_20091013-fs.apr 13Oct09 Layout 1-2
DRAWN BY MJJ
DATE 13Oct09
CHECKED BY
DATE
DATE
SCALE AS NOTED
NAVFAC
SITE LAYOUT AND MONITORING WELL LOCATIONS, SITE 57
OPERABLE UNIT 9, SITES 57 & 58
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 2267
OWNER NO.
APPROVED BY
DATE
DRAWING NO. FIGURE 8-2
REV. 0



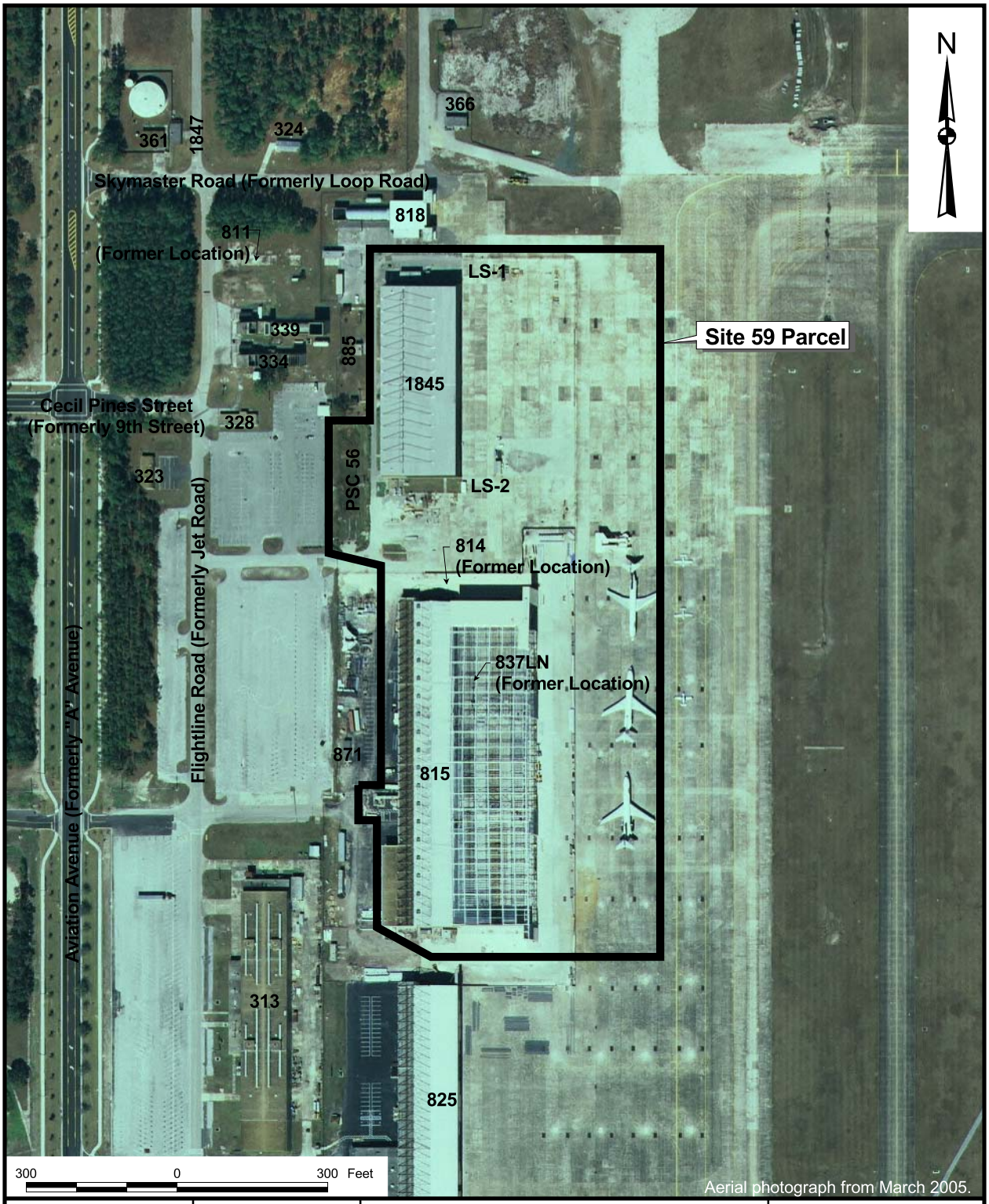
DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

NAVFAC

SITE LAYOUT AND MONITORING WELL LOCATIONS, SITE 58
OPERABLE UNIT 9, SITES 57 & 58
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

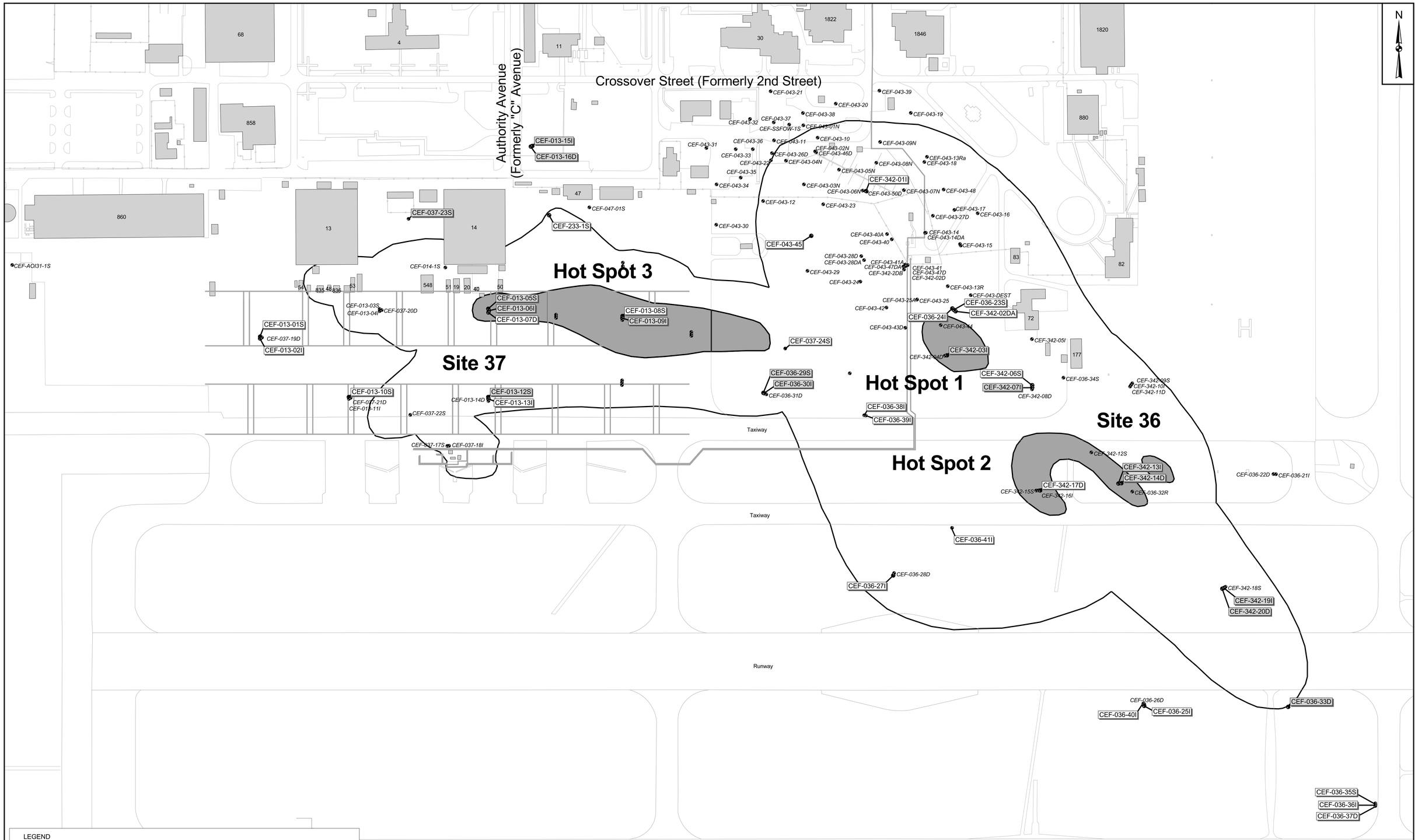
CONTRACT NUMBER	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-3	REV 0

site-58_20091013-fs.apr 13Oct09 Layout 1-5



DRAWN BY MJJ	DATE 13Oct09	SITE LOCATION MAP OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-4 / REV 0

site-59_20091013.apr 13Oct09 Layout_08-04



LEGEND

- Monitoring Well
- Aviation Fuel Piping
- CEF-013-15I — Sample for Natural Attenuation Parameters and Contaminants specified in Table 3-1
- CEF-013-03S — Sample Contaminants specified in Table 3-1 only
- Hot Spot as indicated by Benzene greater than 1000 ug/L and/or DCE or TCE greater than 100 ug/L
- Combined extent of groundwater plume as defined by exceedances of FDEP GCTLs based on RI data.

150 0 150 Feet

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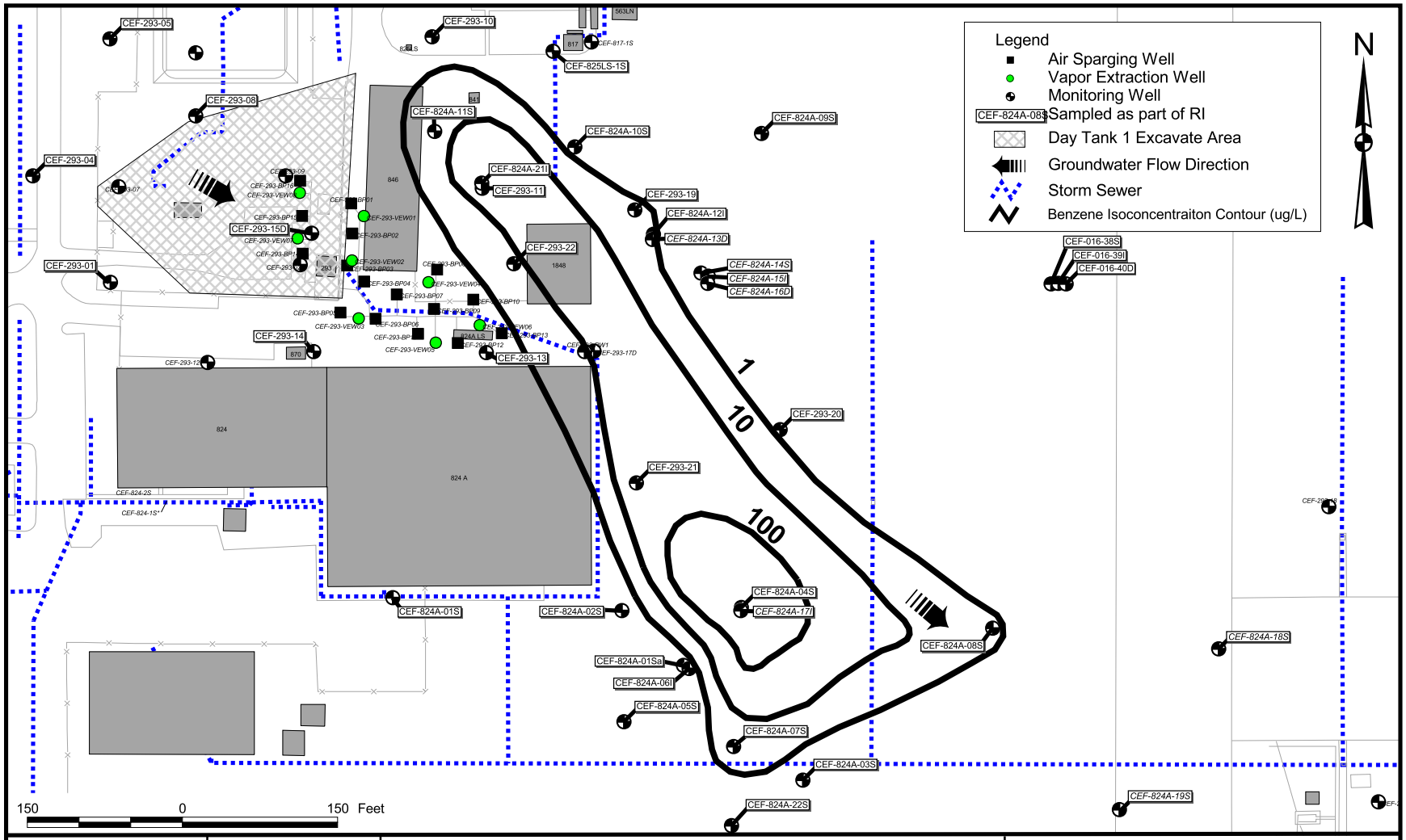
DRAWN BY MJJ	DATE 29Dec04	
CHECKED BY	DATE	
	DATE	
SCALE AS NOTED		

NAVFAC

SITE LOCATION MAP AND
MONITORING WELL LOCATIONS
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. FIGURE 8-5	REV. 0



DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

NAVFAC

EXTENT OF SITE 57 PETROLEUM PLUME

OPERABLE UNIT 9, SITES 57 & 58

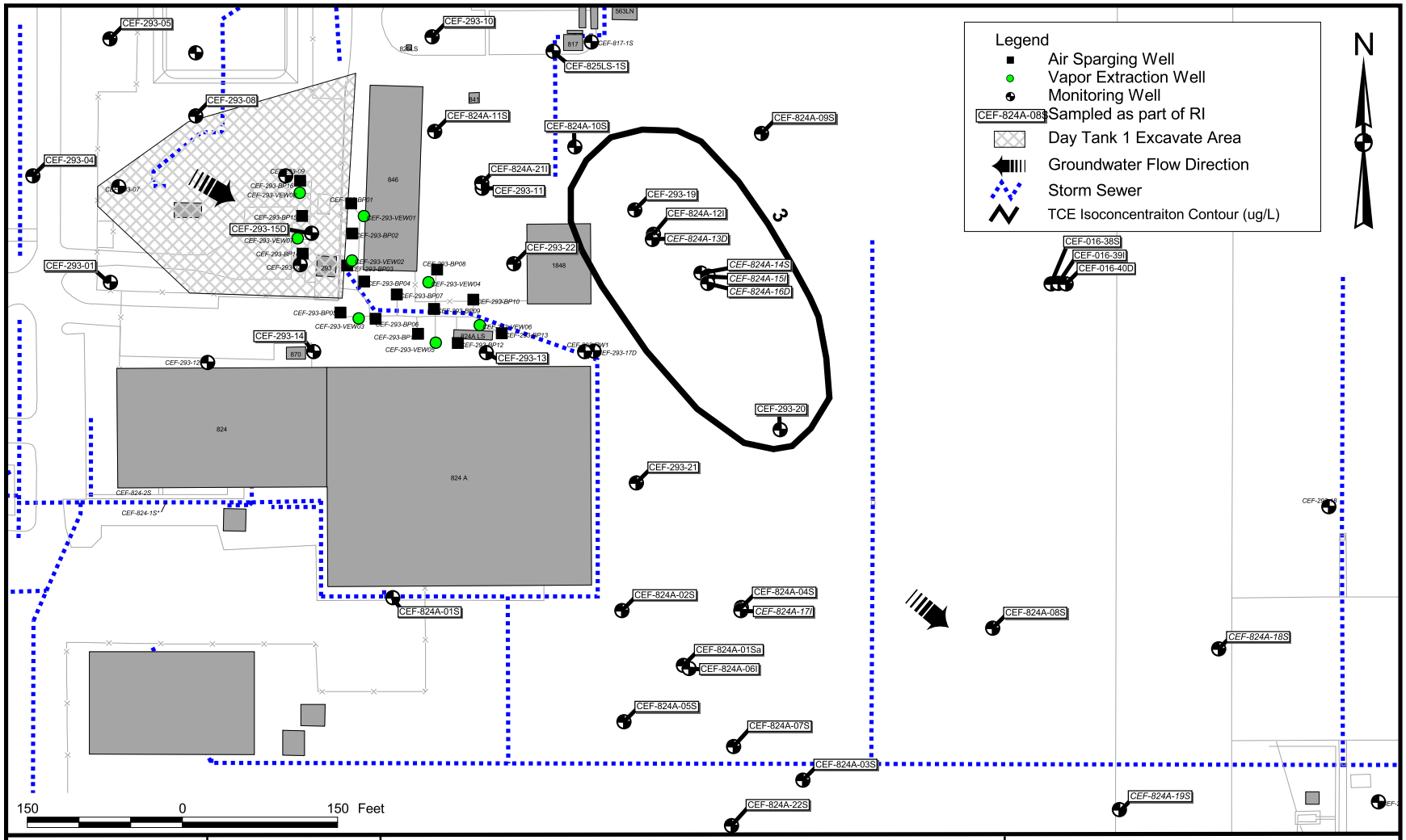
FIVE-YEAR REVIEW

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-6	REV 0

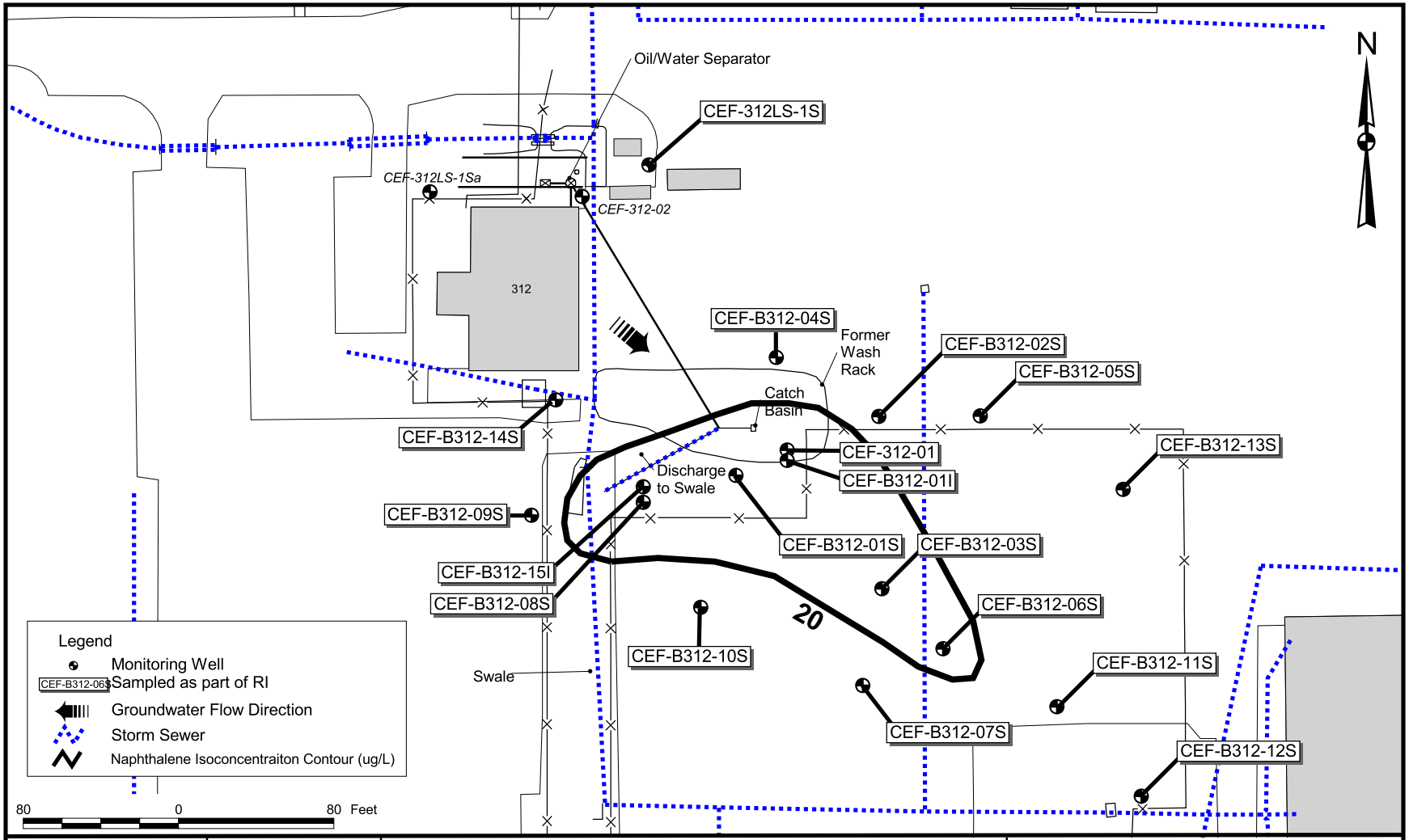
site-57_20091013-fs.apr 13Oct09 Layout 2-2



DRAWN BY MJJ	DATE 13Oct09	EXTENT OF SITE 57 TCE PLUME OPERABLE UNIT 9, SITES 57 & 58 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-7 / REV 0

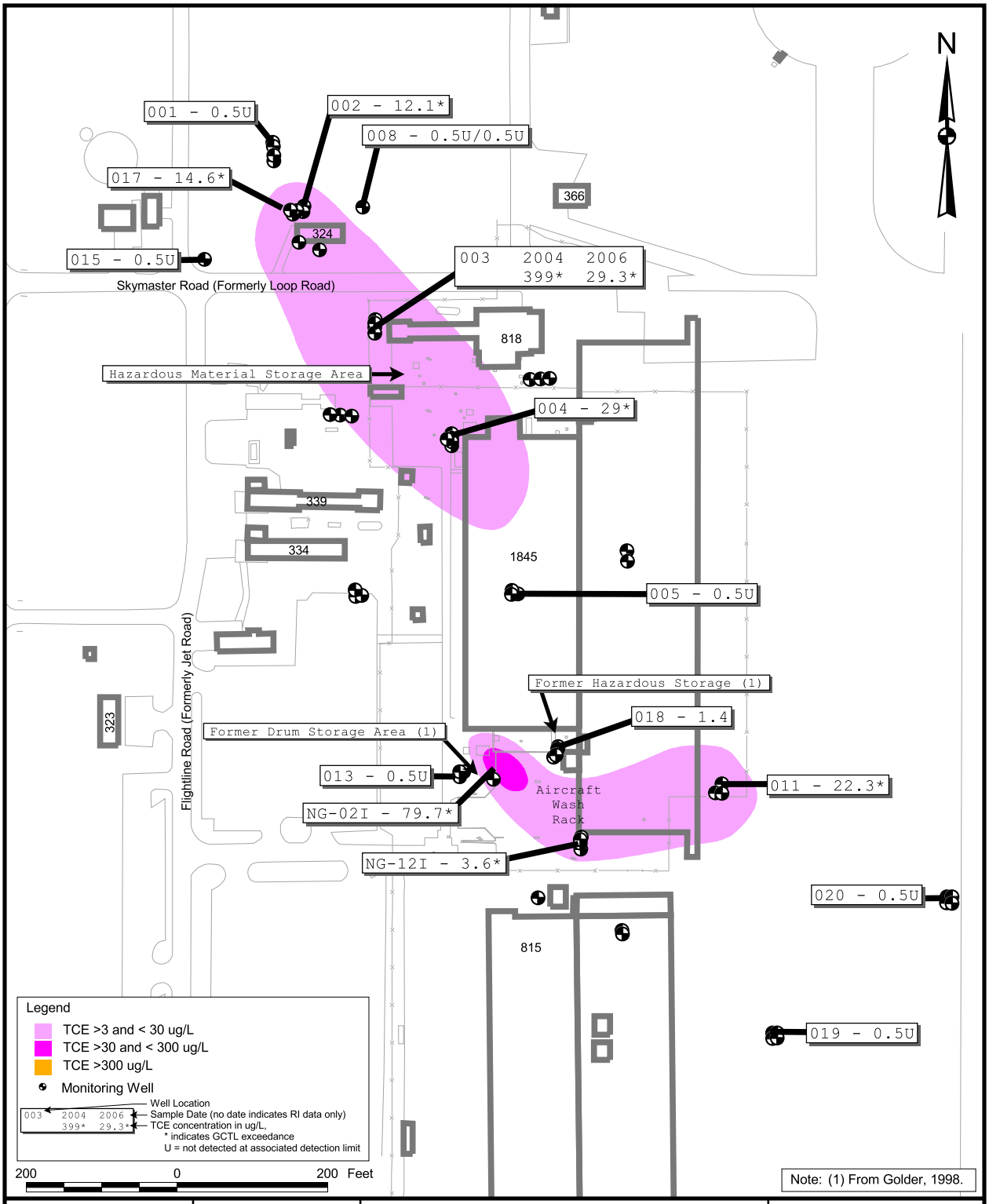
NAVFAC

site-57_20091013-fs.apr 13Oct09 Layout 2-3



DRAWN BY MJJ	DATE 13Oct09	EXTENT OF SITE 58 NAPHTHALENE PLUME OPERABLE UNIT 9, SITES 57 & 58 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-8 / REV 0

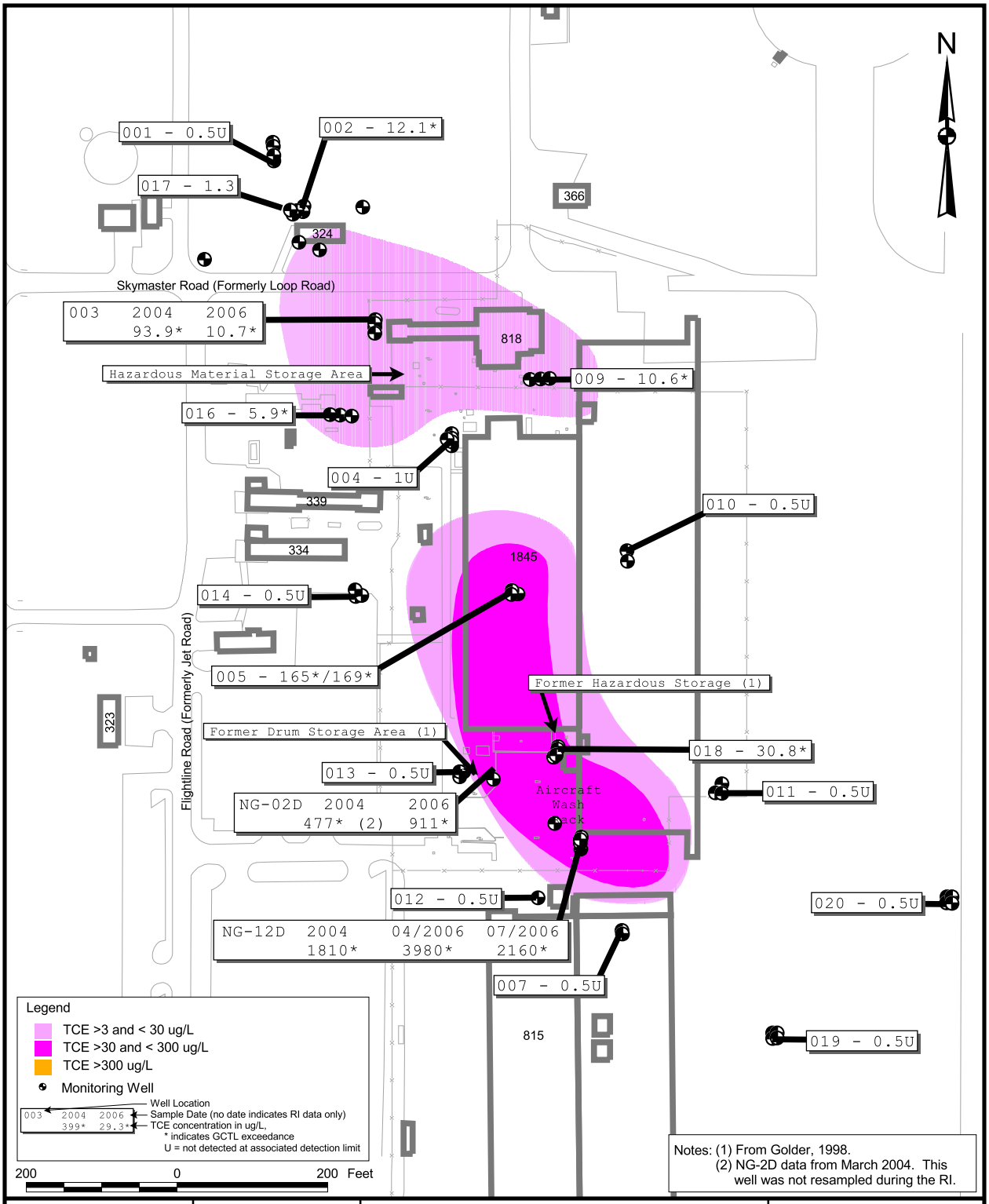
site-58_20091013-fs.apr 13Oct09 Layout Naphthalene



DRAWN BY MJJ	DATE 13Oct09	VOCs IN GROUNDWATER, RI DATA 30-FOOT ZONE OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-9A / REV 0

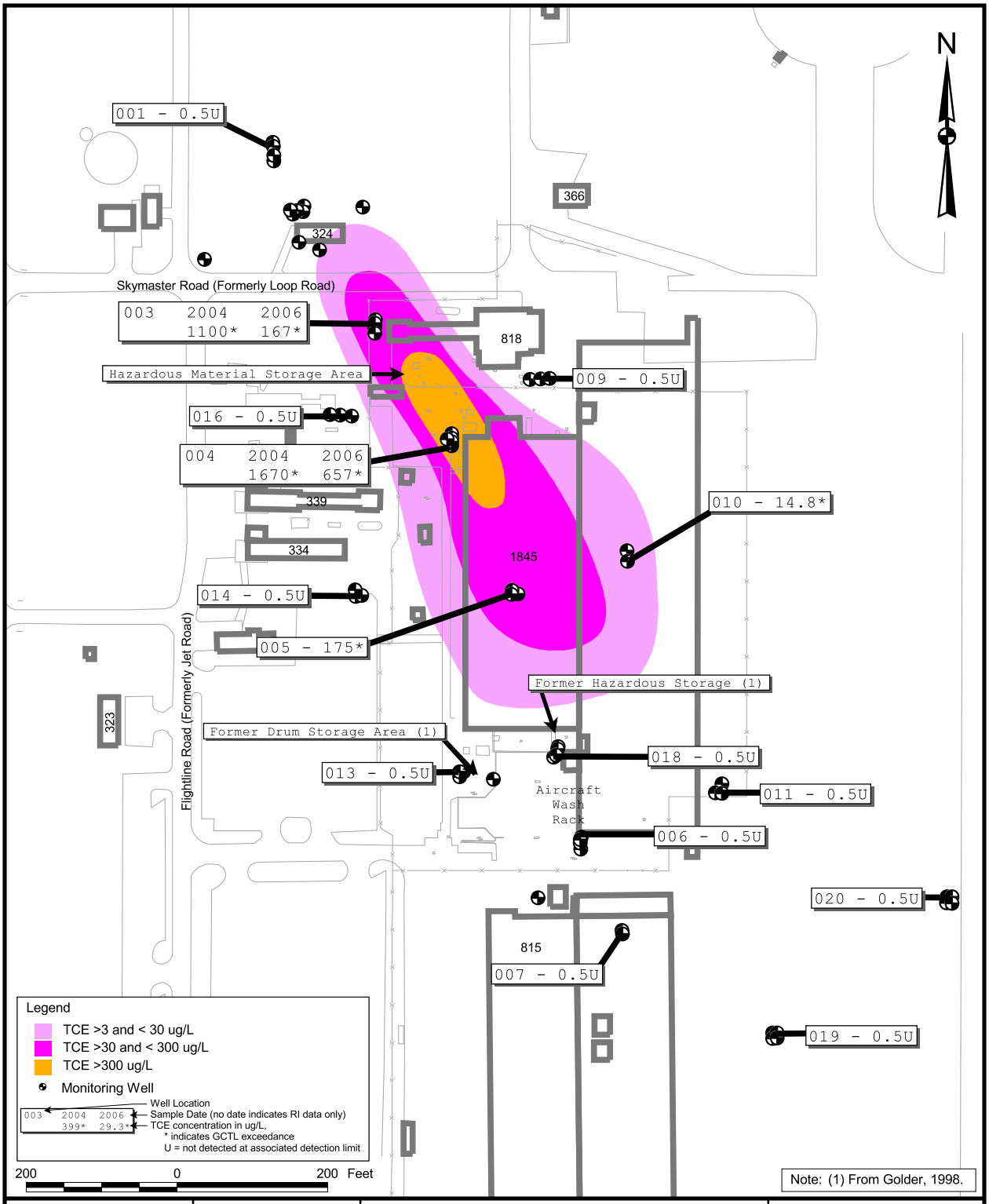
NAVFAC

site-59_20091013.apr 23Dec09 Layout041



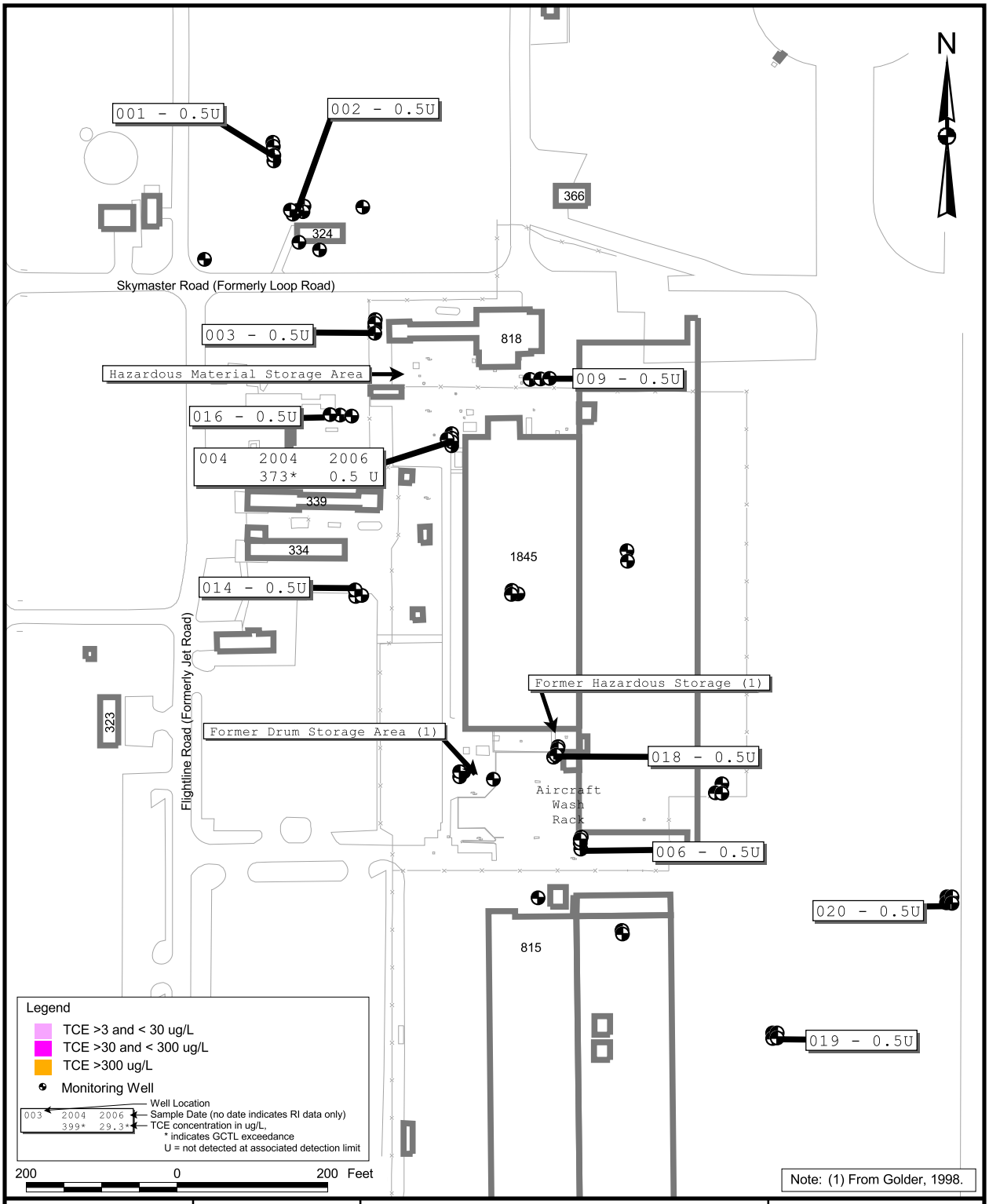
DRAWN BY MJJ	DATE 13Oct09	VOCs IN GROUNDWATER, RI DATA 50-FOOT ZONE OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-9B / REV 0

site-59_20091013.apr 23Dec09 Layout051



DRAWN BY MJJ	DATE 13Oct09	VOCs IN GROUNDWATER, RI DATA 70- TO 80-FOOT ZONE OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-9C / REV 0

site-59_20091013.apr 23Dec09 Layout061



DRAWN BY MJJ	DATE 13Oct09	VOCs IN GROUNDWATER, RI DATA TOP OF ROCK ZONE OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-9D / REV 0

site-59_20091013.apr 23Dec09 Layout071

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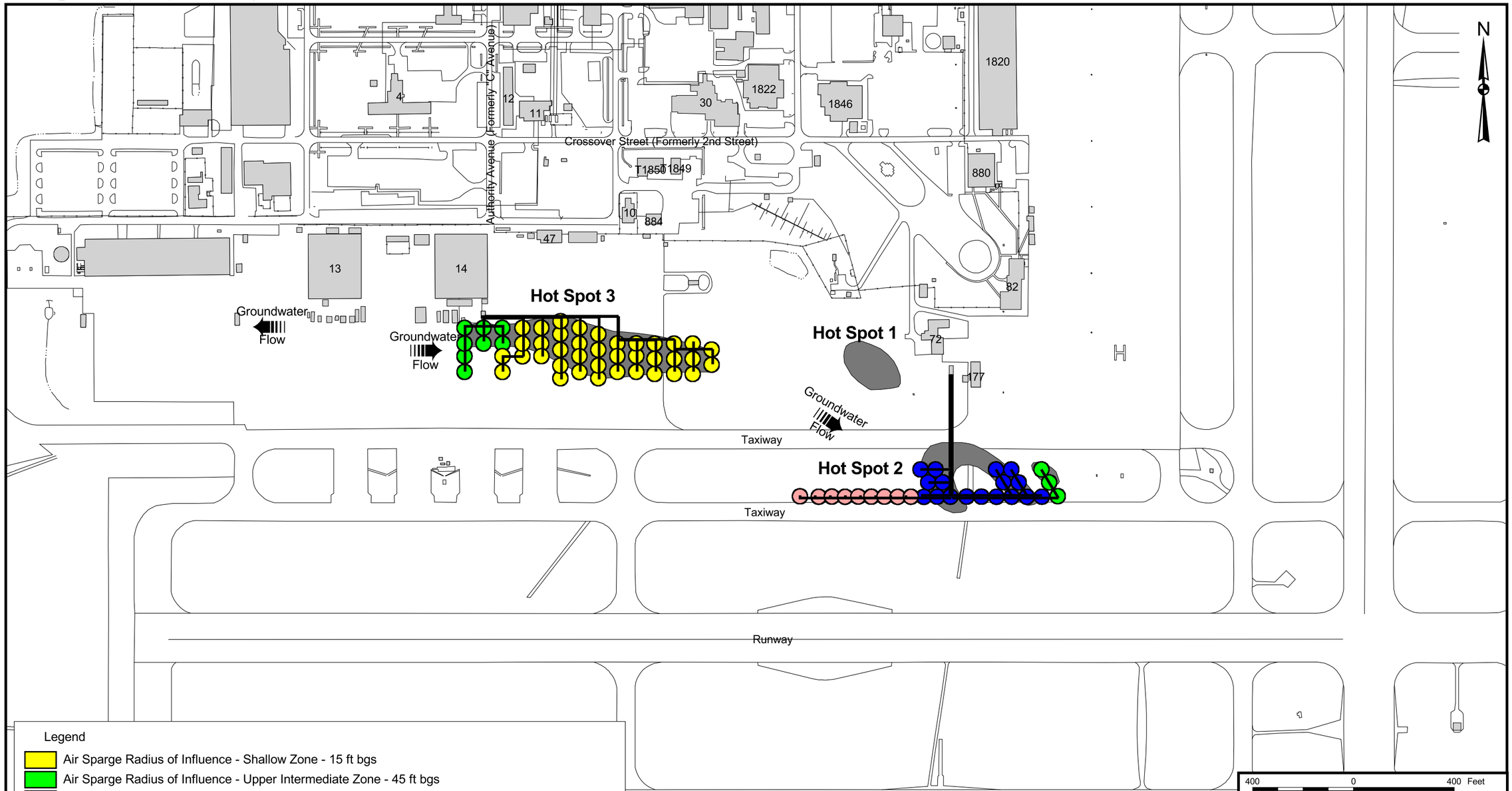
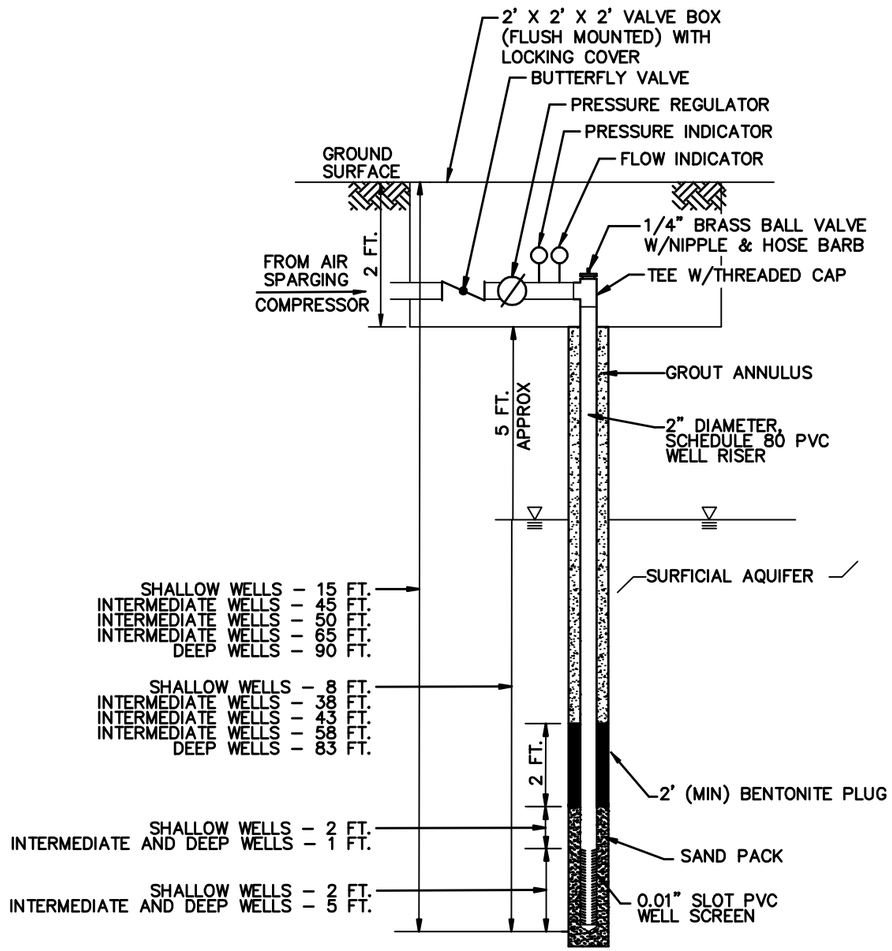


Legend

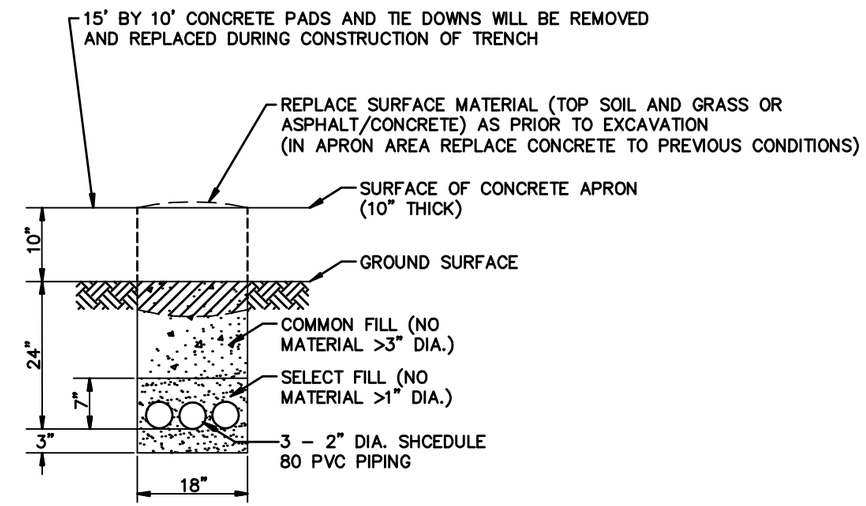
- Air Sparge Radius of Influence - Shallow Zone - 15 ft bgs
- Air Sparge Radius of Influence - Upper Intermediate Zone - 45 ft bgs
- Air Sparge Radius of Influence - Lower Intermediate Zone - 65 ft bgs
- Air Sparge Radius of Influence - Deep Zone - 90 ft bgs
- Groundwater Flow
- Hot Spot as indicated by Benzene greater than 1000 ug/L and/or DCE or TCE greater than 100 ug/L (Note Hot Spot 1 system is not going to be installed at the current time)
- Distribution Line

DRAWN BY MJJ	DATE 29Dec04	LAYOUT OF AS-BUILT AIR SPARGING SYSTEMS OPERABLE UNIT 9, SITES 36 AND 37 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHED-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8-10 / REV. 0

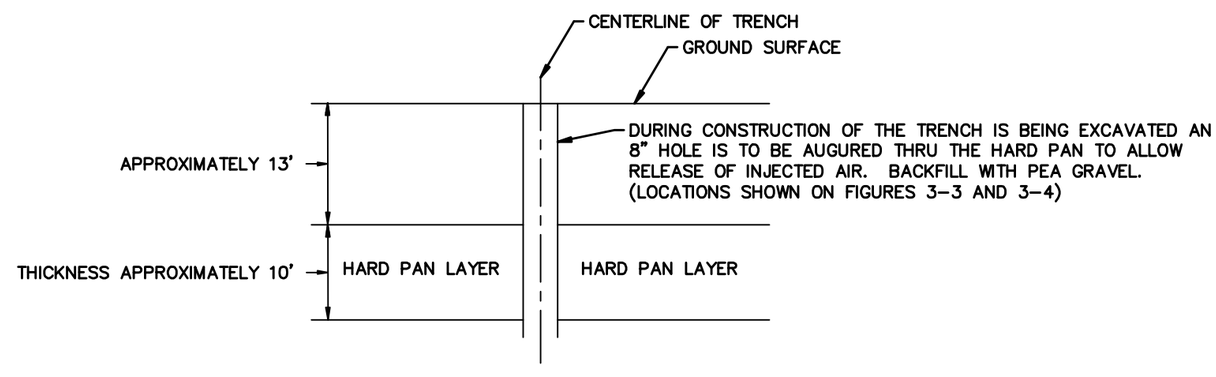
ACAD:0989CP08.dwg 10/13/09 CK PIT



INJECTION WELL DETAIL
NOT TO SCALE

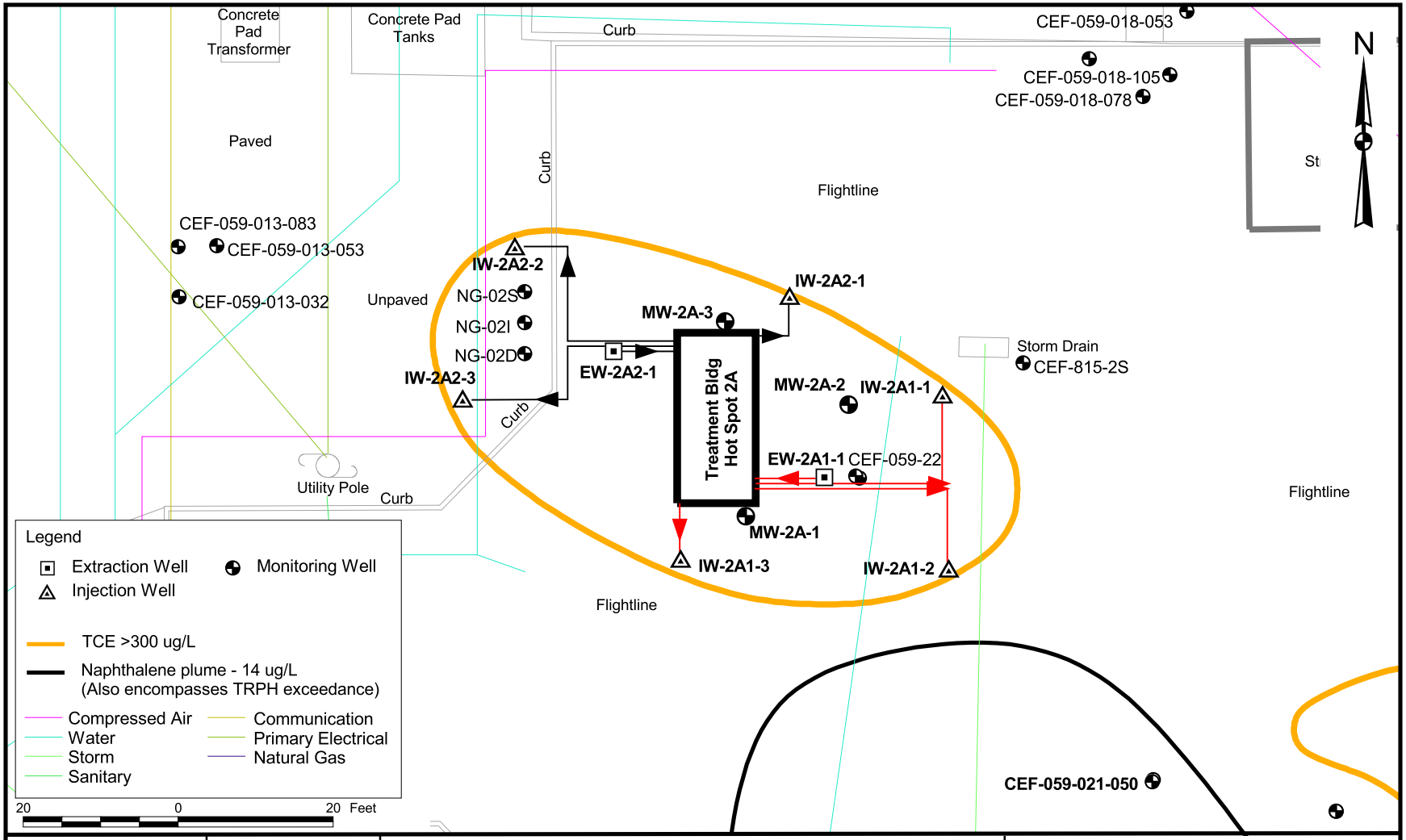


PVC PIPE TRENCH CROSS SECTION
NOT TO SCALE



VENT POINT CROSS SECTION
NOT TO SCALE

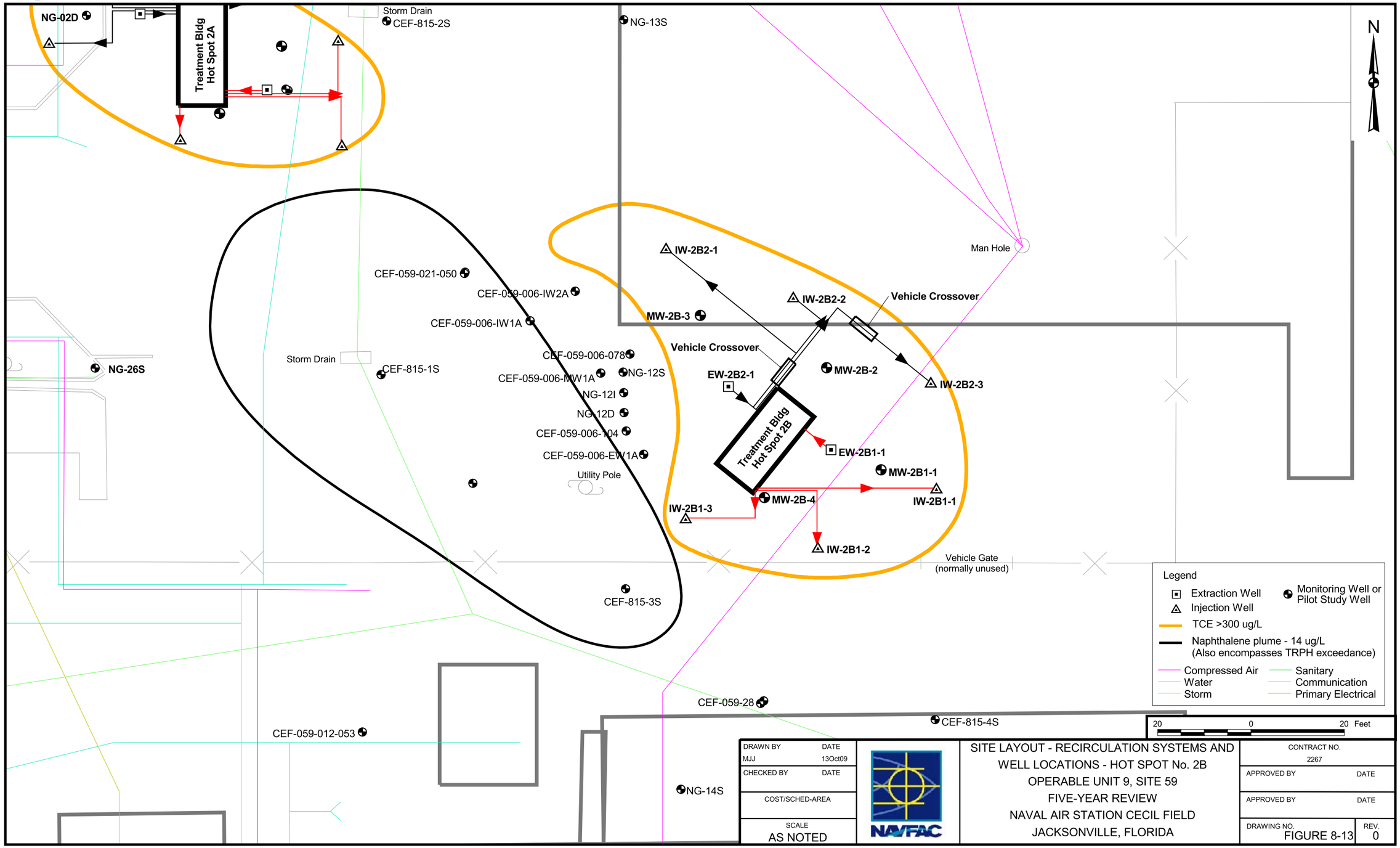
DRAWN BY CK DATE 10/13/09	NAVFAC	WELL INSTALLATION & PIPING DETAILS AS/SVE SYSTEM OPERABLE UNIT 9, SITE 36 AND 37 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 0989
CHECKED BY DATE			OWNER NO. 0000
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 8–11 / REV. 0



DRAWN BY MJJ	DATE 13Oct09	SITE LAYOUT - RECIRCULATION SYSTEMS AND WELL LOCATIONS - HOT SPOT No. 2A OPERABLE UNIT 9, SITE 59 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 8-12 / REV 0

Site-16_20091013.apr 13Oct09 Layout02

Site-16_20091013.apr 13Oct09 03-13 Layout



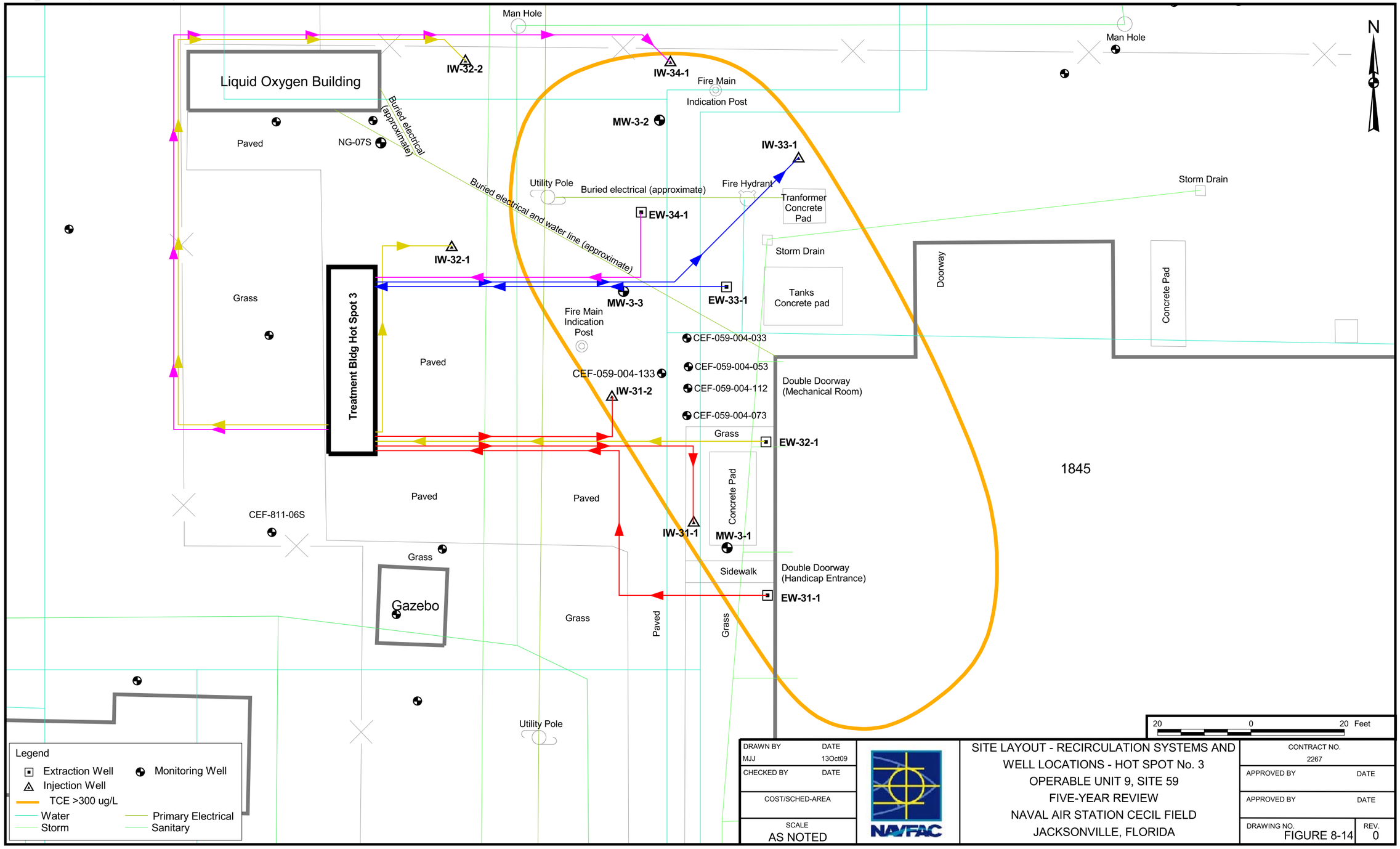
DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

SITE LAYOUT - RECIRCULATION SYSTEMS AND WELL LOCATIONS - HOT SPOT No. 2B
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-13	REV. 0

Site-16_20091013.apr 13Oct09 03-14 Layout

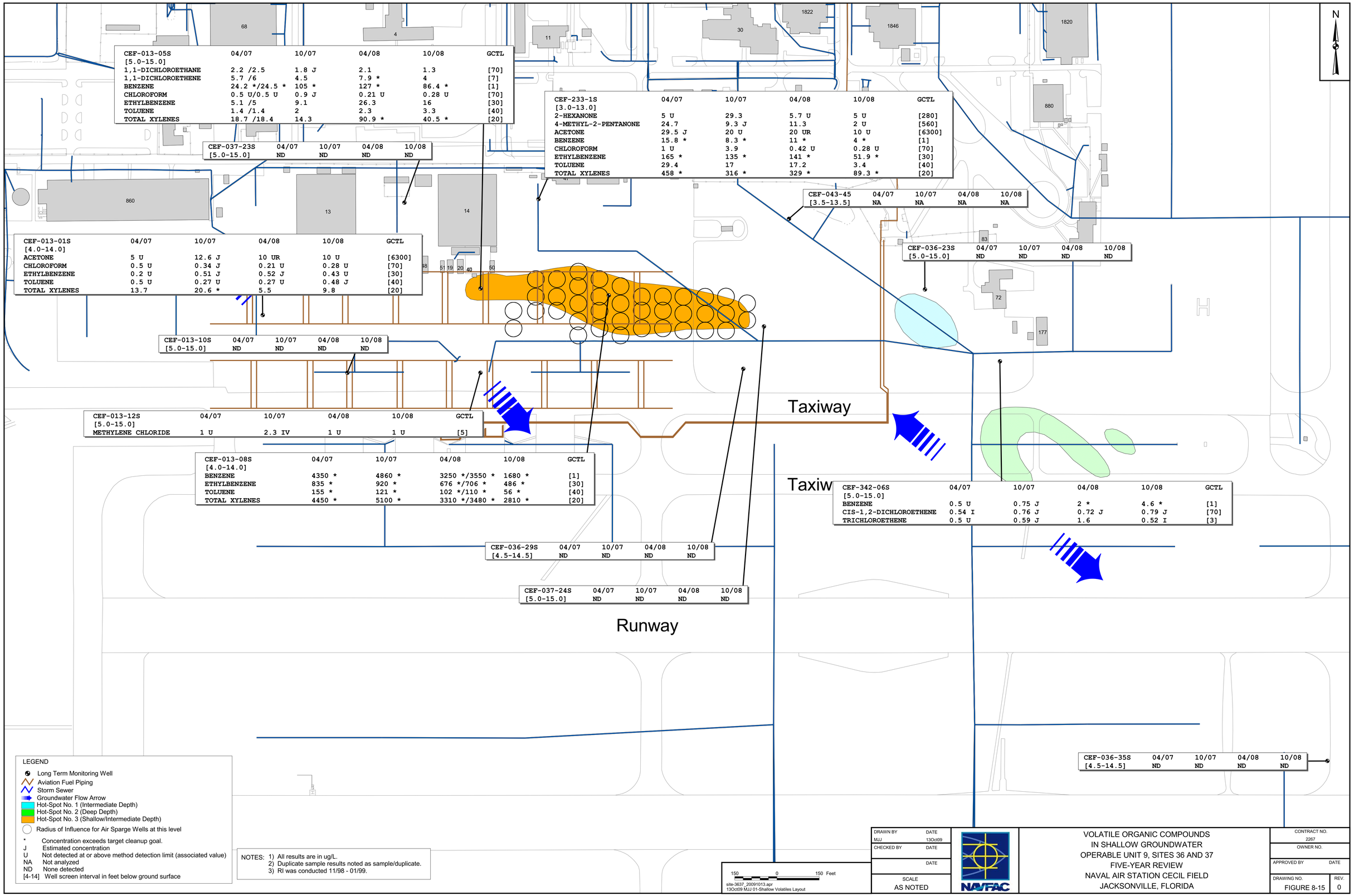


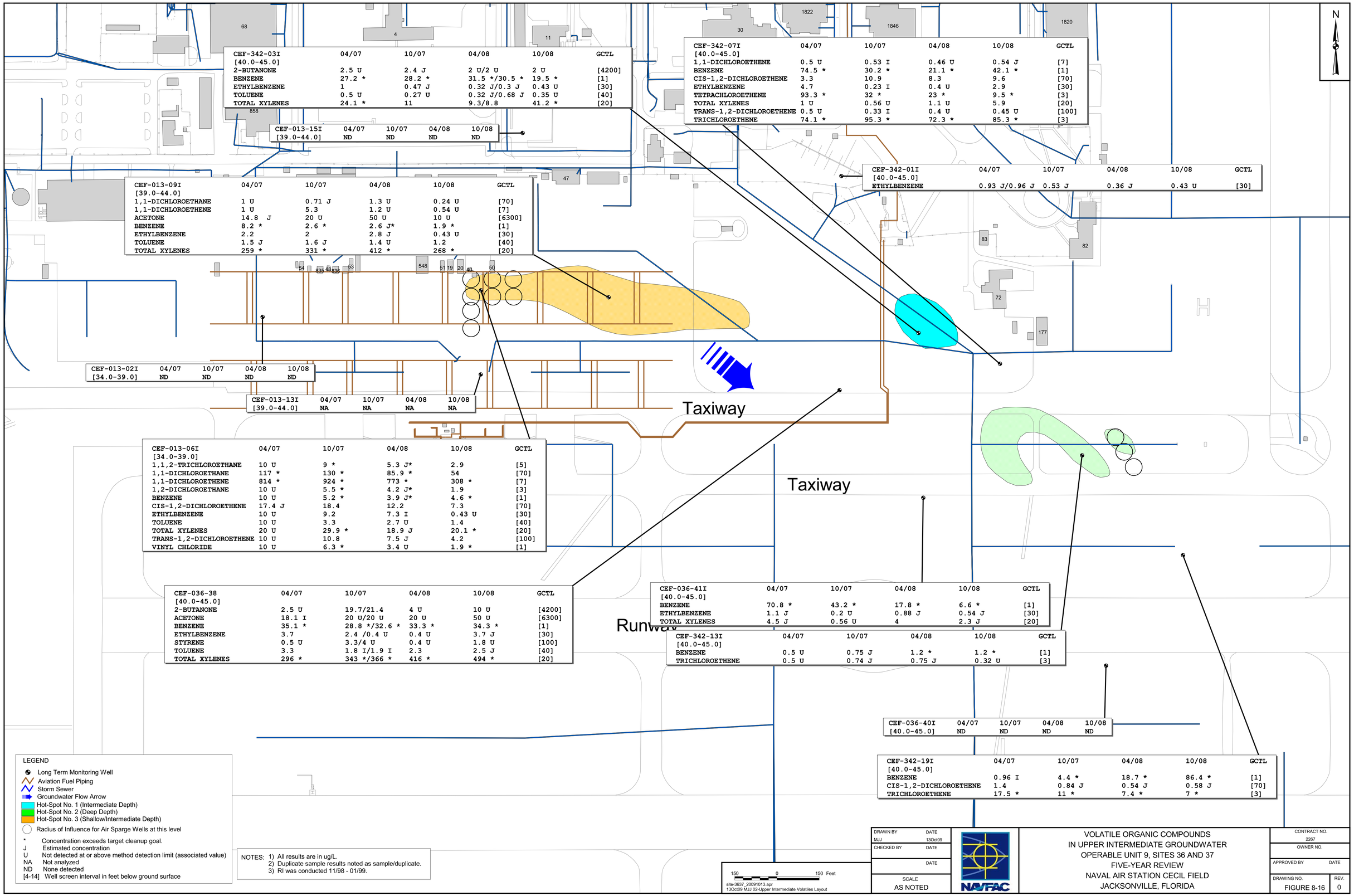
DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

SITE LAYOUT - RECIRCULATION SYSTEMS AND WELL LOCATIONS - HOT SPOT No. 3
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-14	REV. 0


N
68
4
11
30
1822
1846
1820
880
860
13
14
83
72
177
Taxiway
Taxiw
Runway
CEF-013-05S 04/07 10/07 04/08 10/08 GCTL
[5.0-15.0]
1,1-DICHLOROETHANE 2.2 /2.5 1.8 J 2.1 1.3 [70]
1,1-DICHLOROETHENE 5.7 /6 4.5 7.9 * 4 [7]
BENZENE 24.2 */24.5 * 105 * 127 * 86.4 * [1]
CHLOROFORM 0.5 U/0.5 U 0.9 J 0.21 U 0.28 U [70]
ETHYLBENZENE 5.1 /5 9.1 26.3 16 [30]
TOLUENE 1.4 /1.4 2 2.3 3.3 [40]
TOTAL XYLENES 18.7 /18.4 14.3 90.9 * 40.5 * [20]
CEF-037-23S 04/07 10/07 04/08 10/08
[5.0-15.0] ND ND ND ND
CEF-233-1S 04/07 10/07 04/08 10/08 GCTL
[3.0-13.0]
2-HEXANONE 5 U 29.3 5.7 U 5 U [280]
4-METHYL-2-PENTANONE 24.7 9.3 J 11.3 2 U [560]
ACETONE 29.5 J 20 U 20 UR 10 U [6300]
BENZENE 15.8 * 8.3 * 11 * 4 * [1]
CHLOROFORM 1 U 3.9 0.42 U 0.28 U [70]
ETHYLBENZENE 165 * 135 * 141 * 51.9 * [30]
TOLUENE 29.4 17 17.2 3.4 [40]
TOTAL XYLENES 458 * 316 * 329 * 89.3 * [20]
CEF-043-45 04/07 10/07 04/08 10/08
[3.5-13.5] NA NA NA NA
CEF-036-23S 04/07 10/07 04/08 10/08
[5.0-15.0] ND ND ND ND
CEF-013-01S 04/07 10/07 04/08 10/08 GCTL
[4.0-14.0]
ACETONE 5 U 12.6 J 10 UR 10 U [6300]
CHLOROFORM 0.5 U 0.34 J 0.21 U 0.28 U [70]
ETHYLBENZENE 0.2 U 0.51 J 0.52 J 0.43 U [30]
TOLUENE 0.5 U 0.27 U 0.27 U 0.48 J [40]
TOTAL XYLENES 13.7 20.6 * 5.5 9.8 [20]
CEF-013-10S 04/07 10/07 04/08 10/08
[5.0-15.0] ND ND ND ND
CEF-013-12S 04/07 10/07 04/08 10/08 GCTL
[5.0-15.0]
METHYLENE CHLORIDE 1 U 2.3 IV 1 U 1 U [5]
CEF-013-08S 04/07 10/07 04/08 10/08 GCTL
[4.0-14.0]
BENZENE 4350 * 4860 * 3250 */3550 * 1680 * [1]
ETHYLBENZENE 835 * 920 * 676 */706 * 486 * [30]
TOLUENE 155 * 121 * 102 */110 * 56 * [40]
TOTAL XYLENES 4450 * 5100 * 3310 */3480 * 2810 * [20]
CEF-342-06S 04/07 10/07 04/08 10/08 GCTL
[5.0-15.0]
BENZENE 0.5 U 0.75 J 2 * 4.6 * [1]
CIS-1,2-DICHLOROETHENE 0.54 I 0.76 J 0.72 J 0.79 J [70]
TRICHLOROETHENE 0.5 U 0.59 J 1.6 0.52 I [3]
CEF-036-29S 04/07 10/07 04/08 10/08
[4.5-14.5] ND ND ND ND
CEF-037-24S 04/07 10/07 04/08 10/08
[5.0-15.0] ND ND ND ND
CEF-036-35S 04/07 10/07 04/08 10/08
[4.5-14.5] ND ND ND ND
LEGEND
Long Term Monitoring Well
Aviation Fuel Piping
Storm Sewer
Groundwater Flow Arrow
Hot-Spot No. 1 (Intermediate Depth)
Hot-Spot No. 2 (Deep Depth)
Hot-Spot No. 3 (Shallow/Intermediate Depth)
Radius of Influence for Air Sparge Wells at this level
* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface
NOTES: 1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.
150 0 150 Feet
site-3637_20091013.apr
13Oct09 MJJ 01-Shallow Volatiles Layout
DRAWN BY MJJ
DATE 13Oct09
CHECKED BY
DATE
DATE
SCALE AS NOTED
NAVFAC
VOLATILE ORGANIC COMPOUNDS
IN SHALLOW GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 2267
OWNER NO.
APPROVED BY
DATE
DRAWING NO. FIGURE 8-15
REV. 0



CEF-342-03I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
2-BUTANONE	2.5 U	2.4 J	2 U/2 U	2 U	[4200]
BENZENE	27.2 *	28.2 *	31.5 */30.5 *	19.5 *	[1]
ETHYLBENZENE	1	0.47 J	0.32 J/0.3 J	0.43 U	[30]
TOLUENE	0.5 U	0.27 U	0.32 J/0.68 J	0.35 U	[40]
TOTAL XYLENES	24.1 *	11	9.3/8.8	41.2 *	[20]

CEF-013-15I [39.0-44.0]	04/07	10/07	04/08	10/08
	ND	ND	ND	ND

CEF-342-07I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
1,1-DICHLOROETHENE	0.5 U	0.53 I	0.46 U	0.54 J	[7]
BENZENE	74.5 *	30.2 *	21.1 *	42.1 *	[1]
CIS-1,2-DICHLOROETHENE	3.3	10.9	8.3	9.6	[70]
ETHYLBENZENE	4.7	0.23 I	0.4 U	2.9	[30]
TETRACHLOROETHENE	93.3 *	32 *	23 *	9.5 *	[3]
TOTAL XYLENES	1 U	0.56 U	1.1 U	5.9	[20]
TRANS-1,2-DICHLOROETHENE	0.5 U	0.33 I	0.4 U	0.45 U	[100]
TRICHLOROETHENE	74.1 *	95.3 *	72.3 *	85.3 *	[3]

CEF-342-01I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
ETHYLBENZENE	0.93 J/0.96 J	0.53 J	0.36 J	0.43 U	[30]

CEF-013-09I [39.0-44.0]	04/07	10/07	04/08	10/08	GCTL
1,1-DICHLOROETHANE	1 U	0.71 J	1.3 U	0.24 U	[70]
1,1-DICHLOROETHENE	1 U	5.3	1.2 U	0.54 U	[7]
ACETONE	14.8 J	20 U	50 U	10 U	[6300]
BENZENE	8.2 *	2.6 *	2.6 J*	1.9 *	[1]
ETHYLBENZENE	2.2	2	2.8 J	0.43 U	[30]
TOLUENE	1.5 J	1.6 J	1.4 U	1.2	[40]
TOTAL XYLENES	259 *	331 *	412 *	268 *	[20]

CEF-013-02I [34.0-39.0]	04/07	10/07	04/08	10/08
	ND	ND	ND	ND

CEF-013-13I [39.0-44.0]	04/07	10/07	04/08	10/08
	NA	NA	NA	NA

CEF-013-06I [34.0-39.0]	04/07	10/07	04/08	10/08	GCTL
1,1,2-TRICHLOROETHANE	10 U	9 *	5.3 J*	2.9	[5]
1,1-DICHLOROETHANE	117 *	130 *	85.9 *	54	[70]
1,1-DICHLOROETHENE	814 *	924 *	773 *	308 *	[7]
1,2-DICHLOROETHANE	10 U	5.5 *	4.2 J*	1.9	[3]
BENZENE	10 U	5.2 *	3.9 J*	4.6 *	[1]
CIS-1,2-DICHLOROETHENE	17.4 J	18.4	12.2	7.3	[70]
ETHYLBENZENE	10 U	9.2	7.3 I	0.43 U	[30]
TOLUENE	10 U	3.3	2.7 U	1.4	[40]
TOTAL XYLENES	20 U	29.9 *	18.9 J	20.1 *	[20]
TRANS-1,2-DICHLOROETHENE	10 U	10.8	7.5 J	4.2	[100]
VINYL CHLORIDE	10 U	6.3 *	3.4 U	1.9 *	[1]

CEF-036-38 [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
2-BUTANONE	2.5 U	19.7/21.4	4 U	10 U	[4200]
ACETONE	18.1 I	20 U/20 U	20 U	50 U	[6300]
BENZENE	35.1 *	28.8 */32.6 *	33.3 *	34.3 *	[1]
ETHYLBENZENE	3.7	2.4 /0.4 U	0.4 U	3.7 J	[30]
STYRENE	0.5 U	3.3/4 U	0.4 U	1.8 U	[100]
TOLUENE	3.3	1.8 I/1.9 I	2.3	2.5 J	[40]
TOTAL XYLENES	296 *	343 */366 *	416 *	494 *	[20]

CEF-036-41I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
BENZENE	70.8 *	43.2 *	17.8 *	6.6 *	[1]
ETHYLBENZENE	1.1 J	0.2 U	0.88 J	0.54 J	[30]
TOTAL XYLENES	4.5 J	0.56 U	4	2.3 J	[20]

CEF-342-13I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
BENZENE	0.5 U	0.75 J	1.2 *	1.2 *	[1]
TRICHLOROETHENE	0.5 U	0.74 J	0.75 J	0.32 U	[3]

CEF-036-40I [40.0-45.0]	04/07	10/07	04/08	10/08
	ND	ND	ND	ND

CEF-342-19I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
BENZENE	0.96 I	4.4 *	18.7 *	86.4 *	[1]
CIS-1,2-DICHLOROETHENE	1.4	0.84 J	0.54 J	0.58 J	[70]
TRICHLOROETHENE	17.5 *	11 *	7.4 *	7 *	[3]

LEGEND

- Long Term Monitoring Well
- Aviation Fuel Piping
- Storm Sewer
- Groundwater Flow Arrow
- Hot-Spot No. 1 (Intermediate Depth)
- Hot-Spot No. 2 (Deep Depth)
- Hot-Spot No. 3 (Shallow/Intermediate Depth)
- Radius of Influence for Air Sparge Wells at this level

* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface

NOTES:
1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.

150 0 150 Feet

site-3637_20091013.apr
13Oct09 MJJ 02-Upper Intermediate Volatiles Layout

DRAWN BY	DATE
MJJ	13Oct09
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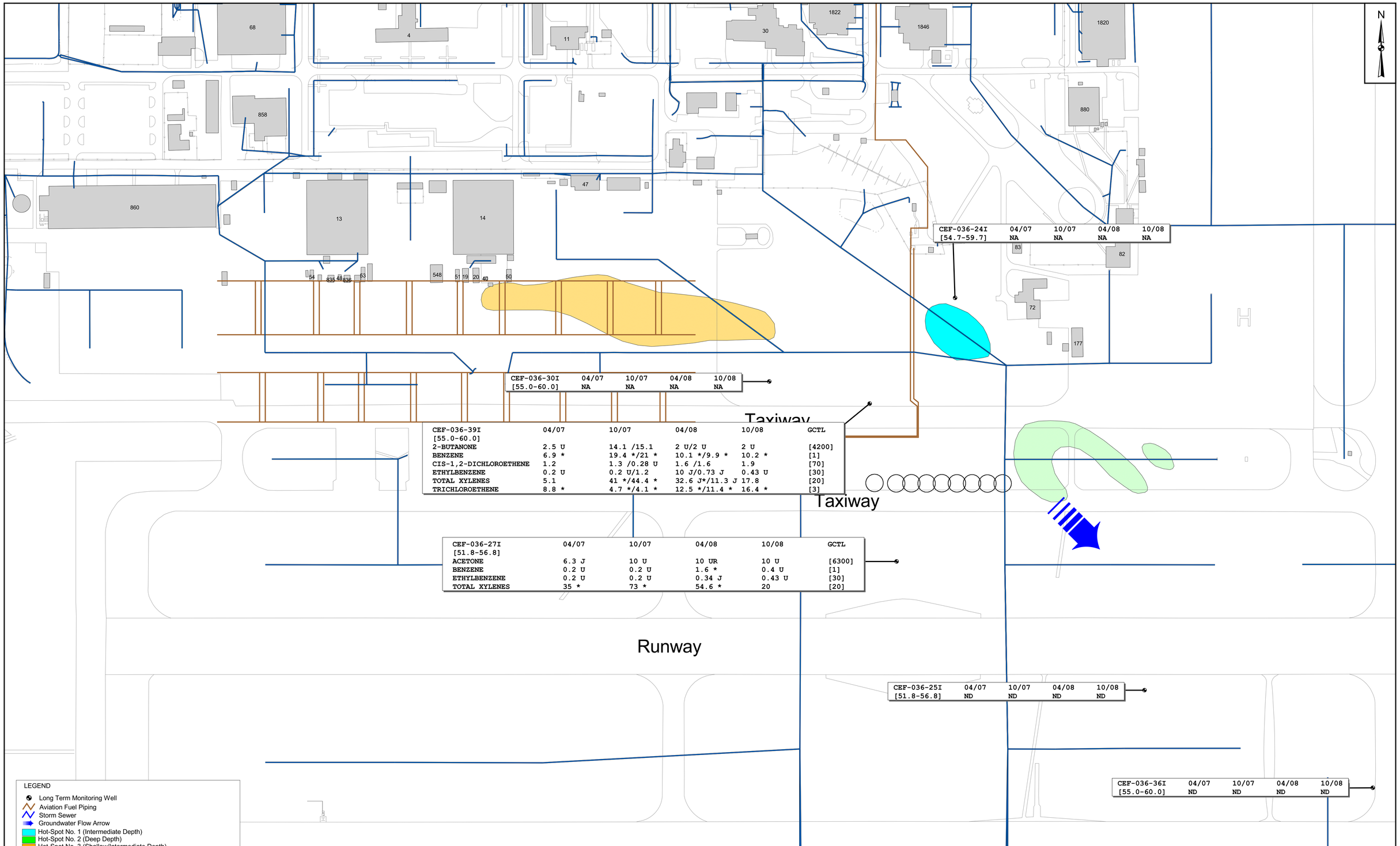
	DATE
SCALE	
AS NOTED	

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN UPPER INTERMEDIATE GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267
OWNER NO.
APPROVED BY DATE
DRAWING NO. FIGURE 8-16
REV. 0



LEGEND

- Long Term Monitoring Well
- Aviation Fuel Piping
- Storm Sewer
- Groundwater Flow Arrow
- Hot-Spot No. 1 (Intermediate Depth)
- Hot-Spot No. 2 (Deep Depth)
- Hot-Spot No. 3 (Shallow/Intermediate Depth)
- Radius of Influence for Air Sparge Wells at this level

* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface

NOTES:
1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.

150 0 150 Feet

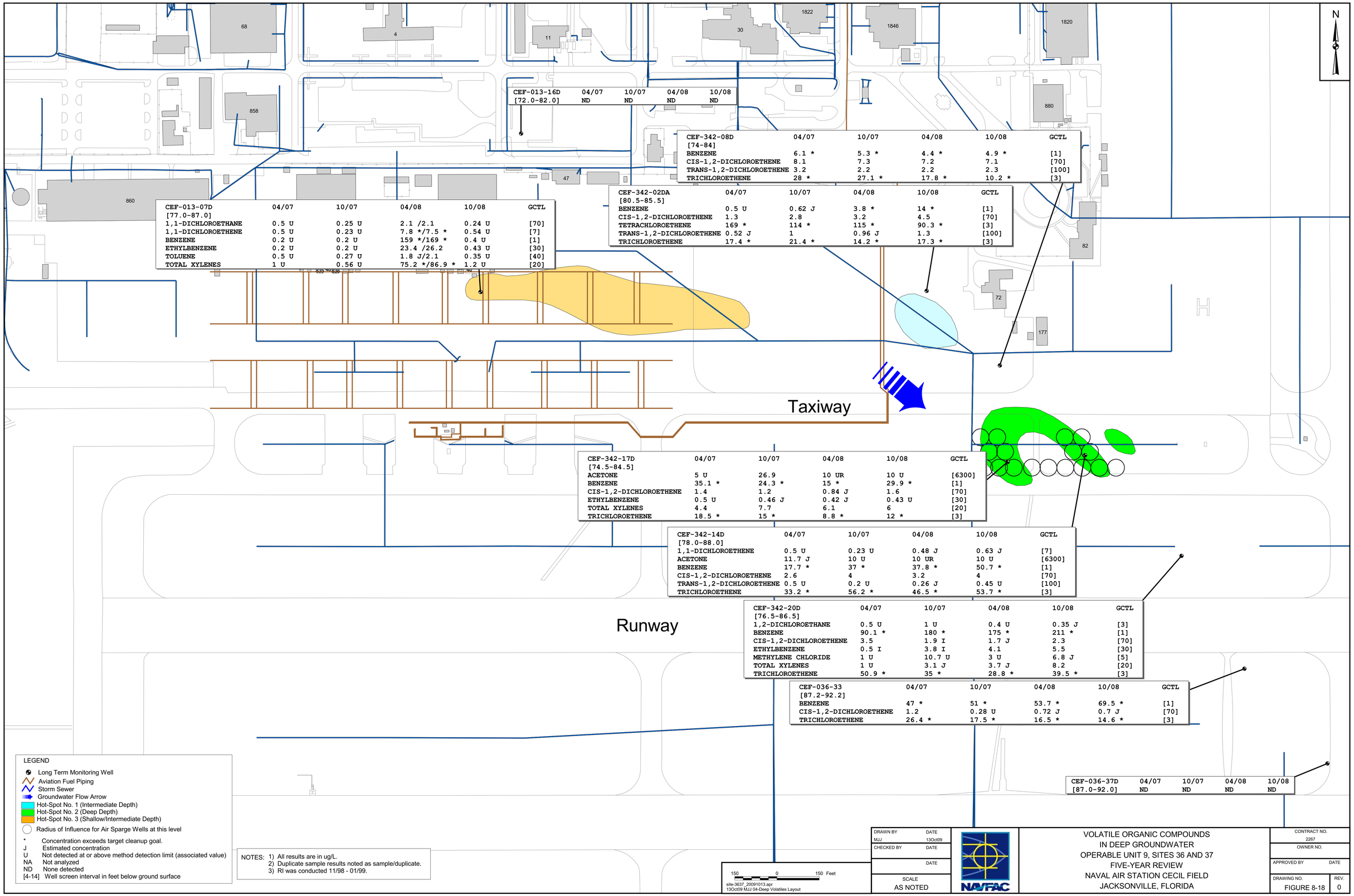
site-3637_20091013.apr
13Oct09 MJJ 03-Lower Intermediate Volatiles Layout

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
	DATE
SCALE	
AS NOTED	

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN LOWER INTERMEDIATE GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 8-17	0



CEF-013-16D [72.0-82.0]	04/07	10/07	04/08	10/08
	ND	ND	ND	ND

CEF-342-08D [74-84]	04/07	10/07	04/08	10/08	GCTL
BENZENE	6.1 *	5.3 *	4.4 *	4.9 *	[1]
CIS-1,2-DICHLOROETHENE	8.1	7.3	7.2	7.1	[70]
TRANS-1,2-DICHLOROETHENE	3.2	2.2	2.2	2.3	[100]
TRICHLOROETHENE	28 *	27.1 *	17.8 *	10.2 *	[3]

CEF-013-07D [77.0-87.0]	04/07	10/07	04/08	10/08	GCTL
1,1-DICHLOROETHANE	0.5 U	0.25 U	2.1 /2.1	0.24 U	[70]
1,1-DICHLOROETHENE	0.5 U	0.23 U	7.8 */7.5 *	0.54 U	[7]
BENZENE	0.2 U	0.2 U	159 */169 *	0.4 U	[1]
ETHYLBENZENE	0.2 U	0.2 U	23.4 /26.2	0.43 U	[30]
TOLUENE	0.5 U	0.27 U	1.8 J/2.1	0.35 U	[40]
TOTAL XYLENES	1 U	0.56 U	75.2 */86.9 *	1.2 U	[20]

CEF-342-02DA [80.5-85.5]	04/07	10/07	04/08	10/08	GCTL
BENZENE	0.5 U	0.62 J	3.8 *	14 *	[1]
CIS-1,2-DICHLOROETHENE	1.3	2.8	3.2	4.5	[70]
TETRACHLOROETHENE	169 *	114 *	115 *	90.3 *	[3]
TRANS-1,2-DICHLOROETHENE	0.52 J	1	0.96 J	1.3	[100]
TRICHLOROETHENE	17.4 *	21.4 *	14.2 *	17.3 *	[3]

CEF-342-17D [74.5-84.5]	04/07	10/07	04/08	10/08	GCTL
ACETONE	5 U	26.9	10 UR	10 U	[6300]
BENZENE	35.1 *	24.3 *	15 *	29.9 *	[1]
CIS-1,2-DICHLOROETHENE	1.4	1.2	0.84 J	1.6	[70]
ETHYLBENZENE	0.5 U	0.46 J	0.42 J	0.43 U	[30]
TOTAL XYLENES	4.4	7.7	6.1	6	[20]
TRICHLOROETHENE	18.5 *	15 *	8.8 *	12 *	[3]

CEF-342-14D [78.0-88.0]	04/07	10/07	04/08	10/08	GCTL
1,1-DICHLOROETHENE	0.5 U	0.23 U	0.48 J	0.63 J	[7]
ACETONE	11.7 J	10 U	10 UR	10 U	[6300]
BENZENE	17.7 *	37 *	37.8 *	50.7 *	[1]
CIS-1,2-DICHLOROETHENE	2.6	4	3.2	4	[70]
TRANS-1,2-DICHLOROETHENE	0.5 U	0.2 U	0.26 J	0.45 U	[100]
TRICHLOROETHENE	33.2 *	56.2 *	46.5 *	53.7 *	[3]

CEF-342-20D [76.5-86.5]	04/07	10/07	04/08	10/08	GCTL
1,2-DICHLOROETHANE	0.5 U	1 U	0.4 U	0.35 J	[3]
BENZENE	90.1 *	180 *	175 *	211 *	[1]
CIS-1,2-DICHLOROETHENE	3.5	1.9 I	1.7 J	2.3	[70]
ETHYLBENZENE	0.5 I	3.8 I	4.1	5.5	[30]
METHYLENE CHLORIDE	1 U	10.7 U	3 U	6.8 J	[5]
TOTAL XYLENES	1 U	3.1 J	3.7 J	8.2	[20]
TRICHLOROETHENE	50.9 *	35 *	28.8 *	39.5 *	[3]

CEF-036-33 [87.2-92.2]	04/07	10/07	04/08	10/08	GCTL
BENZENE	47 *	51 *	53.7 *	69.5 *	[1]
CIS-1,2-DICHLOROETHENE	1.2	0.28 U	0.72 J	0.7 J	[70]
TRICHLOROETHENE	26.4 *	17.5 *	16.5 *	14.6 *	[3]

CEF-036-37D [87.0-92.0]	04/07	10/07	04/08	10/08
	ND	ND	ND	ND

LEGEND

- Long Term Monitoring Well
- Aviation Fuel Piping
- Storm Sewer
- Groundwater Flow Arrow
- Hot-Spot No. 1 (Intermediate Depth)
- Hot-Spot No. 2 (Deep Depth)
- Hot-Spot No. 3 (Shallow/Intermediate Depth)
- Radius of Influence for Air Sparge Wells at this level

* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface

NOTES:
1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.

150 0 150 Feet

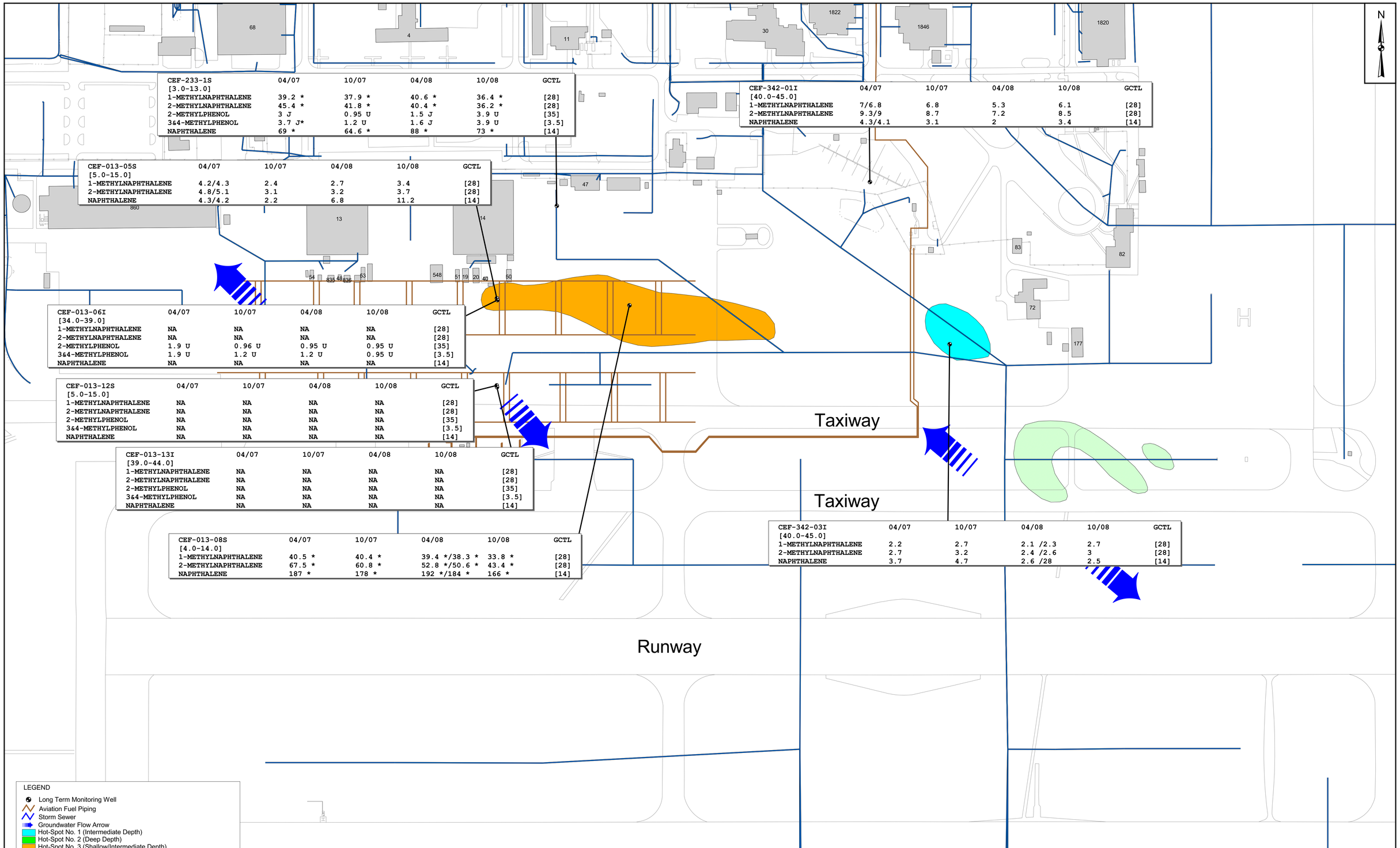
site-3637_20091013.apr
13Oct09 MJJ 04-Deep Volatiles Layout

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
	DATE
SCALE	
AS NOTED	

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN DEEP GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 8-18	0



CEF-233-1S [3.0-13.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	39.2 *	37.9 *	40.6 *	36.4 *	[28]
2-METHYLNAPHTHALENE	45.4 *	41.8 *	40.4 *	36.2 *	[28]
2-METHYLPHENOL	3 J	0.95 U	1.5 J	3.9 U	[35]
3&4-METHYLPHENOL	3.7 J*	1.2 U	1.6 J	3.9 U	[3.5]
NAPHTHALENE	69 *	64.6 *	88 *	73 *	[14]

CEF-342-01I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	7/6.8	6.8	5.3	6.1	[28]
2-METHYLNAPHTHALENE	9.3/9	8.7	7.2	8.5	[28]
NAPHTHALENE	4.3/4.1	3.1	2	3.4	[14]

CEF-013-05S [5.0-15.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	4.2/4.3	2.4	2.7	3.4	[28]
2-METHYLNAPHTHALENE	4.8/5.1	3.1	3.2	3.7	[28]
NAPHTHALENE	4.3/4.2	2.2	6.8	11.2	[14]

CEF-013-06I [34.0-39.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLPHENOL	1.9 U	0.96 U	0.95 U	0.95 U	[35]
3&4-METHYLPHENOL	1.9 U	1.2 U	1.2 U	0.95 U	[3.5]
NAPHTHALENE	NA	NA	NA	NA	[14]

CEF-013-12S [5.0-15.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLPHENOL	NA	NA	NA	NA	[35]
3&4-METHYLPHENOL	NA	NA	NA	NA	[3.5]
NAPHTHALENE	NA	NA	NA	NA	[14]

CEF-013-13I [39.0-44.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLNAPHTHALENE	NA	NA	NA	NA	[28]
2-METHYLPHENOL	NA	NA	NA	NA	[35]
3&4-METHYLPHENOL	NA	NA	NA	NA	[3.5]
NAPHTHALENE	NA	NA	NA	NA	[14]

CEF-013-08S [4.0-14.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	40.5 *	40.4 *	39.4 */38.3 *	33.8 *	[28]
2-METHYLNAPHTHALENE	67.5 *	60.8 *	52.8 */50.6 *	43.4 *	[28]
NAPHTHALENE	187 *	178 *	192 */184 *	166 *	[14]

CEF-342-03I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
1-METHYLNAPHTHALENE	2.2	2.7	2.1 /2.3	2.7	[28]
2-METHYLNAPHTHALENE	2.7	3.2	2.4 /2.6	3	[28]
NAPHTHALENE	3.7	4.7	2.6 /28	2.5	[14]

LEGEND

- Long Term Monitoring Well
- Aviation Fuel Piping
- Storm Sewer
- Groundwater Flow Arrow
- Hot-Spot No. 1 (Intermediate Depth)
- Hot-Spot No. 2 (Deep Depth)
- Hot-Spot No. 3 (Shallow/Intermediate Depth)
- Radius of Influence for Air Sparge Wells at this level

* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface

NOTES:
1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.

150 0 150 Feet

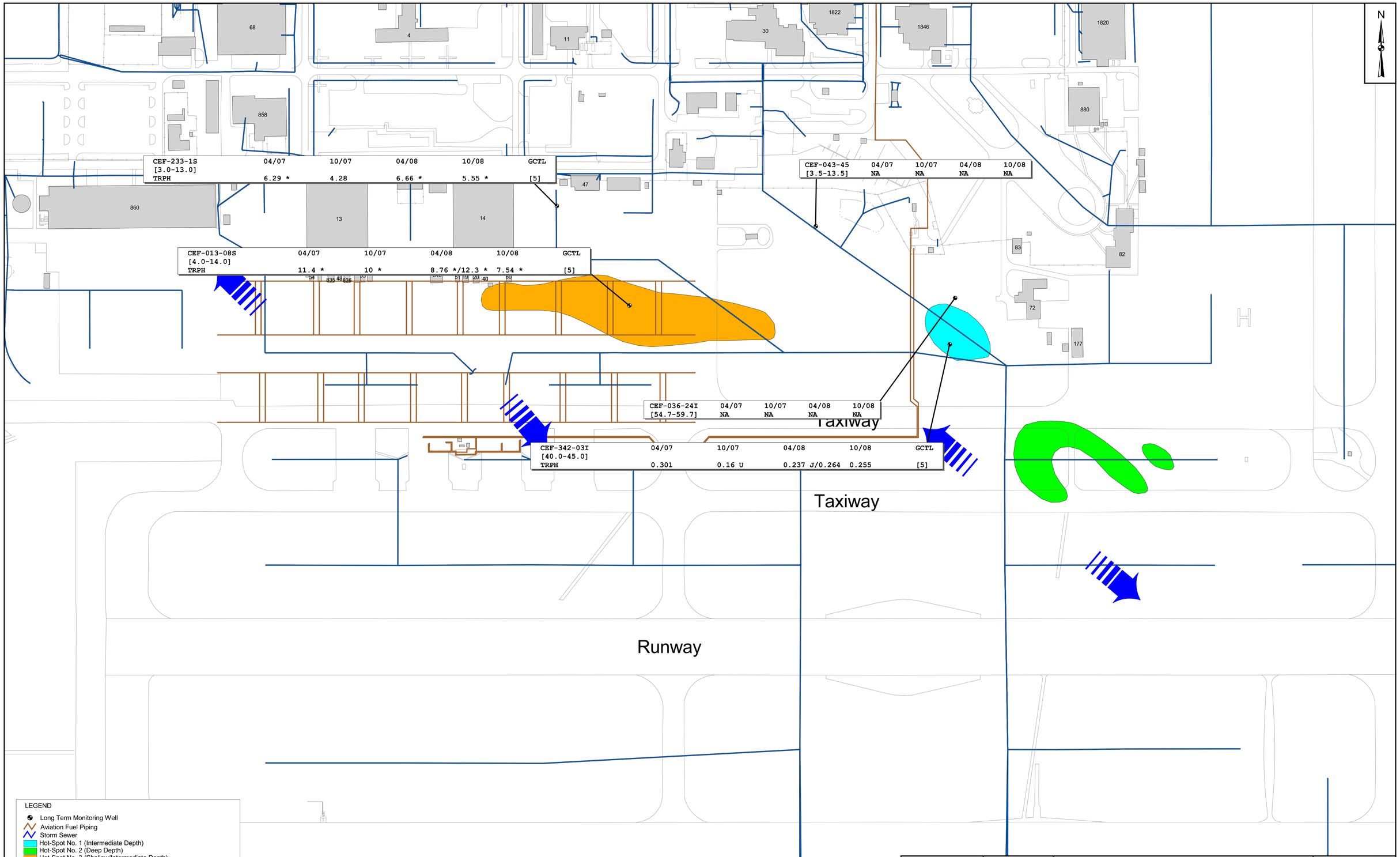
site-3637_20091013.apr
13Oct09 MJJ 05-Shallow Semiolatiles Layout

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
	DATE
SCALE	
AS NOTED	

NAVFAC

SEMIVOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 8-19	0



LEGEND

- Long Term Monitoring Well
- Aviation Fuel Piping
- Storm Sewer
- Hot-Spot No. 1 (Intermediate Depth)
- Hot-Spot No. 2 (Deep Depth)
- Hot-Spot No. 3 (Shallow/Intermediate Depth)

* Concentration exceeds target cleanup goal.
J Estimated concentration
U Not detected at or above method detection limit (associated value)
NA Not analyzed
ND None detected
[4-14] Well screen interval in feet below ground surface

NOTES:
1) All results are in mg/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted 11/98 - 01/99.

150 0 150 Feet

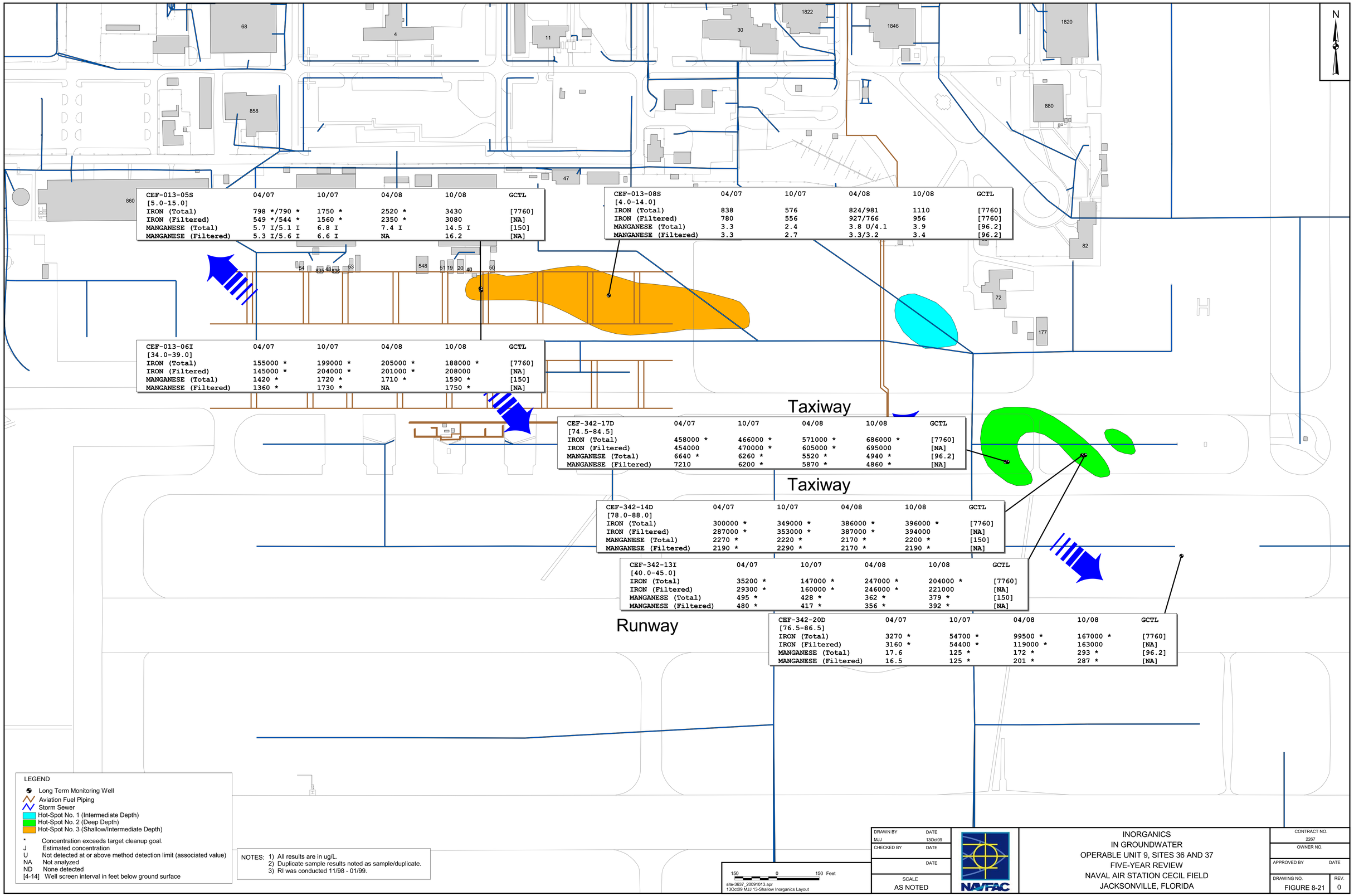
site-3637_20091013.apr
13Oct09 MJJ 09-Shallow TPH Layout

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
	DATE
SCALE	
AS NOTED	

NAVFAC

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
IN GROUNDWATER
OPERABLE UNIT 9, SITES 36 AND 37
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 8-20	0



CEF-013-05S [5.0-15.0]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	798 */790 *	1750 *	2520 *	3430	[7760]
IRON (Filtered)	549 */544 *	1560 *	2350 *	3080	[NA]
MANGANESE (Total)	5.7 I/5.1 I	6.8 I	7.4 I	14.5 I	[150]
MANGANESE (Filtered)	5.3 I/5.6 I	6.6 I	NA	16.2	[NA]

CEF-013-08S [4.0-14.0]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	838	576	824/981	1110	[7760]
IRON (Filtered)	780	556	927/766	956	[7760]
MANGANESE (Total)	3.3	2.4	3.8 U/4.1	3.9	[96.2]
MANGANESE (Filtered)	3.3	2.7	3.3/3.2	3.4	[96.2]

CEF-013-06I [34.0-39.0]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	155000 *	199000 *	205000 *	188000 *	[7760]
IRON (Filtered)	145000 *	204000 *	201000 *	208000	[NA]
MANGANESE (Total)	1420 *	1720 *	1710 *	1590 *	[150]
MANGANESE (Filtered)	1360 *	1730 *	NA	1750 *	[NA]

CEF-342-17D [74.5-84.5]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	458000 *	466000 *	571000 *	686000 *	[7760]
IRON (Filtered)	454000	470000 *	605000 *	695000	[NA]
MANGANESE (Total)	6640 *	6260 *	5520 *	4940 *	[96.2]
MANGANESE (Filtered)	7210	6200 *	5870 *	4860 *	[NA]

CEF-342-14D [78.0-88.0]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	300000 *	349000 *	386000 *	396000 *	[7760]
IRON (Filtered)	287000 *	353000 *	387000 *	394000	[NA]
MANGANESE (Total)	2270 *	2220 *	2170 *	2200 *	[150]
MANGANESE (Filtered)	2190 *	2290 *	2170 *	2190 *	[NA]

CEF-342-13I [40.0-45.0]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	35200 *	147000 *	247000 *	204000 *	[7760]
IRON (Filtered)	29300 *	160000 *	246000 *	221000	[NA]
MANGANESE (Total)	495 *	428 *	362 *	379 *	[150]
MANGANESE (Filtered)	480 *	417 *	356 *	392 *	[NA]

CEF-342-20D [76.5-86.5]	04/07	10/07	04/08	10/08	GCTL
IRON (Total)	3270 *	54700 *	99500 *	167000 *	[7760]
IRON (Filtered)	3160 *	54400 *	119000 *	163000	[NA]
MANGANESE (Total)	17.6	125 *	172 *	293 *	[96.2]
MANGANESE (Filtered)	16.5	125 *	201 *	287 *	[NA]

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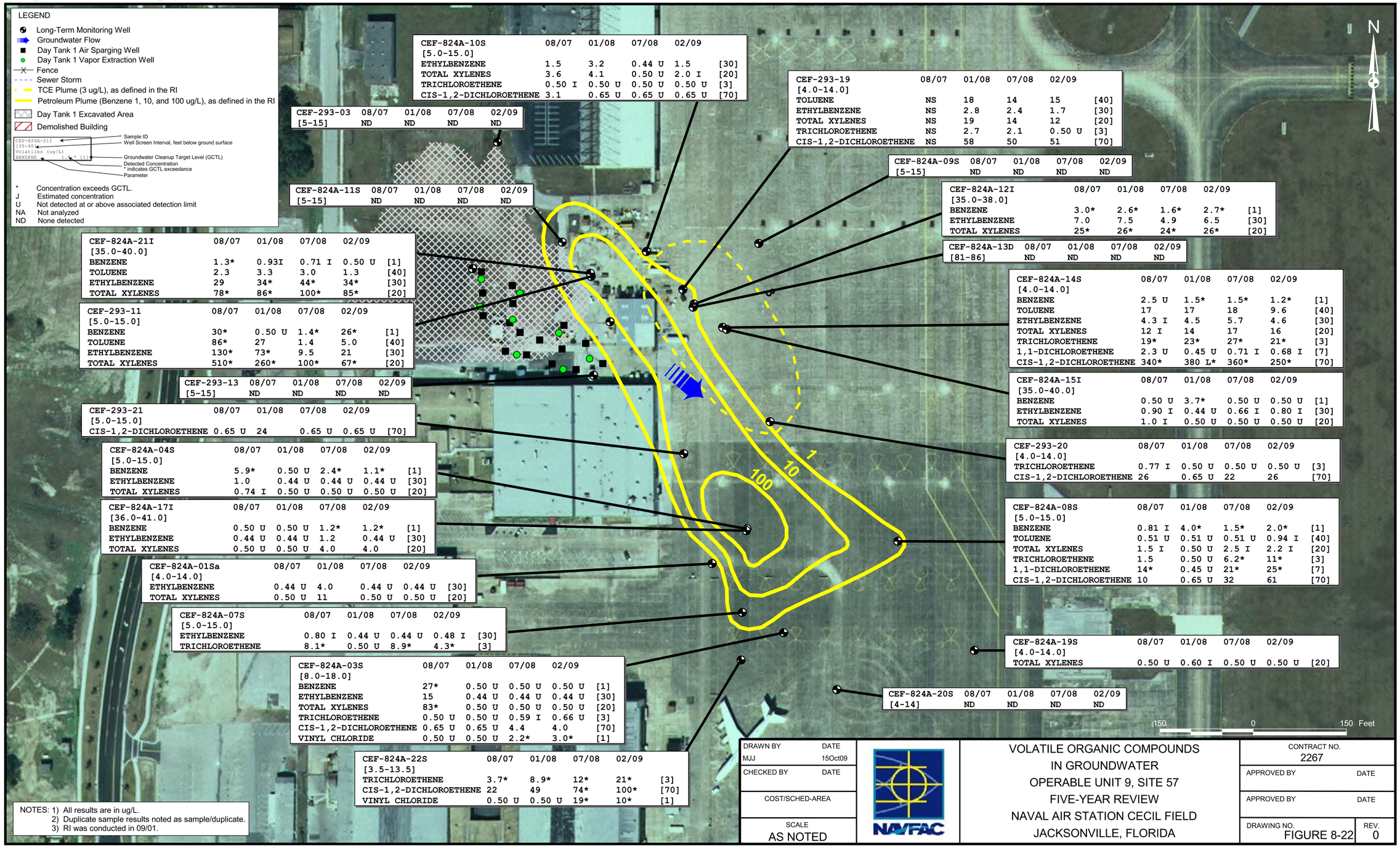

CEF-824A-10S [5.0-15.0]	08/07	01/08	07/08	02/09	
ETHYLBENZENE	1.5	3.2	0.44 U	1.5	[30]
TOTAL XYLENES	3.6	4.1	0.50 U	2.0 I	[20]
TRICHLOROETHENE	0.50 I	0.50 U	0.50 U	0.50 U	[3]
CIS-1,2-DICHLOROETHENE	3.1	0.65 U	0.65 U	0.65 U	[70]

CEF-293-03 [5-15]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

CEF-824A-11S [5-15]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

CEF-824A-21I [35.0-40.0]	08/07	01/08	07/08	02/09	
BENZENE	1.3*	0.93I	0.71 I	0.50 U	[1]
TOLUENE	2.3	3.3	3.0	1.3	[40]
ETHYLBENZENE	29	34*	44*	34*	[30]
TOTAL XYLENES	78*	86*	100*	85*	[20]

CEF-293-11 [5.0-15.0]	08/07	01/08	07/08	02/09	
BENZENE	30*	0.50 U	1.4*	26*	[1]
TOLUENE	86*	27	1.4	5.0	[40]
ETHYLBENZENE	130*	73*	9.5	21	[30]
TOTAL XYLENES	510*	260*	100*	67*	[20]

CEF-293-13 [5-15]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

CEF-293-21 [5.0-15.0]	08/07	01/08	07/08	02/09	
CIS-1,2-DICHLOROETHENE	0.65 U	24	0.65 U	0.65 U	[70]

CEF-824A-04S [5.0-15.0]	08/07	01/08	07/08	02/09	
BENZENE	5.9*	0.50 U	2.4*	1.1*	[1]
ETHYLBENZENE	1.0	0.44 U	0.44 U	0.44 U	[30]
TOTAL XYLENES	0.74 I	0.50 U	0.50 U	0.50 U	[20]

CEF-824A-17I [36.0-41.0]	08/07	01/08	07/08	02/09	
BENZENE	0.50 U	0.50 U	1.2*	1.2*	[1]
ETHYLBENZENE	0.44 U	0.44 U	1.2	0.44 U	[30]
TOTAL XYLENES	0.50 U	0.50 U	4.0	4.0	[20]

CEF-824A-01Sa [4.0-14.0]	08/07	01/08	07/08	02/09	
ETHYLBENZENE	0.44 U	4.0	0.44 U	0.44 U	[30]
TOTAL XYLENES	0.50 U	11	0.50 U	0.50 U	[20]

CEF-824A-07S [5.0-15.0]	08/07	01/08	07/08	02/09	
ETHYLBENZENE	0.80 I	0.44 U	0.44 U	0.48 I	[30]
TRICHLOROETHENE	8.1*	0.50 U	8.9*	4.3*	[3]

CEF-824A-03S [8.0-18.0]	08/07	01/08	07/08	02/09	
BENZENE	27*	0.50 U	0.50 U	0.50 U	[1]
ETHYLBENZENE	15	0.44 U	0.44 U	0.44 U	[30]
TOTAL XYLENES	83*	0.50 U	0.50 U	0.50 U	[20]
TRICHLOROETHENE	0.50 U	0.50 U	0.59 I	0.66 U	[3]
CIS-1,2-DICHLOROETHENE	0.65 U	0.65 U	4.4	4.0	[70]
VINYL CHLORIDE	0.50 U	0.50 U	2.2*	3.0*	[1]

CEF-824A-22S [3.5-13.5]	08/07	01/08	07/08	02/09	
TRICHLOROETHENE	3.7*	8.9*	12*	21*	[3]
CIS-1,2-DICHLOROETHENE	22	49	74*	100*	[70]
VINYL CHLORIDE	0.50 U	0.50 U	19*	10*	[1]

CEF-293-19 [4.0-14.0]	08/07	01/08	07/08	02/09	
TOLUENE	NS	18	14	15	[40]
ETHYLBENZENE	NS	2.8	2.4	1.7	[30]
TOTAL XYLENES	NS	19	14	12	[20]
TRICHLOROETHENE	NS	2.7	2.1	0.50 U	[3]
CIS-1,2-DICHLOROETHENE	NS	58	50	51	[70]

CEF-824A-09S [5-15]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

CEF-824A-12I [35.0-38.0]	08/07	01/08	07/08	02/09	
BENZENE	3.0*	2.6*	1.6*	2.7*	[1]
ETHYLBENZENE	7.0	7.5	4.9	6.5	[30]
TOTAL XYLENES	25*	26*	24*	26*	[20]

CEF-824A-13D [81-86]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

CEF-824A-14S [4.0-14.0]	08/07	01/08	07/08	02/09	
BENZENE	2.5 U	1.5*	1.5*	1.2*	[1]
TOLUENE	17	17	18	9.6	[40]
ETHYLBENZENE	4.3 I	4.5	5.7	4.6	[30]
TOTAL XYLENES	12 I	14	17	16	[20]
TRICHLOROETHENE	19*	23*	27*	21*	[3]
1,1-DICHLOROETHENE	2.3 U	0.45 U	0.71 I	0.68 I	[7]
CIS-1,2-DICHLOROETHENE	340*	380 L*	360*	250*	[70]

CEF-824A-15I [35.0-40.0]	08/07	01/08	07/08	02/09	
BENZENE	0.50 U	3.7*	0.50 U	0.50 U	[1]
ETHYLBENZENE	0.90 I	0.44 U	0.66 I	0.80 I	[30]
TOTAL XYLENES	1.0 I	0.50 U	0.50 U	0.50 U	[20]

CEF-293-20 [4.0-14.0]	08/07	01/08	07/08	02/09	
TRICHLOROETHENE	0.77 I	0.50 U	0.50 U	0.50 U	[3]
CIS-1,2-DICHLOROETHENE	26	0.65 U	22	26	[70]

CEF-824A-08S [5.0-15.0]	08/07	01/08	07/08	02/09	
BENZENE	0.81 I	4.0*	1.5*	2.0*	[1]
TOLUENE	0.51 U	0.51 U	0.51 U	0.94 I	[40]
TOTAL XYLENES	1.5 I	0.50 U	2.5 I	2.2 I	[20]
TRICHLOROETHENE	1.5	0.50 U	6.2*	11*	[3]
1,1-DICHLOROETHENE	14*	0.45 U	21*	25*	[7]
CIS-1,2-DICHLOROETHENE	10	0.65 U	32	61	[70]

CEF-824A-19S [4.0-14.0]	08/07	01/08	07/08	02/09	
TOTAL XYLENES	0.50 U	0.60 I	0.50 U	0.50 U	[20]

CEF-824A-20S [4-14]	08/07	01/08	07/08	02/09
	ND	ND	ND	ND

NOTES: 1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted in 09/01.

DRAWN BY	DATE
MJJ	15Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
OPERABLE UNIT 9, SITE 57
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-22	REV. 0

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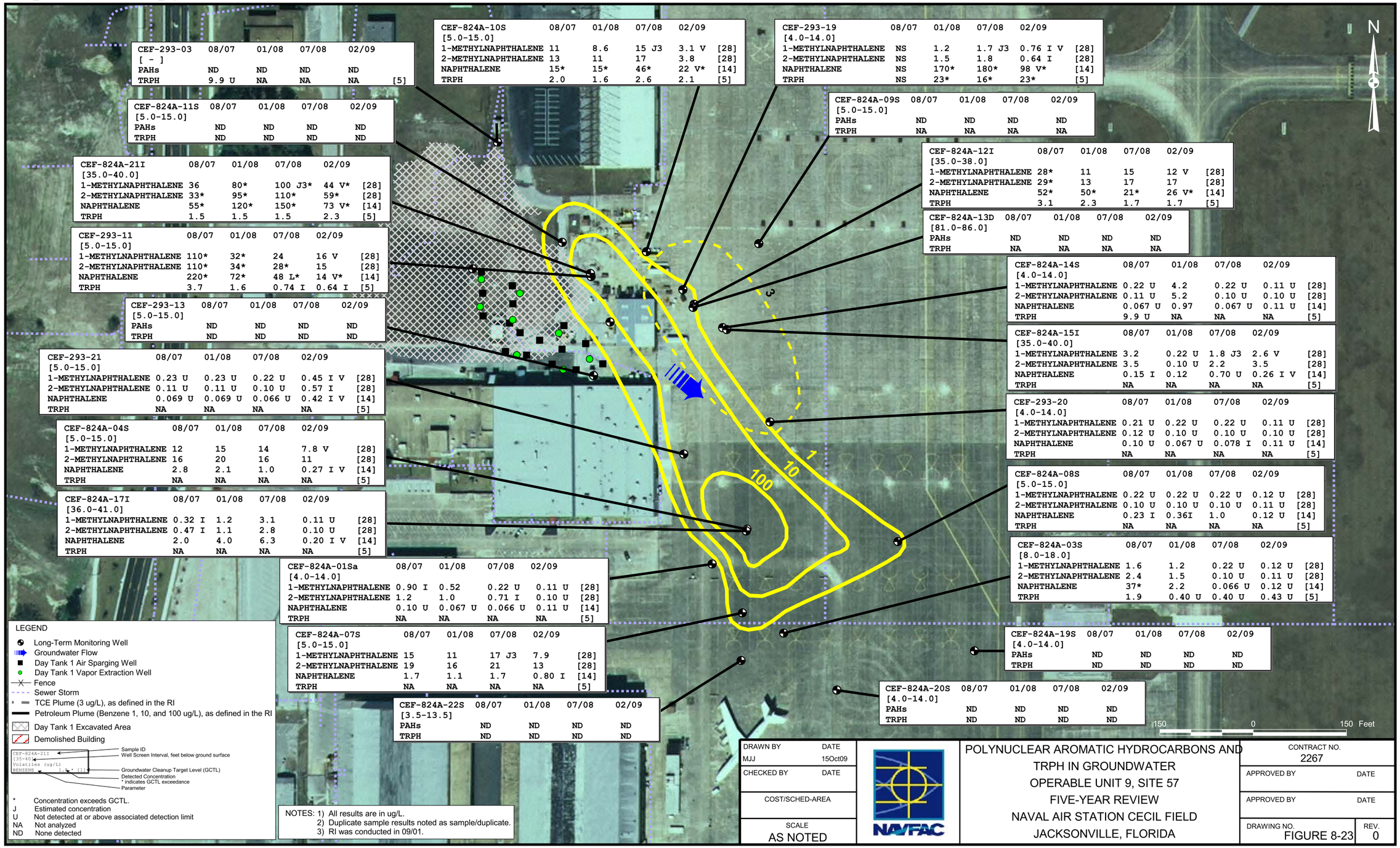

CEF-293-03	08/07	01/08	07/08	02/09	
[-]					
PAHs	ND	ND	ND	ND	
TRPH	9.9 U	NA	NA	NA	[5]

CEF-824A-11S	08/07	01/08	07/08	02/09
[5.0-15.0]				
PAHs	ND	ND	ND	ND
TRPH	ND	ND	ND	ND

CEF-824A-21I	08/07	01/08	07/08	02/09	
[35.0-40.0]					
1-METHYLNAPHTHALENE	36	80*	100 J3*	44 V*	[28]
2-METHYLNAPHTHALENE	33*	95*	110*	59*	[28]
NAPHTHALENE	55*	120*	150*	73 V*	[14]
TRPH	1.5	1.5	1.5	2.3	[5]

CEF-293-11	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	110*	32*	24	16 V	[28]
2-METHYLNAPHTHALENE	110*	34*	28*	15	[28]
NAPHTHALENE	220*	72*	48 L*	14 V*	[14]
TRPH	3.7	1.6	0.74 I	0.64 I	[5]

CEF-293-13	08/07	01/08	07/08	02/09
[5.0-15.0]				
PAHs	ND	ND	ND	ND
TRPH	ND	ND	ND	ND

CEF-293-21	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	0.23 U	0.23 U	0.22 U	0.45 I V	[28]
2-METHYLNAPHTHALENE	0.11 U	0.11 U	0.10 U	0.57 I	[28]
NAPHTHALENE	0.069 U	0.069 U	0.066 U	0.42 I V	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-04S	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	12	15	14	7.8 V	[28]
2-METHYLNAPHTHALENE	16	20	16	11	[28]
NAPHTHALENE	2.8	2.1	1.0	0.27 I V	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-17I	08/07	01/08	07/08	02/09	
[36.0-41.0]					
1-METHYLNAPHTHALENE	0.32 I	1.2	3.1	0.11 U	[28]
2-METHYLNAPHTHALENE	0.47 I	1.1	2.8	0.10 U	[28]
NAPHTHALENE	2.0	4.0	6.3	0.20 I V	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-01Sa	08/07	01/08	07/08	02/09	
[4.0-14.0]					
1-METHYLNAPHTHALENE	0.90 I	0.52	0.22 U	0.11 U	[28]
2-METHYLNAPHTHALENE	1.2	1.0	0.71 I	0.10 U	[28]
NAPHTHALENE	0.10 U	0.067 U	0.066 U	0.11 U	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-07S	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	15	11	17 J3	7.9	[28]
2-METHYLNAPHTHALENE	19	16	21	13	[28]
NAPHTHALENE	1.7	1.1	1.7	0.80 I	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-22S	08/07	01/08	07/08	02/09
[3.5-13.5]				
PAHs	ND	ND	ND	ND
TRPH	ND	ND	ND	ND

CEF-824A-10S	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	11	8.6	15 J3	3.1 V	[28]
2-METHYLNAPHTHALENE	13	11	17	3.8	[28]
NAPHTHALENE	15*	15*	46*	22 V*	[14]
TRPH	2.0	1.6	2.6	2.1	[5]

CEF-293-19	08/07	01/08	07/08	02/09	
[4.0-14.0]					
1-METHYLNAPHTHALENE	NS	1.2	1.7 J3	0.76 I V	[28]
2-METHYLNAPHTHALENE	NS	1.5	1.8	0.64 I	[28]
NAPHTHALENE	NS	170*	180*	98 V*	[14]
TRPH	NS	23*	16*	23*	[5]

CEF-824A-09S	08/07	01/08	07/08	02/09
[5.0-15.0]				
PAHs	ND	ND	ND	ND
TRPH	NA	NA	NA	NA

CEF-824A-12I	08/07	01/08	07/08	02/09	
[35.0-38.0]					
1-METHYLNAPHTHALENE	28*	11	15	12 V	[28]
2-METHYLNAPHTHALENE	29*	13	17	17	[28]
NAPHTHALENE	52*	50*	21*	26 V*	[14]
TRPH	3.1	2.3	1.7	1.7	[5]

CEF-824A-13D	08/07	01/08	07/08	02/09
[81.0-86.0]				
PAHs	ND	ND	ND	ND
TRPH	NA	NA	NA	NA

CEF-824A-14S	08/07	01/08	07/08	02/09	
[4.0-14.0]					
1-METHYLNAPHTHALENE	0.22 U	4.2	0.22 U	0.11 U	[28]
2-METHYLNAPHTHALENE	0.11 U	5.2	0.10 U	0.10 U	[28]
NAPHTHALENE	0.067 U	0.97	0.067 U	0.11 U	[14]
TRPH	9.9 U	NA	NA	NA	[5]

CEF-824A-15I	08/07	01/08	07/08	02/09	
[35.0-40.0]					
1-METHYLNAPHTHALENE	3.2	0.22 U	1.8 J3	2.6 V	[28]
2-METHYLNAPHTHALENE	3.5	0.10 U	2.2	3.5	[28]
NAPHTHALENE	0.15 I	0.12	0.70 U	0.26 I V	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-293-20	08/07	01/08	07/08	02/09	
[4.0-14.0]					
1-METHYLNAPHTHALENE	0.21 U	0.22 U	0.22 U	0.11 U	[28]
2-METHYLNAPHTHALENE	0.12 U	0.10 U	0.10 U	0.10 U	[28]
NAPHTHALENE	0.10 U	0.067 U	0.078 I	0.11 U	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-08S	08/07	01/08	07/08	02/09	
[5.0-15.0]					
1-METHYLNAPHTHALENE	0.22 U	0.22 U	0.22 U	0.12 U	[28]
2-METHYLNAPHTHALENE	0.10 U	0.10 U	0.10 U	0.11 U	[28]
NAPHTHALENE	0.23 I	0.36I	1.0	0.12 U	[14]
TRPH	NA	NA	NA	NA	[5]

CEF-824A-03S	08/07	01/08	07/08	02/09	
[8.0-18.0]					
1-METHYLNAPHTHALENE	1.6	1.2	0.22 U	0.12 U	[28]
2-METHYLNAPHTHALENE	2.4	1.5	0.10 U	0.11 U	[28]
NAPHTHALENE	37*	2.2	0.066 U	0.12 U	[14]
TRPH	1.9	0.40 U	0.40 U	0.43 U	[5]

CEF-824A-19S	08/07	01/08	07/08	02/09
[4.0-14.0]				
PAHs	ND	ND	ND	ND
TRPH	ND	ND	ND	ND

CEF-824A-20S	08/07	01/08	07/08	02/09
[4.0-14.0]				
PAHs	ND	ND	ND	ND
TRPH	ND	ND	ND	ND

LEGEND

- Long-Term Monitoring Well
- Groundwater Flow
- Day Tank 1 Air Sparging Well
- Day Tank 1 Vapor Extraction Well
- Fence
- Sewer Storm
- TCE Plume (3 ug/L), as defined in the RI
- Petroleum Plume (Benzene 1, 10, and 100 ug/L), as defined in the RI
- Day Tank 1 Excavated Area
- Demolished Building

CEF-824A-21I [35-40] Volatiles (ug/L) BENZENE 1.6 * [1]

Sample ID
Well Screen Interval, feet below ground surface
Groundwater Cleanup Target Level (GCTL)
Detected Concentration
* indicates GCTL exceedance
Parameter

* Concentration exceeds GCTL.
J Estimated concentration
U Not detected at or above associated detection limit
NA Not analyzed
ND None detected

NOTES: 1) All results are in ug/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted in 09/01.

DRAWN BY	DATE
MJJ	15Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

POLYNUCLEAR AROMATIC HYDROCARBONS AND TRPH IN GROUNDWATER
OPERABLE UNIT 9, SITE 57
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-23	REV. 0

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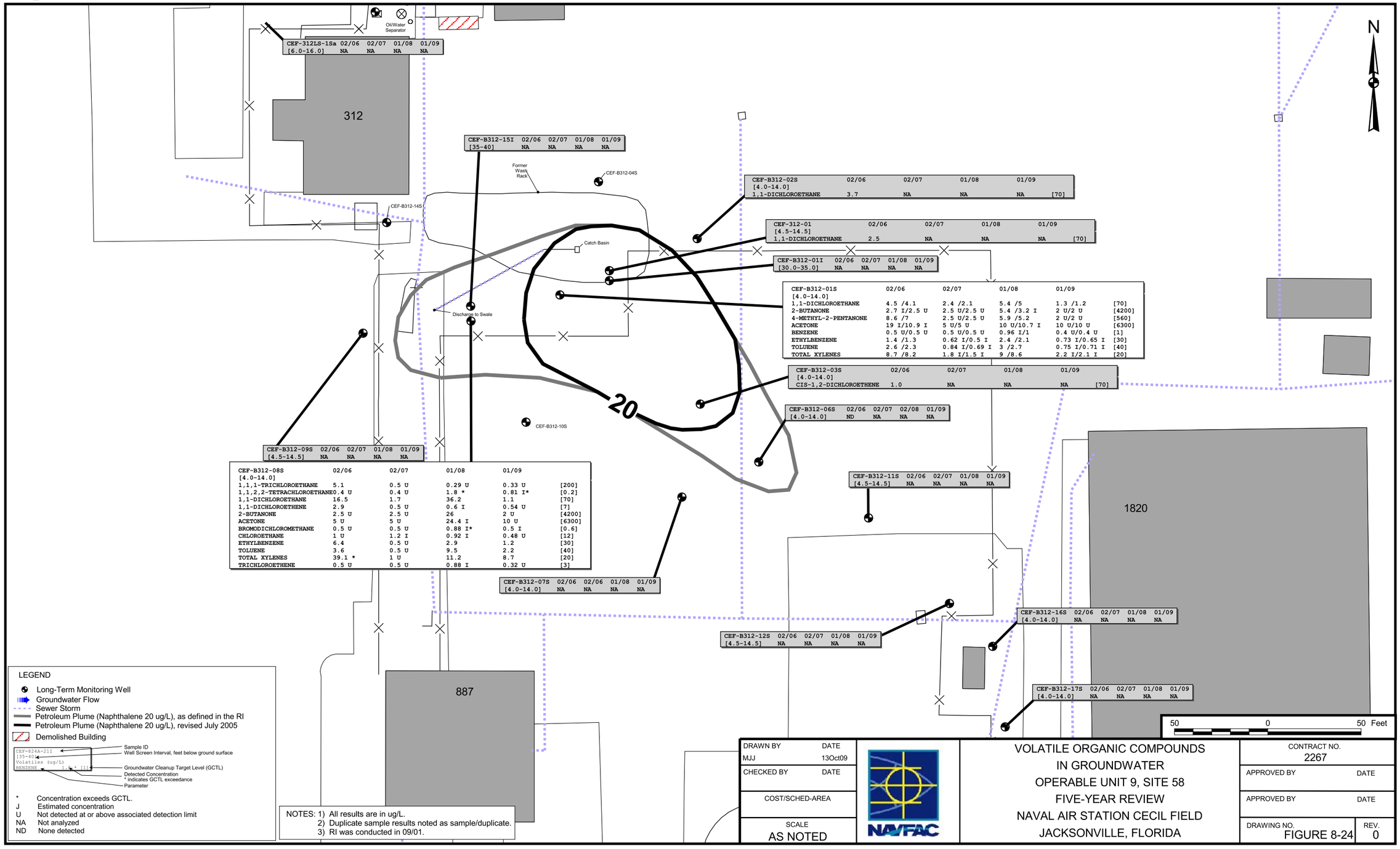

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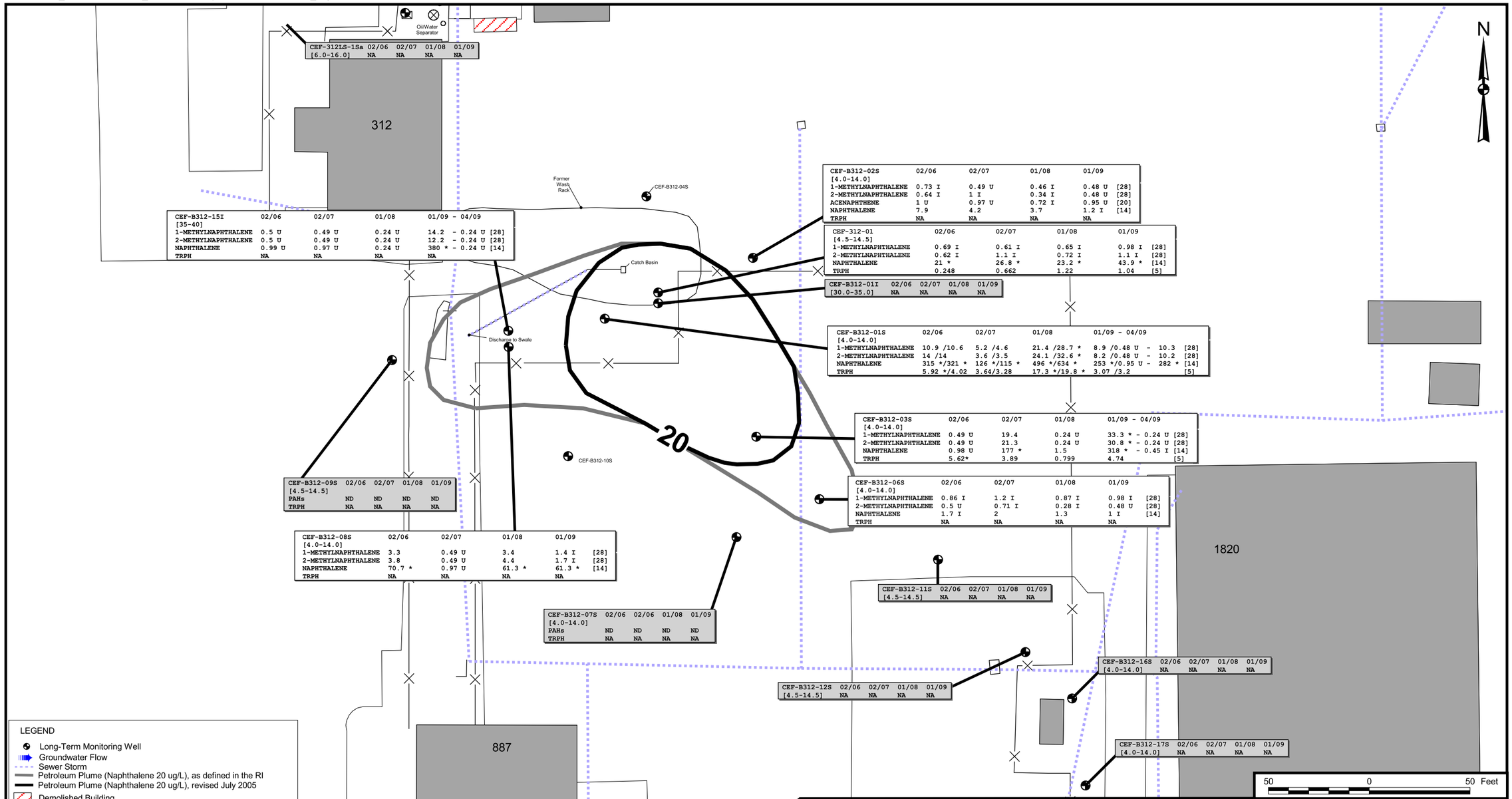


CEF-312LS-1Sa [6.0-16.0]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

CEF-B312-15I [35-40]	02/06	02/07	01/08	01/09 - 04/09
1-METHYLNAPHTHALENE	0.5 U	0.49 U	0.24 U	14.2 - 0.24 U [28]
2-METHYLNAPHTHALENE	0.5 U	0.49 U	0.24 U	12.2 - 0.24 U [28]
NAPHTHALENE	0.99 U	0.97 U	0.24 U	380 * - 0.24 U [14]
TRPH	NA	NA	NA	NA

CEF-B312-02S [4.0-14.0]	02/06	02/07	01/08	01/09
1-METHYLNAPHTHALENE	0.73 I	0.49 U	0.46 I	0.48 U [28]
2-METHYLNAPHTHALENE	0.64 I	1 I	0.34 I	0.48 U [28]
ACENAPHTHENE	1 U	0.97 U	0.72 I	0.95 U [20]
NAPHTHALENE	7.9	4.2	3.7	1.2 I [14]
TRPH	NA	NA	NA	NA

CEF-312-01 [4.5-14.5]	02/06	02/07	01/08	01/09
1-METHYLNAPHTHALENE	0.69 I	0.61 I	0.65 I	0.98 I [28]
2-METHYLNAPHTHALENE	0.62 I	1.1 I	0.72 I	1.1 I [28]
NAPHTHALENE	21 *	26.8 *	23.2 *	43.9 * [14]
TRPH	0.248	0.662	1.22	1.04 [5]

CEF-B312-01I [30.0-35.0]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

CEF-B312-01S [4.0-14.0]	02/06	02/07	01/08	01/09 - 04/09
1-METHYLNAPHTHALENE	10.9 /10.6	5.2 /4.6	21.4 /28.7 *	8.9 /0.48 U - 10.3 [28]
2-METHYLNAPHTHALENE	14 /14	3.6 /3.5	24.1 /32.6 *	8.2 /0.48 U - 10.2 [28]
NAPHTHALENE	315 */321 *	126 */115 *	496 */634 *	253 */0.95 U - 282 * [14]
TRPH	5.92 */4.02	3.64/3.28	17.3 */19.8 *	3.07 /3.2 [5]

CEF-B312-03S [4.0-14.0]	02/06	02/07	01/08	01/09 - 04/09
1-METHYLNAPHTHALENE	0.49 U	19.4	0.24 U	33.3 * - 0.24 U [28]
2-METHYLNAPHTHALENE	0.49 U	21.3	0.24 U	30.8 * - 0.24 U [28]
NAPHTHALENE	0.98 U	177 *	1.5	318 * - 0.45 I [14]
TRPH	5.62*	3.89	0.799	4.74 [5]

CEF-B312-06S [4.0-14.0]	02/06	02/07	01/08	01/09
1-METHYLNAPHTHALENE	0.86 I	1.2 I	0.87 I	0.98 I [28]
2-METHYLNAPHTHALENE	0.5 U	0.71 I	0.28 I	0.48 U [28]
NAPHTHALENE	1.7 I	2	1.3	1 I [14]
TRPH	NA	NA	NA	NA

CEF-B312-09S [4.5-14.5]	02/06	02/07	01/08	01/09
PAHs	ND	ND	ND	ND
TRPH	NA	NA	NA	NA

CEF-B312-08S [4.0-14.0]	02/06	02/07	01/08	01/09
1-METHYLNAPHTHALENE	3.3	0.49 U	3.4	1.4 I [28]
2-METHYLNAPHTHALENE	3.8	0.49 U	4.4	1.7 I [28]
NAPHTHALENE	70.7 *	0.97 U	61.3 *	61.3 * [14]
TRPH	NA	NA	NA	NA

CEF-B312-07S [4.0-14.0]	02/06	02/06	01/08	01/09
PAHs	ND	ND	ND	ND
TRPH	NA	NA	NA	NA

CEF-B312-11S [4.5-14.5]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

CEF-B312-12S [4.5-14.5]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

CEF-B312-16S [4.0-14.0]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

CEF-B312-17S [4.0-14.0]	02/06	02/07	01/08	01/09
	NA	NA	NA	NA

LEGEND

- Long-Term Monitoring Well
- Groundwater Flow
- Sewer Storm
- Petroleum Plume (Naphthalene 20 ug/L), as defined in the RI
- Petroleum Plume (Naphthalene 20 ug/L), revised July 2005
- Demolished Building

CEF-824A-21I [35-40] Volatiles (ug/L) BENZENE 1.4 * [1]

Sample ID; Well Screen Interval, feet below ground surface; Groundwater Cleanup Target Level (GCTL); Detected Concentration; * indicates GCTL exceedance; Parameter

* Concentration exceeds GCTL.
J Estimated concentration
U Not detected at or above associated detection limit
NA Not analyzed
ND None detected

NOTES: 1) All results are in ug/L, except TRPH which are in are in mg/L.
2) Duplicate sample results noted as sample/duplicate.
3) RI was conducted in 09/01.
4) CEF-B312-01S, -03S, and -15I resampled April 02, 2009 to confirm January 2009 sampling results.

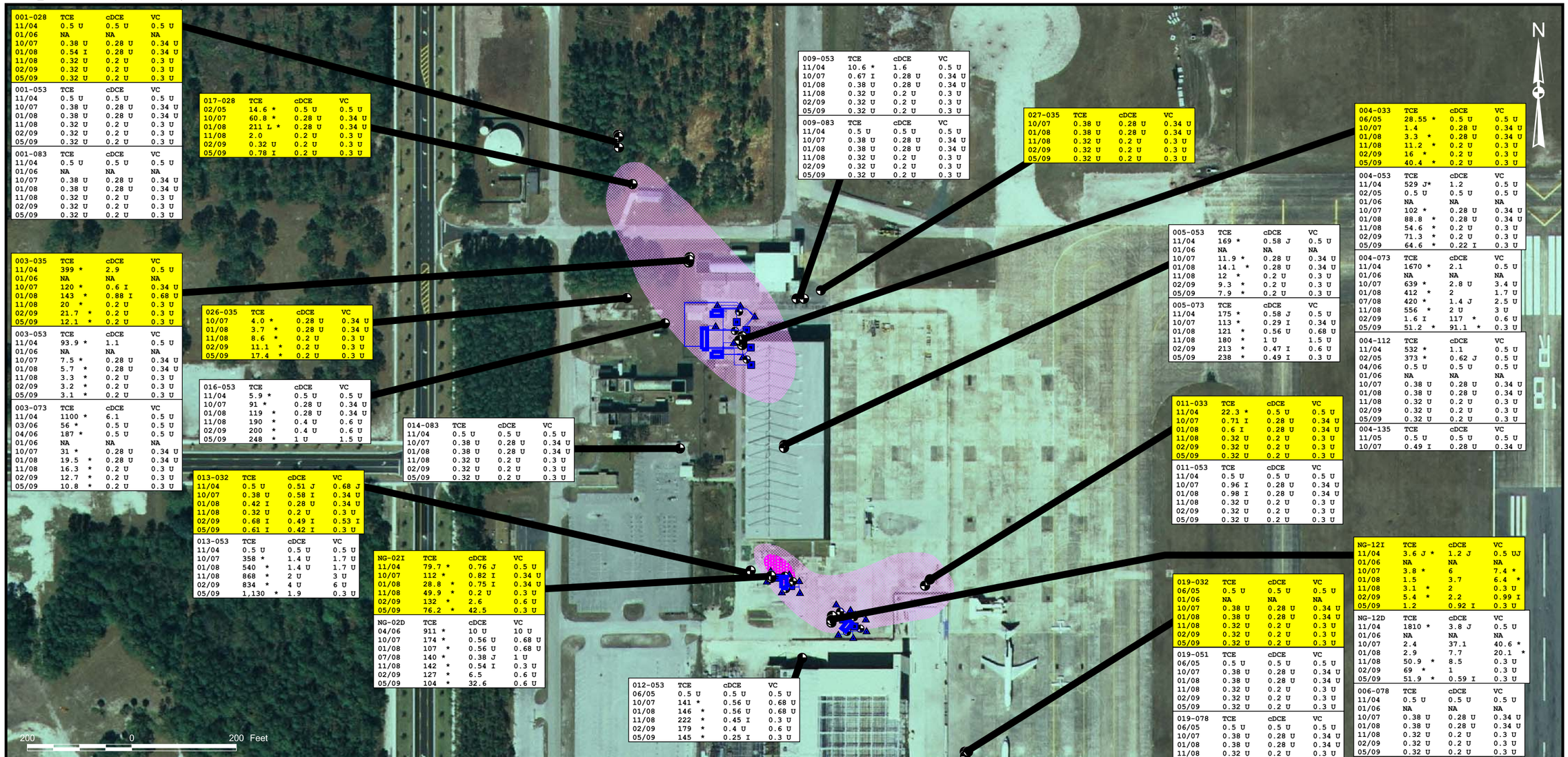
DRAWN BY	DATE
MJJ	15Oct04
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

PAHs AND TRPH
IN GROUNDWATER
OPERABLE UNIT 9, SITE 58
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 8-25
REV. 0

site-59_20091013-ltm.apr 20Jan10 Layout08



001-028	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.54 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

017-028	TCE	cDCE	VC
02/05	14.6 *	0.5 U	0.5 U
10/07	60.8 *	0.28 U	0.34 U
01/08	211 L *	0.28 U	0.34 U
11/08	2.0	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.78 I	0.2 U	0.3 U

003-035	TCE	cDCE	VC
11/04	399 *	2.9	0.5 U
01/06	NA	NA	NA
10/07	120 *	0.6 I	0.34 U
01/08	143 *	0.88 I	0.68 U
11/08	20 *	0.2 U	0.3 U
02/09	21.7 *	0.2 U	0.3 U
05/09	12.1 *	0.2 U	0.3 U

003-053	TCE	cDCE	VC
11/04	93.9 *	1.1	0.5 U
01/06	NA	NA	NA
10/07	7.5 *	0.28 U	0.34 U
01/08	5.7 *	0.28 U	0.34 U
11/08	3.3 *	0.2 U	0.3 U
02/09	3.2 *	0.2 U	0.3 U
05/09	3.1 *	0.2 U	0.3 U

003-073	TCE	cDCE	VC
11/04	1100 *	6.1	0.5 U
03/06	56 *	0.5 U	0.5 U
04/06	187 *	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	31 *	0.28 U	0.34 U
01/08	19.5 *	0.28 U	0.34 U
11/08	16.3 *	0.2 U	0.3 U
02/09	12.7 *	0.2 U	0.3 U
05/09	10.8 *	0.2 U	0.3 U

026-035	TCE	cDCE	VC
10/07	4.0 *	0.28 U	0.34 U
01/08	3.7 *	0.28 U	0.34 U
11/08	8.6 *	0.2 U	0.3 U
02/09	11.1 *	0.2 U	0.3 U
05/09	17.4 *	0.2 U	0.3 U

016-053	TCE	cDCE	VC
11/04	5.9 *	0.5 U	0.5 U
10/07	91 *	0.28 U	0.34 U
01/08	119 *	0.28 U	0.34 U
11/08	190 *	0.4 U	0.6 U
02/09	200 *	0.4 U	0.6 U
05/09	248 *	1 U	1.5 U

014-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

013-032	TCE	cDCE	VC
11/04	0.5 U	0.51 J	0.68 J
10/07	0.38 U	0.58 I	0.34 U
01/08	0.42 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.68 I	0.49 I	0.53 I
05/09	0.61 I	0.42 I	0.3 U

013-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	358 *	1.4 U	1.7 U
01/08	540 *	1.4 U	1.7 U
11/08	868 *	2 U	3 U
02/09	834 *	4 U	6 U
05/09	1,130 *	1.9	0.3 U

NG-02I	TCE	cDCE	VC
11/04	79.7 *	0.76 J	0.5 U
10/07	112 *	0.82 I	0.34 U
01/08	28.8 *	0.75 I	0.34 U
11/08	49.9 *	0.2 U	0.3 U
02/09	132 *	2.6	0.6 U
05/09	76.2 *	42.5	0.3 U

NG-02D	TCE	cDCE	VC
04/06	911 *	10 U	10 U
10/07	174 *	0.56 U	0.68 U
01/08	107 *	0.56 U	0.68 U
07/08	140 *	0.38 J	1 U
11/08	142 *	0.54 I	0.3 U
02/09	127 *	6.5	0.6 U
05/09	104 *	32.6	0.6 U

012-053	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	141 *	0.56 U	0.68 U
01/08	146 *	0.56 U	0.68 U
11/08	222 *	0.45 I	0.3 U
02/09	179 *	0.4 U	0.6 U
05/09	145 *	0.25 I	0.3 U

009-053	TCE	cDCE	VC
11/04	10.6 *	1.6	0.5 U
10/07	0.67 I	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

009-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

027-035	TCE	cDCE	VC
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-033	TCE	cDCE	VC
06/05	28.55 *	0.5 U	0.5 U
10/07	1.4	0.28 U	0.34 U
01/08	3.3 *	0.28 U	0.34 U
11/08	11.2 *	0.2 U	0.3 U
02/09	16 *	0.2 U	0.3 U
05/09	40.4 *	0.2 U	0.3 U

004-053	TCE	cDCE	VC
11/04	529 J*	1.2	0.5 U
02/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	102 *	0.28 U	0.34 U
01/08	88.8 *	0.28 U	0.34 U
11/08	54.6 *	0.2 U	0.3 U
02/09	71.3 *	0.2 U	0.3 U
05/09	64.6 *	0.22 I	0.3 U

005-053	TCE	cDCE	VC
11/04	169 *	0.58 J	0.5 U
01/06	NA	NA	NA
10/07	11.9 *	0.28 U	0.34 U
01/08	14.1 *	0.28 U	0.34 U
11/08	12 *	0.2 U	0.3 U
02/09	9.3 *	0.2 U	0.3 U
05/09	7.9 *	0.2 U	0.3 U

005-073	TCE	cDCE	VC
11/04	175 *	0.58 J	0.5 U
10/07	113 *	0.29 I	0.34 U
01/08	121 *	0.56 U	0.68 U
11/08	180 *	1 U	1.5 U
02/09	213 *	0.47 I	0.6 U
05/09	238 *	0.49 I	0.3 U

004-073	TCE	cDCE	VC
11/04	1670 *	2.1	0.5 U
01/06	NA	NA	NA
10/07	639 *	2.8 U	3.4 U
01/08	412 *	2	1.7 U
07/08	420 *	1.4 J	2.5 U
11/08	556 *	2 U	3 U
02/09	1.6 I	117 *	0.6 U
05/09	51.2 *	91.1 *	0.3 U

004-112	TCE	cDCE	VC
11/04	532 *	1.1	0.5 U
02/05	373 *	0.62 J	0.5 U
04/06	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-135	TCE	cDCE	VC
11/05	0.5 U	0.5 U	0.5 U
10/07	0.49 I	0.28 U	0.34 U

011-033	TCE	cDCE	VC
11/04	22.3 *	0.5 U	0.5 U
10/07	0.71 I	0.28 U	0.34 U
01/08	0.6 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.96 I	0.28 U	0.34 U
01/08	0.98 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

NG-12I	TCE	cDCE	VC
11/04	3.6 J *	1.2 J	0.5 UJ
01/06	NA	NA	NA
10/07	3.8 *	6	7.4 *
01/08	1.5	3.7	6.4 *
11/08	3.1 *	2	0.3 U
02/09	5.4 *	2.2	0.99 I
05/09	1.2	0.92 I	0.3 U

019-032	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

NG-12D	TCE	cDCE	VC
11/04	1810 *	3.8 J	0.5 U
01/06	NA	NA	NA
10/07	2.4	37.1	40.6 *
01/08	2.9	7.7	20.1 *
11/08	50.9 *	8.5	0.3 U
02/09	69 *	1	0.3 U
05/09	51.9 *	0.59 I	0.3 U

019-051	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-078	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

006-078	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

Legend

- Remediation System
- Monitoring Well (tags highlighted in yellow correspond to monitoring interval)

013-053	TCE	cDCE	VC
02/09	834 *	4 U	6 U

Monitoring Well

Parameter

Detected Concentration (ug/L)
* - indicates GCTL exceedance
J - Estimated concentration
I - Not detected at or above associated detection limit
NA - Not analyzed

Sample Date

Remedial Investigation Plume

- TCE >3 and < 30 ug/L
- TCE >30 and < 300 ug/L
- TCE >300 ug/L

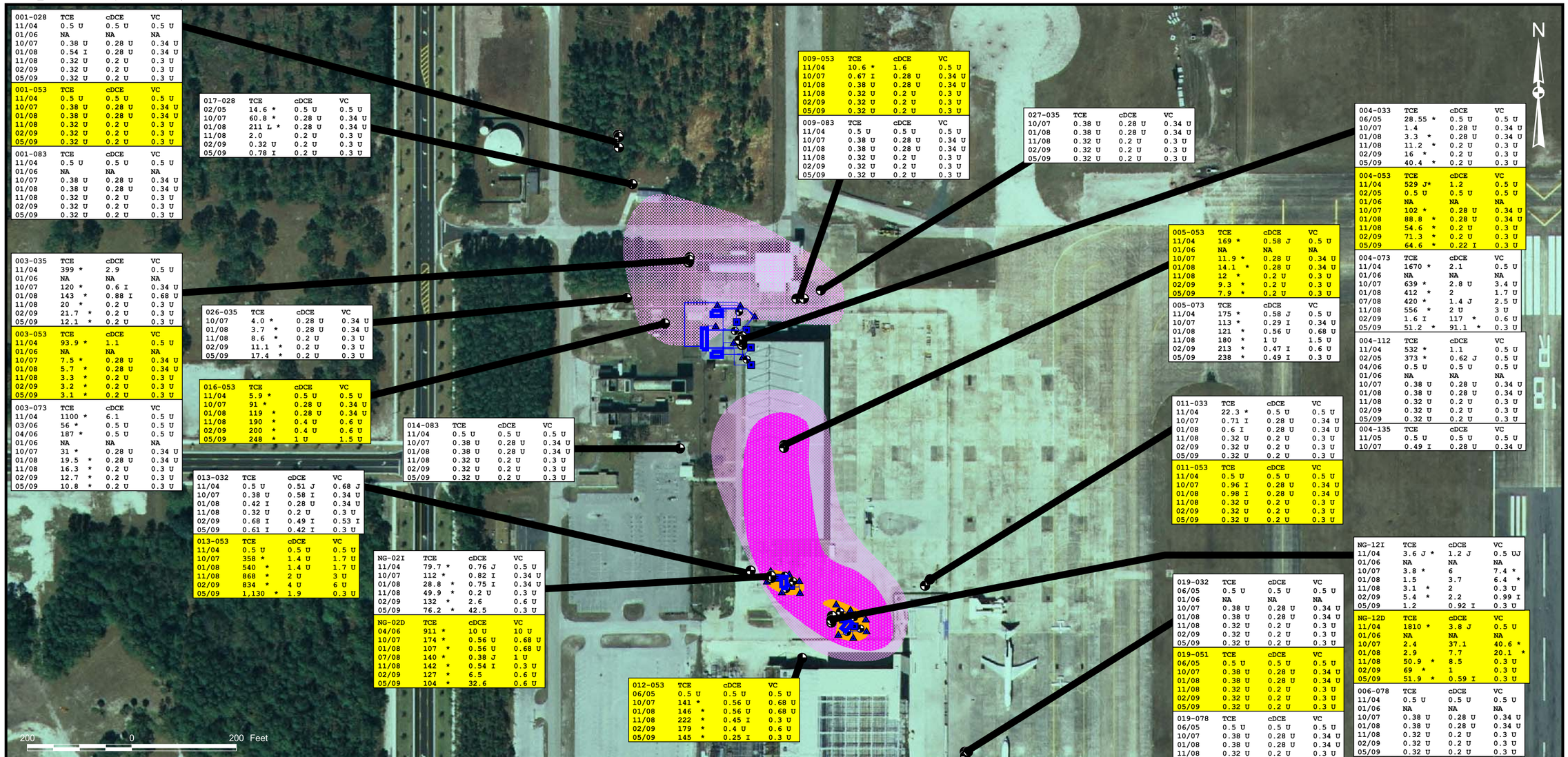
DRAWN BY MJJ	DATE 13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

NAVFAC

VOLATILE ORGANIC COMPOUNDS IN
30-FOOT ZONE
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-26	REV. 0

site-59_20091013-ltm.apr 20Jan10 Layout09



001-028	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.54 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

017-028	TCE	cDCE	VC
02/05	14.6 *	0.5 U	0.5 U
10/07	60.8 *	0.28 U	0.34 U
01/08	211 L *	0.28 U	0.34 U
11/08	2.0	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.78 I	0.2 U	0.3 U

003-035	TCE	cDCE	VC
11/04	399 *	2.9	0.5 U
01/06	NA	NA	NA
10/07	120 *	0.6 I	0.34 U
01/08	143 *	0.88 I	0.68 U
11/08	20 *	0.2 U	0.3 U
02/09	21.7 *	0.2 U	0.3 U
05/09	12.1 *	0.2 U	0.3 U

003-053	TCE	cDCE	VC
11/04	93.9 *	1.1	0.5 U
01/06	NA	NA	NA
10/07	7.5 *	0.28 U	0.34 U
01/08	5.7 *	0.28 U	0.34 U
11/08	3.3 *	0.2 U	0.3 U
02/09	3.2 *	0.2 U	0.3 U
05/09	3.1 *	0.2 U	0.3 U

026-035	TCE	cDCE	VC
10/07	4.0 *	0.28 U	0.34 U
01/08	3.7 *	0.28 U	0.34 U
11/08	8.6 *	0.2 U	0.3 U
02/09	11.1 *	0.2 U	0.3 U
05/09	17.4 *	0.2 U	0.3 U

016-053	TCE	cDCE	VC
11/04	5.9 *	0.5 U	0.5 U
10/07	91 *	0.28 U	0.34 U
01/08	119 *	0.28 U	0.34 U
11/08	190 *	0.4 U	0.6 U
02/09	200 *	0.4 U	0.6 U
05/09	248 *	1 U	1.5 U

003-073	TCE	cDCE	VC
11/04	1100 *	6.1	0.5 U
03/06	56 *	0.5 U	0.5 U
04/06	187 *	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	31 *	0.28 U	0.34 U
01/08	19.5 *	0.28 U	0.34 U
11/08	16.3 *	0.2 U	0.3 U
02/09	12.7 *	0.2 U	0.3 U
05/09	10.8 *	0.2 U	0.3 U

014-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

013-032	TCE	cDCE	VC
11/04	0.5 U	0.51 J	0.68 J
10/07	0.38 U	0.58 I	0.34 U
01/08	0.42 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.68 I	0.49 I	0.53 I
05/09	0.61 I	0.42 I	0.3 U

013-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	358 *	1.4 U	1.7 U
01/08	540 *	1.4 U	1.7 U
11/08	868 *	2 U	3 U
02/09	834 *	4 U	6 U
05/09	1,130 *	1.9	0.3 U

NG-02I	TCE	cDCE	VC
11/04	79.7 *	0.76 J	0.5 U
10/07	112 *	0.82 I	0.34 U
01/08	28.8 *	0.75 I	0.34 U
11/08	49.9 *	0.2 U	0.3 U
02/09	132 *	2.6	0.6 U
05/09	76.2 *	42.5	0.3 U

NG-02D	TCE	cDCE	VC
04/06	911 *	10 U	10 U
10/07	174 *	0.56 U	0.68 U
01/08	107 *	0.56 U	0.68 U
07/08	140 *	0.38 J	1 U
11/08	142 *	0.54 I	0.3 U
02/09	127 *	6.5	0.6 U
05/09	104 *	32.6	0.6 U

012-053	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	141 *	0.56 U	0.68 U
01/08	146 *	0.56 U	0.68 U
11/08	222 *	0.45 I	0.3 U
02/09	179 *	0.4 U	0.6 U
05/09	145 *	0.25 I	0.3 U

009-053	TCE	cDCE	VC
11/04	10.6 *	1.6	0.5 U
10/07	0.67 I	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

009-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

027-035	TCE	cDCE	VC
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

005-053	TCE	cDCE	VC
11/04	169 *	0.58 J	0.5 U
01/06	NA	NA	NA
10/07	11.9 *	0.28 U	0.34 U
01/08	14.1 *	0.28 U	0.34 U
11/08	12 *	0.2 U	0.3 U
02/09	9.3 *	0.2 U	0.3 U
05/09	7.9 *	0.2 U	0.3 U

005-073	TCE	cDCE	VC
11/04	175 *	0.58 J	0.5 U
10/07	113 *	0.29 I	0.34 U
01/08	121 *	0.56 U	0.68 U
11/08	180 *	1 U	1.5 U
02/09	213 *	0.47 I	0.6 U
05/09	238 *	0.49 I	0.3 U

011-033	TCE	cDCE	VC
11/04	22.3 *	0.5 U	0.5 U
10/07	0.71 I	0.28 U	0.34 U
01/08	0.6 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.96 I	0.28 U	0.34 U
01/08	0.98 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-032	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-051	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-078	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-033	TCE	cDCE	VC
06/05	28.55 *	0.5 U	0.5 U
10/07	1.4	0.28 U	0.34 U
01/08	3.3 *	0.28 U	0.34 U
11/08	11.2 *	0.2 U	0.3 U
02/09	16 *	0.2 U	0.3 U
05/09	40.4 *	0.2 U	0.3 U

004-053	TCE	cDCE	VC
11/04	529 J*	1.2	0.5 U
02/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	102 *	0.28 U	0.34 U
01/08	88.8 *	0.28 U	0.34 U
11/08	54.6 *	0.2 U	0.3 U
02/09	71.3 *	0.2 U	0.3 U
05/09	64.6 *	0.22 I	0.3 U

004-073	TCE	cDCE	VC
11/04	1670 *	2.1	0.5 U
01/06	NA	NA	NA
10/07	639 *	2.8 U	3.4 U
01/08	412 *	2	1.7 U
07/08	420 *	1.4 J	2.5 U
11/08	556 *	2 U	3 U
02/09	1.6 I	117 *	0.6 U
05/09	51.2 *	91.1 *	0.3 U

004-112	TCE	cDCE	VC
11/04	532 *	1.1	0.5 U
02/05	373 *	0.62 J	0.5 U
04/06	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-135	TCE	cDCE	VC
11/05	0.5 U	0.5 U	0.5 U
10/07	0.49 I	0.28 U	0.34 U

NG-12I	TCE	cDCE	VC
11/04	3.6 J *	1.2 J	0.5 UJ
01/06	NA	NA	NA
10/07	3.8 *	6	7.4 *
01/08	1.5	3.7	6.4 *
11/08	3.1 *	2	0.3 U
02/09	5.4 *	2.2	0.99 I
05/09	1.2	0.92 I	0.3 U

NG-12D	TCE	cDCE	VC
11/04	1810 *	3.8 J	0.5 U
01/06	NA	NA	NA
10/07	2.4	37.1	40.6 *
01/08	2.9	7.7	20.1 *
11/08	50.9 *	8.5	0.3 U
02/09	69 *	1	0.3 U
05/09	51.9 *	0.59 I	0.3 U

006-078	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

Legend

- Remediation System
- Monitoring Well (tags highlighted in yellow correspond to monitoring interval)

Monitoring Well

013-053	TCE	cDCE	VC
02/09	834 *	4 U	6 U

Parameter

Detected Concentration (ug/L)
* - indicates GCTL exceedance
J - Estimated concentration
I - Not detected at or above associated detection limit
NA - Not analyzed

Sample Date

Remedial Investigation Plume

- TCE >3 and < 30 ug/L
- TCE >30 and < 300 ug/L
- TCE >300 ug/L

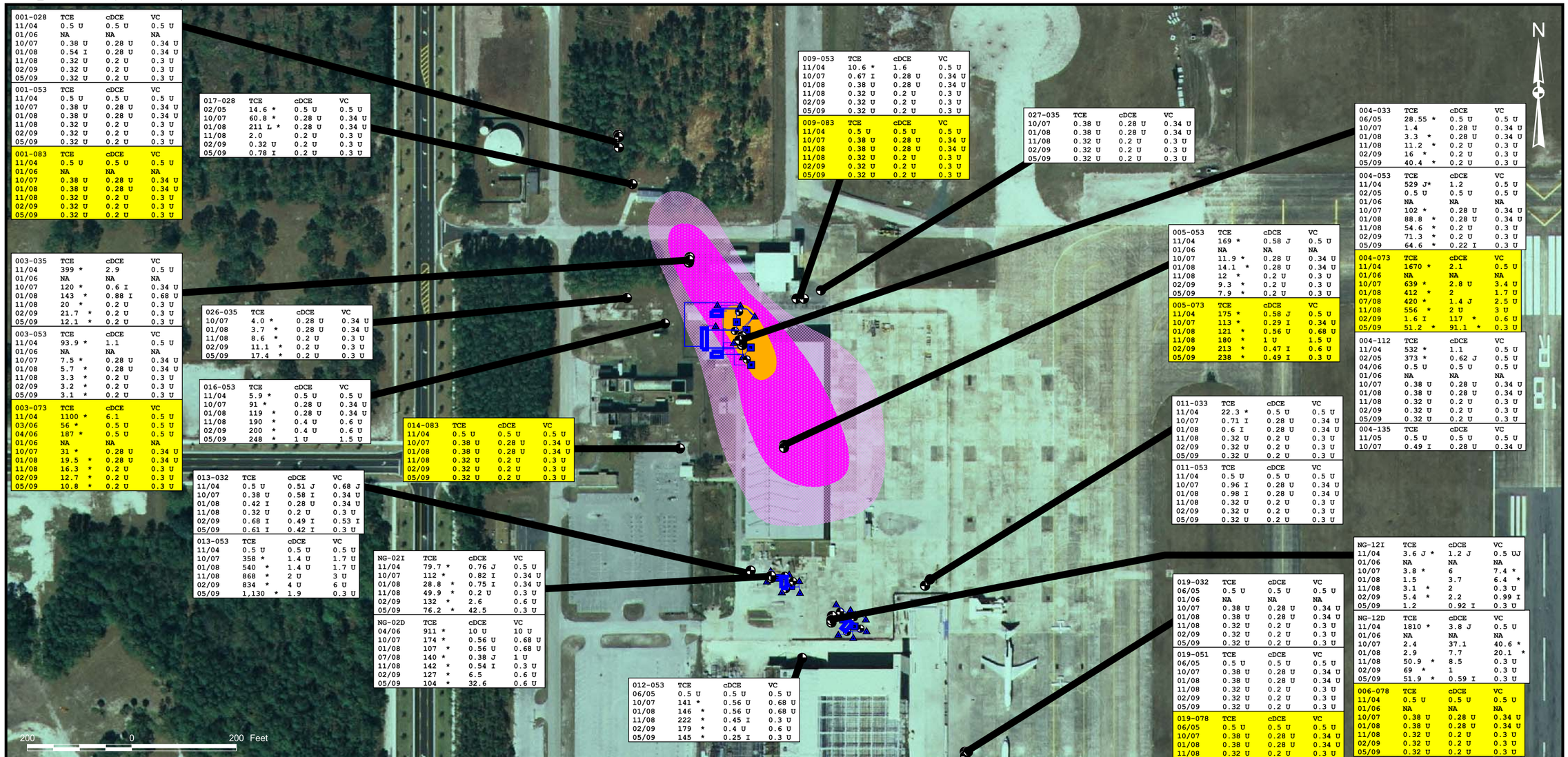
DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS IN
50-FOOT ZONE
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-27	REV. 0

site-59_20091013-ltm.apr 20Jan10 Layout10



001-028	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.54 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

017-028	TCE	cDCE	VC
02/05	14.6 *	0.5 U	0.5 U
10/07	60.8 *	0.28 U	0.34 U
01/08	211 L *	0.28 U	0.34 U
11/08	2.0	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.78 I	0.2 U	0.3 U

009-053	TCE	cDCE	VC
11/04	10.6 *	1.6	0.5 U
10/07	0.67 I	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

009-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

027-035	TCE	cDCE	VC
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-033	TCE	cDCE	VC
06/05	28.55 *	0.5 U	0.5 U
10/07	1.4	0.28 U	0.34 U
01/08	3.3 *	0.28 U	0.34 U
11/08	11.2 *	0.2 U	0.3 U
02/09	16 *	0.2 U	0.3 U
05/09	40.4 *	0.2 U	0.3 U

004-053	TCE	cDCE	VC
11/04	529 J*	1.2	0.5 U
02/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	102 *	0.28 U	0.34 U
01/08	88.8 *	0.28 U	0.34 U
11/08	54.6 *	0.2 U	0.3 U
02/09	71.3 *	0.2 U	0.3 U
05/09	64.6 *	0.22 I	0.3 U

004-073	TCE	cDCE	VC
11/04	1670 *	2.1	0.5 U
01/06	NA	NA	NA
10/07	639 *	2.8 U	3.4 U
01/08	412 *	2	1.7 U
07/08	420 *	1.4 J	2.5 U
11/08	556 *	2 U	3 U
02/09	1.6 I	117 *	0.6 U
05/09	51.2 *	91.1 *	0.3 U

004-112	TCE	cDCE	VC
11/04	532 *	1.1	0.5 U
02/05	373 *	0.62 J	0.5 U
04/06	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-135	TCE	cDCE	VC
11/05	0.5 U	0.5 U	0.5 U
10/07	0.49 I	0.28 U	0.34 U

005-053	TCE	cDCE	VC
11/04	169 *	0.58 J	0.5 U
01/06	NA	NA	NA
10/07	11.9 *	0.28 U	0.34 U
01/08	14.1 *	0.28 U	0.34 U
11/08	12 *	0.2 U	0.3 U
02/09	9.3 *	0.2 U	0.3 U
05/09	7.9 *	0.2 U	0.3 U

005-073	TCE	cDCE	VC
11/04	175 *	0.58 J	0.5 U
10/07	113 *	0.29 I	0.34 U
01/08	121 *	0.56 U	0.68 U
11/08	180 *	1 U	1.5 U
02/09	213 *	0.47 I	0.6 U
05/09	238 *	0.49 I	0.3 U

003-035	TCE	cDCE	VC
11/04	399 *	2.9	0.5 U
01/06	NA	NA	NA
10/07	120 *	0.6 I	0.34 U
01/08	143 *	0.88 I	0.68 U
11/08	20 *	0.2 U	0.3 U
02/09	21.7 *	0.2 U	0.3 U
05/09	12.1 *	0.2 U	0.3 U

003-053	TCE	cDCE	VC
11/04	93.9 *	1.1	0.5 U
01/06	NA	NA	NA
10/07	7.5 *	0.28 U	0.34 U
01/08	5.7 *	0.28 U	0.34 U
11/08	3.3 *	0.2 U	0.3 U
02/09	3.2 *	0.2 U	0.3 U
05/09	3.1 *	0.2 U	0.3 U

003-073	TCE	cDCE	VC
11/04	1100 *	6.1	0.5 U
03/06	56 *	0.5 U	0.5 U
04/06	187 *	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	31 *	0.28 U	0.34 U
01/08	19.5 *	0.28 U	0.34 U
11/08	16.3 *	0.2 U	0.3 U
02/09	12.7 *	0.2 U	0.3 U
05/09	10.8 *	0.2 U	0.3 U

026-035	TCE	cDCE	VC
10/07	4.0 *	0.28 U	0.34 U
01/08	3.7 *	0.28 U	0.34 U
11/08	8.6 *	0.2 U	0.3 U
02/09	11.1 *	0.2 U	0.3 U
05/09	17.4 *	0.2 U	0.3 U

016-053	TCE	cDCE	VC
11/04	5.9 *	0.5 U	0.5 U
10/07	91 *	0.28 U	0.34 U
01/08	119 *	0.28 U	0.34 U
11/08	190 *	0.4 U	0.6 U
02/09	200 *	0.4 U	0.6 U
05/09	248 *	1 U	1.5 U

014-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-033	TCE	cDCE	VC
11/04	22.3 *	0.5 U	0.5 U
10/07	0.71 I	0.28 U	0.34 U
01/08	0.6 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.96 I	0.28 U	0.34 U
01/08	0.98 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

013-032	TCE	cDCE	VC
11/04	0.5 U	0.51 J	0.68 J
10/07	0.38 U	0.58 I	0.34 U
01/08	0.42 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.68 I	0.49 I	0.53 I
05/09	0.61 I	0.42 I	0.3 U

013-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	358 *	1.4 U	1.7 U
01/08	540 *	1.4 U	1.7 U
11/08	868 *	2 U	3 U
02/09	834 *	4 U	6 U
05/09	1,130 *	1.9	0.3 U

NG-02I	TCE	cDCE	VC
11/04	79.7 *	0.76 J	0.5 U
10/07	112 *	0.82 I	0.34 U
01/08	28.8 *	0.75 I	0.34 U
11/08	49.9 *	0.2 U	0.3 U
02/09	132 *	2.6	0.6 U
05/09	76.2 *	42.5	0.3 U

NG-02D	TCE	cDCE	VC
04/06	911 *	10 U	10 U
10/07	174 *	0.56 U	0.68 U
01/08	107 *	0.56 U	0.68 U
07/08	140 *	0.38 J	1 U
11/08	142 *	0.54 I	0.3 U
02/09	127 *	6.5	0.6 U
05/09	104 *	32.6	0.6 U

012-053	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	141 *	0.56 U	0.68 U
01/08	146 *	0.56 U	0.68 U
11/08	222 *	0.45 I	0.3 U
02/09	179 *	0.4 U	0.6 U
05/09	145 *	0.25 I	0.3 U

019-032	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-051	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-078	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

NG-12I	TCE	cDCE	VC
11/04	3.6 J *	1.2 J	0.5 UJ
01/06	NA	NA	NA
10/07	3.8 *	6	7.4 *
01/08	1.5	3.7	6.4 *
11/08	3.1 *	2	0.3 U
02/09	5.4 *	2.2	0.99 I
05/09	1.2	0.92 I	0.3 U

NG-12D	TCE	cDCE	VC
11/04	1810 *	3.8 J	0.5 U
01/06	NA	NA	NA
10/07	2.4	37.1	40.6 *
01/08	2.9	7.7	20.1 *
11/08	50.9 *	8.5	0.3 U
02/09	69 *	1	0.3 U
05/09	51.9 *	0.59 I	0.3 U

006-078	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

Legend

- Remediation System
- Monitoring Well (tags highlighted in yellow correspond to monitoring interval)

013-053	TCE	cDCE	VC
02/09	834 *	4 U	6 U

Monitoring Well

Parameter

Detected Concentration (ug/L)
* - indicates GCTL exceedance
J - Estimated concentration
I - Not detected at or above associated detection limit
NA - Not analyzed

Sample Date

Remedial Investigation Plume

- TCE >3 and < 30 ug/L
- TCE >30 and < 300 ug/L
- TCE >300 ug/L

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS IN
70- TO 80-FOOT ZONE
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
APPROVED BY	DATE
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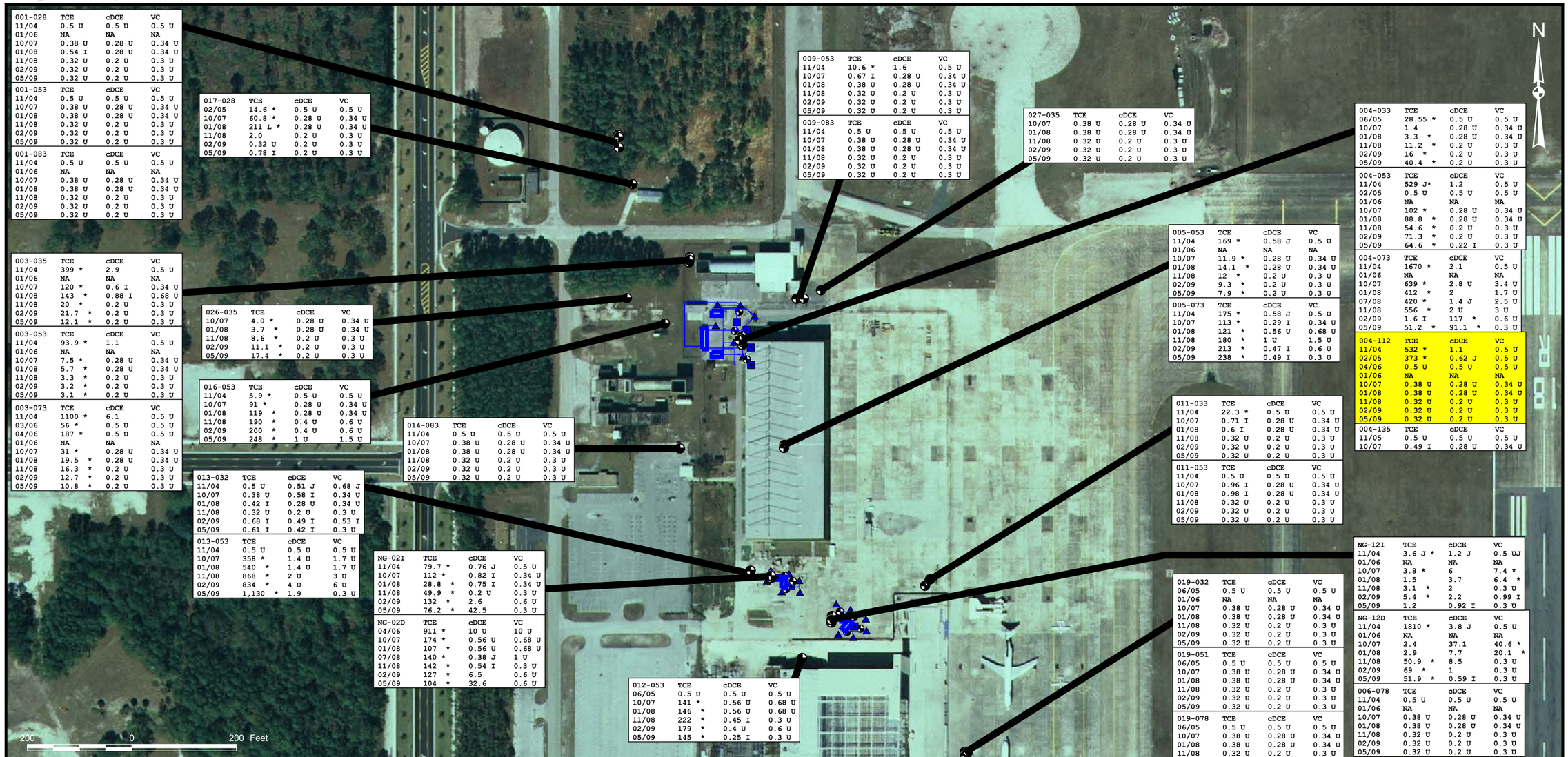
DRAWING NO. FIGURE 8-28	REV. 0

site-59_20091013-ltm.apr 20Jan10 Layout11



001-028	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.54 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

001-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

017-028	TCE	cDCE	VC
02/05	14.6 *	0.5 U	0.5 U
10/07	60.8 *	0.28 U	0.34 U
01/08	211 L *	0.28 U	0.34 U
11/08	2.0	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.78 I	0.2 U	0.3 U

009-053	TCE	cDCE	VC
11/04	10.6 *	1.6	0.5 U
10/07	0.67 I	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

009-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

027-035	TCE	cDCE	VC
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-033	TCE	cDCE	VC
06/05	28.55 *	0.5 U	0.5 U
10/07	1.4	0.28 U	0.34 U
01/08	3.3 *	0.28 U	0.34 U
11/08	11.2 *	0.2 U	0.3 U
02/09	16 *	0.2 U	0.3 U
05/09	40.4 *	0.2 U	0.3 U

004-053	TCE	cDCE	VC
11/04	529 J*	1.2	0.5 U
02/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	102 *	0.28 U	0.34 U
01/08	88.8 *	0.28 U	0.34 U
11/08	54.6 *	0.2 U	0.3 U
02/09	71.3 *	0.2 U	0.3 U
05/09	64.6 *	0.22 I	0.3 U

005-053	TCE	cDCE	VC
11/04	169 *	0.58 J	0.5 U
01/06	NA	NA	NA
10/07	11.9 *	0.28 U	0.34 U
01/08	14.1 *	0.28 U	0.34 U
11/08	12 *	0.2 U	0.3 U
02/09	9.3 *	0.2 U	0.3 U
05/09	7.9 *	0.2 U	0.3 U

005-073	TCE	cDCE	VC
11/04	175 *	0.58 J	0.5 U
10/07	113 *	0.29 I	0.34 U
01/08	121 *	0.56 U	0.68 U
11/08	180 *	1 U	1.5 U
02/09	213 *	0.47 I	0.6 U
05/09	238 *	0.49 I	0.3 U

004-073	TCE	cDCE	VC
11/04	1670 *	2.1	0.5 U
01/06	NA	NA	NA
10/07	639 *	2.8 U	3.4 U
01/08	412 *	2	1.7 U
07/08	420 *	1.4 J	2.5 U
11/08	556 *	2 U	3 U
02/09	1.6 I	117 *	0.6 U
05/09	51.2 *	91.1 *	0.3 U

004-112	TCE	cDCE	VC
11/04	532 *	1.1	0.5 U
02/05	373 *	0.62 J	0.5 U
04/06	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

004-135	TCE	cDCE	VC
11/05	0.5 U	0.5 U	0.5 U
10/07	0.49 I	0.28 U	0.34 U

003-035	TCE	cDCE	VC
11/04	399 *	2.9	0.5 U
01/06	NA	NA	NA
10/07	120 *	0.6 I	0.34 U
01/08	143 *	0.88 I	0.68 U
11/08	20 *	0.2 U	0.3 U
02/09	21.7 *	0.2 U	0.3 U
05/09	12.1 *	0.2 U	0.3 U

026-035	TCE	cDCE	VC
10/07	4.0 *	0.28 U	0.34 U
01/08	3.7 *	0.28 U	0.34 U
11/08	8.6 *	0.2 U	0.3 U
02/09	11.1 *	0.2 U	0.3 U
05/09	17.4 *	0.2 U	0.3 U

003-053	TCE	cDCE	VC
11/04	93.9 *	1.1	0.5 U
01/06	NA	NA	NA
10/07	7.5 *	0.28 U	0.34 U
01/08	5.7 *	0.28 U	0.34 U
11/08	3.3 *	0.2 U	0.3 U
02/09	3.2 *	0.2 U	0.3 U
05/09	3.1 *	0.2 U	0.3 U

016-053	TCE	cDCE	VC
11/04	5.9 *	0.5 U	0.5 U
10/07	91 *	0.28 U	0.34 U
01/08	119 *	0.28 U	0.34 U
11/08	190 *	0.4 U	0.6 U
02/09	200 *	0.4 U	0.6 U
05/09	248 *	1 U	1.5 U

003-073	TCE	cDCE	VC
11/04	1100 *	6.1	0.5 U
03/06	56 *	0.5 U	0.5 U
04/06	187 *	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	31 *	0.28 U	0.34 U
01/08	19.5 *	0.28 U	0.34 U
11/08	16.3 *	0.2 U	0.3 U
02/09	12.7 *	0.2 U	0.3 U
05/09	10.8 *	0.2 U	0.3 U

014-083	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-033	TCE	cDCE	VC
11/04	22.3 *	0.5 U	0.5 U
10/07	0.71 I	0.28 U	0.34 U
01/08	0.6 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

011-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	0.96 I	0.28 U	0.34 U
01/08	0.98 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

013-032	TCE	cDCE	VC
11/04	0.5 U	0.51 J	0.68 J
10/07	0.38 U	0.58 I	0.34 U
01/08	0.42 I	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.68 I	0.49 I	0.53 I
05/09	0.61 I	0.42 I	0.3 U

013-053	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
10/07	358 *	1.4 U	1.7 U
01/08	540 *	1.4 U	1.7 U
11/08	868 *	2 U	3 U
02/09	834 *	4 U	6 U
05/09	1,130 *	1.9	0.3 U

NG-02I	TCE	cDCE	VC
11/04	79.7 *	0.76 J	0.5 U
10/07	112 *	0.82 I	0.34 U
01/08	28.8 *	0.75 I	0.34 U
11/08	49.9 *	0.2 U	0.3 U
02/09	132 *	2.6	0.6 U
05/09	76.2 *	42.5	0.3 U

NG-02D	TCE	cDCE	VC
04/06	911 *	10 U	10 U
10/07	174 *	0.56 U	0.68 U
01/08	107 *	0.56 U	0.68 U
07/08	140 *	0.38 J	1 U
11/08	142 *	0.54 I	0.3 U
02/09	127 *	6.5	0.6 U
05/09	104 *	32.6	0.6 U

012-053	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	141 *	0.56 U	0.68 U
01/08	146 *	0.56 U	0.68 U
11/08	222 *	0.45 I	0.3 U
02/09	179 *	0.4 U	0.6 U
05/09	145 *	0.25 I	0.3 U

NG-12I	TCE	cDCE	VC
11/04	3.6 J *	1.2 J	0.5 UJ
01/06	NA	NA	NA
10/07	3.8 *	6	7.4 *
01/08	1.5	3.7	6.4 *
11/08	3.1 *	2	0.3 U
02/09	5.4 *	2.2	0.99 I
05/09	1.2	0.92 I	0.3 U

019-032	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

NG-12D	TCE	cDCE	VC
11/04	1810 *	3.8 J	0.5 U
01/06	NA	NA	NA
10/07	2.4	37.1	40.6 *
01/08	2.9	7.7	20.1 *
11/08	50.9 *	8.5	0.3 U
02/09	69 *	1	0.3 U
05/09	51.9 *	0.59 I	0.3 U

019-051	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

006-078	TCE	cDCE	VC
11/04	0.5 U	0.5 U	0.5 U
01/06	NA	NA	NA
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

019-078	TCE	cDCE	VC
06/05	0.5 U	0.5 U	0.5 U
10/07	0.38 U	0.28 U	0.34 U
01/08	0.38 U	0.28 U	0.34 U
11/08	0.32 U	0.2 U	0.3 U
02/09	0.32 U	0.2 U	0.3 U
05/09	0.32 U	0.2 U	0.3 U

Legend

- Remediation System
- Monitoring Well (tags highlighted in yellow correspond to monitoring interval)

013-053	TCE	cDCE	VC
02/09	834 *	4 U	6 U

Monitoring Well

Parameter

Detected Concentration (ug/L)
* - indicates GCTL exceedance
J - Estimated concentration
I - Not detected at or above associated detection limit
NA - Not analyzed

Sample Date

Remedial Investigation Plume

- TCE >3 and < 30 ug/L
- TCE >30 and < 300 ug/L
- TCE >300 ug/L

DRAWN BY	DATE
MJJ	13Oct09
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED

NAVFAC

VOLATILE ORGANIC COMPOUNDS IN
TOP OF ROCK ZONE
OPERABLE UNIT 9, SITE 59
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO.	
2267	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8-29	REV. 0

9.0 OPERABLE UNIT 10, SITES 21 AND 25

9.1 INTRODUCTION

This Third Five-Year Review is the first review to include OU 10, Sites 21 and 25. Implementation of the remedial actions at OU 10 began in early 2001, but the RODs for these sites were not finalized before the date of the Second Five-Year Review. This five-year review is being conducted as a statutory review because even after groundwater cleanup levels are achieved, unlimited use and unrestricted exposure to soils will remain unacceptable. OU 10 consists of Site 21, the Golf Course Maintenance Area, and Site 25, the Former Transformer Storage Yard.

9.2 SITE CHRONOLOGY

A list of important OU 10, Sites 21 and 25 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Site 21 Golf Course Maintenance Area buildings constructed	1950s to 1981
Site 25 Former Transformer Storage Yard buildings constructed	1956 to 1975
Site 21 designation changed from Area of Interest (AOI) 21 to PSC 21	1999
PSC 21 re-designated as Installation Restoration (IR) Site 21 and included in OU 10	2000
RI/FS complete	2001
Soil Removal Action at Site 25	April – May 2001
Soil Removal Action at Site 21	August 2001
Long-term Groundwater Monitoring Work Plan, Sites 21, 25, and 45	June 2002
Groundwater sampling at Site 21	July 2002 - ongoing
Groundwater sampling at Site 25	July 2002 – February 2007
Site 25 ROD signed	October 2004
Supplemental Sampling and Analysis Work Plan Site 21	January 2005
Work Plan Addendum, Drum and Stained Soil Removal at Site 21	January 2005
Drum Removal complete at Site 21	June 2005
Asbestos Survey at Site 21	August 2005
IRAR for Site 25 signed	October 2004
Site 21 ROD signed	November 2005
IRAR for Site 21 signed	December 2005
LUC RDs for Site 21 and Site 25	May 2006
Final OPS Demonstration for Sites 21 and 25	May 2006
Sites 21 and 25 FOSTs	October 30, 2006

Event	Date
Approval of NFA and removal of LUCs at Site 25	December 2008
Remedial Action Completion Report approved for Site 25	February 2009

9.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 10. The OU 10, Site 21 golf course maintenance area, former gas pump and UST, septic system, and mounded leachfield are presented on Figure 9-1. The OU 10, Site 25 oil-water separators, former transformer storage yard, and Buildings 247 and 101 are presented on Figure 9-2. Site 21 occupies approximately 1.5 acres, and Site 25 occupies approximately 0.6 acres of OU 10.

Land and Resource Use

Site 21, the Golf Course Maintenance Area, operated from the 1950s until the base was closed in 1999, providing an area for office space, repairs, maintenance activities, and storage. Site 25, the Former Transformer Storage Yard, was operated as a storage area for transformers and other electrical equipment from the 1950s until the early 1990s.

History of Contamination

At Site 21, an empty drum and can disposal pile was located to the northwest of Building 371. Most of the drums and cans were removed prior to 1992. The site was also used for washing equipment (both on exposed ground and on a washdown pad), pesticide storage, and the operation of a septic system for an abandoned public toilet. Soil contaminated with arsenic and pesticides was delineated prior to the RI. The contaminated soil was excavated and disposed off site. Groundwater contaminated by chlordane was also identified before RI activities.

At Site 25, electrical equipment reportedly containing PCBs was stored, and pesticide storage buildings existed. Soil contaminated with PCBs, PAHs, TRPH, and pesticides greater than FDEP residential SCTLs was delineated at the site before the RI was conducted. The contaminated soil was excavated and disposed off-site. Groundwater contaminated by BHC isomers and aluminum was also identified.

Initial Response and Basis for Taking Action

The 1994 base-wide EBS conducted by ABB-ES recommended further investigation for Site 21 (then AOI 21) based on the possible contamination caused by activities conducted at the site including mixing

and storage of pesticides, herbicides, fungicides, and fertilizers; and surface disposal of containers. The EBS recommended further investigation at Site 25 based on the potential for lead-based paint and the presence of friable asbestos at the site. In the 1999 Sampling and Analysis Reports for each site prepared by HLA, hazardous constituents were detected in soil and groundwater at Site 21 and soil at Site 25, and further study was recommended for both sites.

9.4 REMEDIAL ACTIONS

9.4.1 Remedy Selection

The purpose of remedial action at OU 10 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 21 and 25. The RAOs for Site 21 were published in the ROD for Site 21, accepted in November 2005, and the RAOs for Site 25 were published in the ROD for Site 25, accepted in October 2004. These RAOs were based on an evaluation of site conditions, risks, and legal requirements (ARARs).

9.4.1.1 Site 21

The three RAOs identified for OU 10, Site 21 were developed based on 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 Site 21 ROD were:

- Prevent unacceptable risk from exposure to soil with concentrations of arsenic greater than the background value.

- Prevent unacceptable risk from ingestion of groundwater with concentrations of chlordane greater than the FDEP GCTL and the federal MCL.

- Reduce concentration of chlordane in groundwater to less than the FDEP GCTL and federal MCL.

The selected alternatives at Site 21 were monitored natural attenuation and LUCs for groundwater, and LUCs for soil. 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 21 complied with the chemical- and action-specific ARARs as defined in the Site 21 FS. No location-specific ARARs are applicable to Site 21 soil alternatives. The remedial alternative selected for groundwater at Site 21 did not achieve chemical-specific ARARs immediately; however, compliance will eventually be achieved through natural processes and verified through monitoring. This alternative complied with the action- and location-specific ARARs.

The ROD also included information about remediating the contaminated surface soil based on decisions reached by the BCT. A confirmatory sampling program for soil at Site 21 identified the presence of arsenic, chlordane, TRPH, 4,4'-DDT, toxaphene, and dieldrin at concentrations greater than FDEP SCTLs. Consequently, prior to the ROD, an Action Memorandum was prepared by TtNUS for excavation and disposal of contaminated surface soil at Site 21. This document established the following goal: To prevent migration of contaminated soils which may present an imminent and substantial endangerment to public health, or welfare, or the environment.

A remedial action was conducted by CH2MHill according to this action memorandum and remedial design in May and June 2001 (see Figure 9-3). During this remedial action, approximately 2,974 tons of contaminated soil were excavated and disposed in a permitted off-site facility as presented in the Source Removal Report for Site 21.

The remedial action for soil at Site 21 complied with chemical- and action-specific ARARs.

9.4.1.2 Site 25

Two RAOs were developed for Site 25 based on 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 RAOs in the Site 25 ROD were as follows:

- Prevent ingestion of groundwater with alpha- and beta-BHC concentrations greater than their respective cleanup goals of 0.006 μg/L and 0.02 μg/L, which are the FDEP GCTLs.
- Reduce concentrations of alpha- and beta-BHC in groundwater to less than FDEP GCTLs.

The selected alternative at Site 25 to address the contaminated groundwater was monitored natural attenuation and LUCs, and NFA was selected for soil. The remedial alternative selected for groundwater at Site 25 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.

Contaminant concentrations in soil from Site 25 were reviewed in the ROD. The NFA alternative was selected for soil because the 95 percent UCLs of the residual concentrations of PAHs, PCBs, pesticides, and TRPH in the soil were equal to or less than the FDEP SCTLs for residential exposure after the excavation of 5,234 tons of soil was completed in 2001 (described below). This selected alternative is

considered protective of human health and the environment and does not result in habitat loss or wetland destruction.

The ROD also included information about remediating the contaminated surface soil based on decisions reached by the BCT. A confirmatory sampling program for soil at Site 25 identified the presence of petroleum, pesticides, and PCBs at concentrations greater than FDEP SCTLs. Consequently, prior to the signing of the ROD, an Action Memorandum was prepared by TtNUS for excavation and disposal of contaminated surface soil at Site 25. This document established the following goal: To prevent migration of contaminated soils and possible exposure to nearby human populations.

A remedial action was conducted by CH2MHill according to this action memorandum and remedial design in April and May 2001 (see Figure 9-4). During this remedial action approximately 5,136 tons of non-hazardous soil and 98 tons of hazardous soil were excavated and disposed in a permitted off-site facility as presented in the Source Removal Report for Site 25.

The remedial action for soil at Site 25 complied with chemical- and action-specific ARARs. This source removal action was effective and met the goals identified in the remedial design, and no further soil excavation is required.

9.4.2 Remedy Implementation

The remedial actions at Site 25 are complete and at Site 21 are currently being implemented. A summary of the remedial actions that have been conducted is presented below.

9.4.2.1 Site 21

The action memorandum and remedial design for soil and groundwater at Site 21 were prepared in April 2001. The soil removal described in this document was completed before the RI, FS, and ROD.

After the ROD selected monitored natural attenuation and LUCs as the remedial action to be implemented at Site 21, a Long-Term Monitoring Plan was prepared. Groundwater monitoring at Site 21 was conducted in accordance with the 2002 Long-Term Groundwater Sampling Plan submitted by TtNUS for OU 10, Sites 21 and 25, and OU 11, Site 45.

Groundwater monitoring to support the Site 21 remedial design has been conducted since July 2002 and is ongoing. Sampling was conducted from July 2002 through January 2004 on a semi-annual basis at two wells sampled for total chlordane. The BCT decided in April 2004 that sampling would be changed to annually, with one well being added to the program because of a shift in groundwater flow at Site 21.

During the July 2004 sampling event, elevated concentrations of chlordane were detected at the new downgradient well. A DPT investigation was conducted in the fall of 2004 to determine the extent of the chlordane migration. It was found that the contamination had not migrated far from the original source, and one new downgradient well was installed and added to the long-term monitoring program.

Ten sampling events have occurred to date. The most recent sampling event, Year 7, was performed in September 2009. The data indicated that there is a continued presence of chlordane in groundwater at Site 21 at concentrations great than FDEP GCTLs. The LTM is to continue as planned.

LUCs required at Site 21 to ensure protection of human health and the environment as documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit residential reuse of the site.
- Prohibit the excavation of soils from the site.
- Prohibit all uses of the groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

The LUC requirements went into effect upon finalization of the LUC RD for Site 21 on May 5, 2006 and remained applicable during Navy ownership. LUC objective and LUC requirements were incorporated into the Quitclaim deed by which the Navy transferred the Site 21 property, as required by FDEP. Therefore, the LUCs remained applicable after conveyance of the property to the City of Jacksonville. The LUCs will also apply to any subsequent owners for as long as they are necessary.

9.4.2.2 Site 25

The action memorandum and remedial design for soil and groundwater at Site 25 was prepared in April 2001 by TtNUS. The soil removal described in this document was completed before the RI, FS, and ROD.

After the ROD selected monitored natural attenuation and LUCs as the remedial action to be implemented at Site 25, a Long-Term Monitoring Plan was prepared. Groundwater monitoring at Site 25 was conducted in accordance with the 2002 Long-Term Groundwater Sampling Plan submitted by TtNUS for OU 10, Sites 21 and 25, and OU 11, Site 45. The objective of the monitoring program is to evaluate the performance, progress, and effectiveness of natural attenuation in reducing contaminants and retarding their migration. Eight groundwater sampling events were conducted from July 2002 to February 2007 in support of the Site 25 groundwater long-term monitoring plan.

Alpha- and gamma-BHC were not detected at concentrations exceeding GCTLs through the full monitoring program. Concentrations exceeded the beta-BHC GCTL in August 2003, January 2004, and July 2005, and the dieldrin PQL from the beginning of the monitoring program in July 2002 through January 2004. No COCs had exceedances of their respective comparison criteria in July 2006 or February 2007, so NFA was recommended.

A Remedial Action Completion Report documenting the NFA status for soil and groundwater at the site was approved in February 2009. LUCs had been required at Site 25 to ensure protection of human health and the environment as documented in a LUC RD while monitoring was in progress. However, LUCs are no longer necessary at the site with the approval of NFA.

9.4.3 System Operations/Operation and Maintenance

The long-term natural attenuation groundwater monitoring program at Site 21 is being conducted in accordance with the ROD and the Long-Term Monitoring Work Plan for Site 21.

9.4.3.1 Site 21

Nine groundwater sampling events have been conducted since July 2002. Four of the sampling events were semi-annual, and based on the results from the annual report for the Year 2 semi-annual sampling events; annual sampling began with the fifth event. Sampling was conducted annually from July 2004 through September 2009 and is ongoing. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume are sampled and analyzed for total chlordane. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

9.4.3.2 Site 25

Eight groundwater sampling events were conducted from July 2002 through February 2007. Monitoring wells within the plume, upgradient of the plume (background), and downgradient of the plume were sampled and analyzed for alpha-, beta-, and gamma-BHC and dieldrin. The LTMP was discontinued after two consecutive monitoring events were conducted with no COCs detected at concentrations greater than GCTLs.

9.4.3.3 Cost

Site 21

The Action Memorandum estimated the capital cost for implementation of excavation and disposal for the industrial land use scenarios at $315,000. The Navy's Environmental Detachment completed the excavation and disposal of soil for Site 21 for approximately $372,000. The Navy's original NPW cost estimate in the ROD for implementation of groundwater monitoring and LUCs was $109,000 over a 30-year period. The cost for the implementation of the remedy over the five years encompassed in this five-year review is approximately $19,500, including long-term monitoring sampling and analysis. The total actual cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

Site 25

The Navy's original NPW cost estimate for implementation of natural attenuation for groundwater at Site 25 was approximately $89,000 over a 5-year period. The actual cost was approximately $150,000 over approximately 5 years of groundwater monitoring. The Navy's cost estimate for implementation of excavation and disposal of the contaminated surface soil under the residential land use scenario was approximately $200,000. The actual cost of implementing the excavation and disposal was approximately $600,000.

9.5 PROGRESS SINCE LAST FIVE-YEAR REVIEW

OU 10 was not included in the previous five-year review.

9.6 FIVE-YEAR REVIEW PROCESS

9.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for Sites 21 and 25 including the RODs, soil and groundwater remedial designs, soil removal action memoranda and source removal reports, long-term groundwater monitoring reports, OPS reports, the Interim Remedial Action Report for Site 21, and the Site 25 Final Remedial Action Completion Report. Soil removal actions have been completed at Sites 21 and 25, and NFA is required for soils at Site 25 and NFA with LUCs is required for soils at Site 21. The following sections summarize groundwater results for Sites 21 and 25 based on a review of associated documents. Groundwater monitoring is complete at Site 25.

9.6.1.1 Site 21 Groundwater Data Review

Ten groundwater monitoring events were conducted from July 2002 to September 2009. Four semi-annual monitoring events were conducted during Years 1 and 2 of long-term monitoring. The monitoring frequency was decreased to annually, based on the results of the first 2 years of sampling and with the approval of the BCT, beginning with the fifth monitoring event conducted in July 2004. Monitoring wells within the plume, upgradient of the plume, and downgradient of the plume were sampled and analyzed for total chlordane.

The review of the groundwater monitoring data through September 2009 indicates that the ten groundwater sampling events were conducted in accordance with the long-term monitoring work plan. The semi-annual and annual monitoring reports were provided to U.S. EPA and FDEP for review and comment.

Table 9-1 presents chlordane concentrations since 2002 at Site 21. Concentrations of chlordane in the last six monitoring events are shown on Figure 9-5. Monitoring wells CEF-P21-08S and CEF-P21-09S have not had chlordane concentrations greater than cleanup goals since monitoring began. Chlordane concentrations at wells CEF-P21-01S and CEF-P21-05S have varied during the past 7 years of monitoring. At well CEF-P21-01S, concentrations began at 3.4 µg/L, and increased to as high as 12.4 µg/L by the first semi-annual, Year 2 sampling event. Concentrations at CEF-P21-01S decreased through January and July 2004 sampling events to 2.3 µg/L, but then increased again to 15 µg/L in July 2005. Chlordane concentrations in the well have decreased since July 2005, with 0.54 µg/L in September 2009, which is less than the cleanup goal. Concentrations of chlordane at well CEF-P21-05S have exceeded the cleanup goal during every sampling event since monitoring began at this well in July 2004. The concentration in July 2004 was 23 µg/L, and the concentration in September 2009 was 40.4 µg/L. Long-term monitoring is to continue until the concentration of chlordane in all wells is less than the cleanup goal for two consecutive events.

Semi-annual and annual monitoring reports were submitted to U.S. EPA and FDEP for review and comment. The monitoring locations and frequency specified in the recommendations of the annual groundwater reports for Site 21 are adequate for evaluating the concentration trends of COCs at the site. The Navy routinely re-evaluated the status of the site to optimize the monitoring for Site 21, and determined that monitoring should continue as planned. The monitoring system provides adequate data to evaluate remedy performance and it was sampled on a regular basis. Monitoring wells are located appropriately to provide an indication of concentrations at the source and at the downgradient locations.

9.6.1.2 Site 25 Data Review

Table 9-2 presents alpha-, beta-, and gamma-BHC and dieldrin concentrations since 1999 at Site 25, and Figure 9-6 presents the COC concentrations from the last two sampling events. The laboratory PQLs were used in conjunction with FDEP GCTLs to determine appropriate comparison criteria for each COC. FDEP GCTLs were used to compare gamma-BHC concentrations, and alpha-BHC, beta-BHC, and dieldrin were compared against their PQLs because the GCTLs for these compounds are less than the PQLs and could not be achieved by available laboratory methods. Two wells (CEF-081-02S and CEF-081-03S) did not have exceedances of any of the COCs for the term of the monitoring program. Alpha- and gamma-BHC at well CEF-P25-01S exceeded the FDEP GCTL in previous sampling events, but had decreased to below the GCTL by the beginning of the LTM program and did not have any exceedances during the term of the program. The beta-BHC concentration in CEF-P25-01S increased from 0.020 µg/L during Year 1 annual sampling to 0.100 µg/L in Year 2 sampling. During the second semi-annual Year 2 sampling in January 2004, the beta-BHC concentration in CEF-P25-01S decreased to 0.026 µg/L, but remained greater than the cleanup goal, 0.020 µg/L. The beta-BHC concentration was less than the detection limit in July 2004, and then rebounded to 0.089 µg/L in July 2005 (Year 5). Concentrations of beta-BHC in July 2006 (Year 6) sampling were 0.014 µg/L, which is less than the cleanup goal, and the concentrations in Year 7 were less than detection limits.

The dieldrin concentration in CEF-P25-01S increased from 0.020 µg/L during Year 1 sampling to 0.081 µg/L in Year 2 sampling. During the second semi-annual Year 2 sampling in January 2004, the dieldrin concentration in CEF-P25-01S decreased to 0.026 µg/L, but remained above the cleanup goal. The dieldrin concentration increased again in July 2004 to 0.044 µg/L, and then again to 0.071 µg/L in July 2005 (Year 4). The concentration of dieldrin in July 2006, Year 5, sampling was 0.066 I µg/L, which was an estimated concentration, and the concentration in Year 7 was estimated to be 0.076 I µg/L for the sample and 0.0015 I µg/L for the duplicate..

Based on concentrations of the groundwater COCs decreasing to less than the comparison criteria for two consecutive sampling events, the groundwater monitoring program at Site 25 was discontinued.

9.6.2 <u>Site Inspection</u>

The site inspection for OU 10 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at Site 21 included visual observations of the area, surface water/drainage ditches, soil, and groundwater monitoring wells. . The inspection identified that the implementation of the remedy and monitoring program were operating as designed and they are

protective of human health and the environment. Signs remained intact and no damage was observed. TtNUS conducted several site visits at both Sites 21 and 25 as part of the field activities from 2002 to 2009. Activities conducted during the site visits included groundwater and soil sampling and site walkovers. No unusual observations were documented during these site visits. Inspections of monitoring wells were completed during each groundwater sampling event, and no issues were reported concerning the condition of the wells or health and safety issues.

The proposed land use for the sites has remained unchanged. The Navy transferred the sites and surrounding properties to the City of Jacksonville per the FOST, dated October 30, 2006. The City of Jacksonville plans to use the sites for the same purposes as they were previously used, including industrial/commercial, aviation-related, recreational, military-related, stormwater management, and natural resources corridor uses.

Site 21 LUC inspections have been completed annually by JEDC since 2007. The LUC inspections indicate that Site 21 groundwater is not being used, monitoring wells are not being disturbed, the land is not being used for residential use, the surface soils have not been disturbed, and subsurface soils have not been disturbed.

9.6.3 Interviews

There were no interviews conducted in the course of the five year review.

9.7 TECHNICAL ASSESSMENT

9.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the RODs.

Site 21

The implementation of the source control portion of the remedy was completed in August 2001. The long-term groundwater monitoring program is ongoing and indicates that the natural attenuation is working at the site. The monitoring program will continue to be conducted until two consecutive sampling events occur with the COC concentration less than the FDEP GCTL. LUCs are in place at Site 21 in the form of a recorded deed.

The remedial actions were implemented as designed and included measures that prevented exposure. Data from the completed remedial actions (soil excavation and groundwater monitoring) indicate that soil RAOs have been met, and steps are being taken for the groundwater RAOs to be met.

Site 25

The implementation of the source control portion of the remedy was completed in May 2001. The long-term groundwater monitoring program was conducted from 2002 through 2007 and was discontinued when two consecutive sampling events indicated that there were no COC concentrations exceeding GCTLs. LUCs were in place during remediation activities, but are no long necessary at the site.

The remedial actions have been implemented as designed and include measures that prevent exposure. The remedial actions that have been completed (soil excavation and long-term groundwater monitoring program) are operating as designed, and the data indicate that the RAOs have been met.

9.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedies.

9.7.2.1 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 revised Florida Surface Water Quality Standards (Chapter 62-302, FAC). The site-specific action levels are from the development of an IBDS for NAS Cecil Field.

SOIL			
Arsenic	Previous	0.8 mg/kg	FDEP Soil Cleanup Goal
	New	2.1 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 site-specific action level for arsenic has become less stringent since the signing of the ROD and does not affect the protectiveness of the remedial action.

Other federal and state ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

9.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RIs. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No changes to these assumptions or the cleanup levels developed from them is warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies. The remedies are progressing as expected for OU 10.

9.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedies. No other information has been identified that calls into question the protectiveness of the remedies.

9.7.4 Technical Assessment Summary

According to the data reviewed and the site inspections, the remedies are functioning as intended by the RODs. There have been no changes in the physical conditions of the sites, to toxicity factors for the COCs, or to the standardized risk assessment methodology that would affect the protectiveness of the remedies. There is no other information that calls into question the protectiveness of the remedies.

9.8 ISSUES

There were no issues identified during the five-year review while the Navy owned the property. However, when Site 21 and Site 25 were transferred to the City of Jacksonville, the LUCs needed to be implemented. These LUCs, by way of deed restrictions, notices, or other agreements, were adopted. LUCs are no longer required for Site 25, and the current and expected future land use at Site 21 suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

9.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 10, as no deficiencies were identified during the five-year review.

9.10 PROTECTIVENESS STATEMENT

Site 21

The Site 21 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Abiotic natural attenuation processes continue to be effective in reducing concentrations of contaminants in groundwater, and implementation of soil and groundwater LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. The natural attenuation and associated groundwater monitoring program was implemented as designed, and results indicate progress in achieving cleanup goals. LUCs were implemented by the Navy upon finalization of the LUC RD in May 2006, and in accordance with the LUC RD, are being continued after transfer of Site 21 to City of Jacksonville per the FOST dated October 2006. LUCs will be required until soil and groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Soil LUCs at Site 21 may be permanent, as they allow for current and likely future industrial use, but prohibit any residential use. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 21 have been or will be met.

Site 25

The remedy at Site 25 is protective of human health and the environment. The Remedial Action is complete at Site 25; natural attenuation reduced groundwater concentrations to less then cleanup goals, and no further action is now required for soil and groundwater at the site. Natural attenuation was implemented to reduce concentrations of contaminants in groundwater, as verified by groundwater monitoring. Implementation of groundwater LUCs provided a significant degree of protection of human health and the environment until completion of the remedy achieved full protectiveness and the LUCs were no longer required. Based on the completed remedial activities, the intent and goals of the ROD for Site 25 have been met.

TABLE 9-1

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER
OPERABLE UNIT 10, SITE 21
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

WELL ID	SAMPLING DATE		ALPHA CHLORDANE (ug/L)	GAMMA CHLORDANE (ug/L)	CHLORDANE (ug/L)
TARGET CLEANUP GOAL*			NC	NC	2
CEF-P21-01S	Jan-97		**1.9**	**1.5**	**3.4**
	Jun-99		**1.4**	**1.5**	**2.9**
	Jul-02		NA	NA	**3.6**
	Feb-03		**0.18**	**0.2**	**8.8 J**
	Aug-03	Sample	NA	NA	**12.4 J**
		Duplicate	NA	NA	**14.2 J**
	Jan-04	Sample	NA	NA	**3.3 J**
		Duplicate	NA	NA	**2.9 J**
	Jul-04	Sample	NA	NA	**2.3**
		Duplicate	NA	NA	**2.3**
	Jul-05		NA	NA	**15**
	Jul-06		NA	NA	**4.2**
	Aug-07		NA	NA	**4.5**
	Jul-08		NA	NA	**1.3**
	Sep-09		NA	NA	**0.54**
CEF-P21-05S	Jul-04		NA	NA	**23**
	Oct-09		NA	NA	**10**
	Jul-05		NA	NA	**42**
	Jul-06		NA	NA	**41**
	Aug-07		NA	NA	**78**
	Jul-08		NA	NA	**27 I**
	Sep-09		NA	NA	**40.4**
CEF-P21-08S	Jul-02		NA	NA	0.59 U
	Feb-03		0.079	0.065	**0.68 J**
	Aug-03		NA	NA	**0.8 J**
	Jan-04		NA	NA	0.27 U
	Jul-04		NA	NA	**0.13 J**
	Jul-05		NA	NA	**0.33 J**
	Jul-06		NA	NA	**0.13 I**
	Aug-07		NA	NA	**0.39 I**
	Jul-08		NA	NA	**0.12 I**
			NA	NA	0.24 U
CEF-P21-09S	Jul-05		NA	NA	0.058 U
	Jul-06	Sample	NA	NA	0.061 U
		Duplicate	NA	NA	0.059 U
	Aug-07		NA	NA	0.057 U
	Jul-08	Sample	NA	NA	0.058 U
		Duplicate	NA	NA	0.057 U
	Sep-09		NA	NA	0.24 U

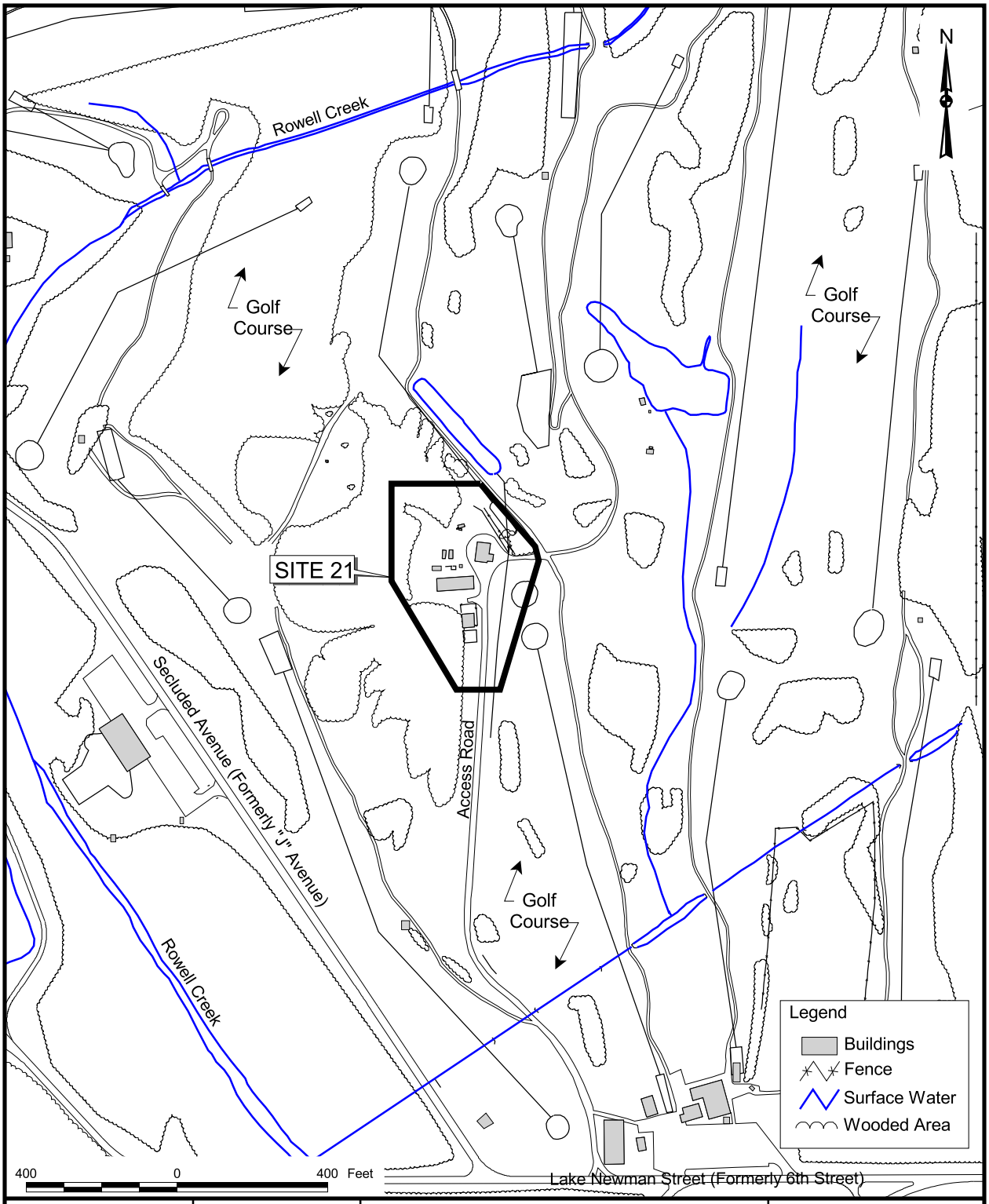
Shaded values exceed Cleanup Goals.
Bolded values exceed detection limit.
*FDEProtection Groundwater Cleanup Taget Levels as stated in FAC 62-777.
NA = Not analyzed
I = Estimated concentration between the Method Detection Limit and Practical Quantitation Limit.
J = Estimated concentration.
U = Not detected at or above detection limit.
Not detected values shown are either the Reporting Limits or the PQL as reported by the laboratory.
ug/L - micrograms per liter

TABLE 9-2

SUMMARY OF ANALYTICAL RESULTS IN GROUNDWATER
OPERABLE UNIT 10, SITE 25
FIVE YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

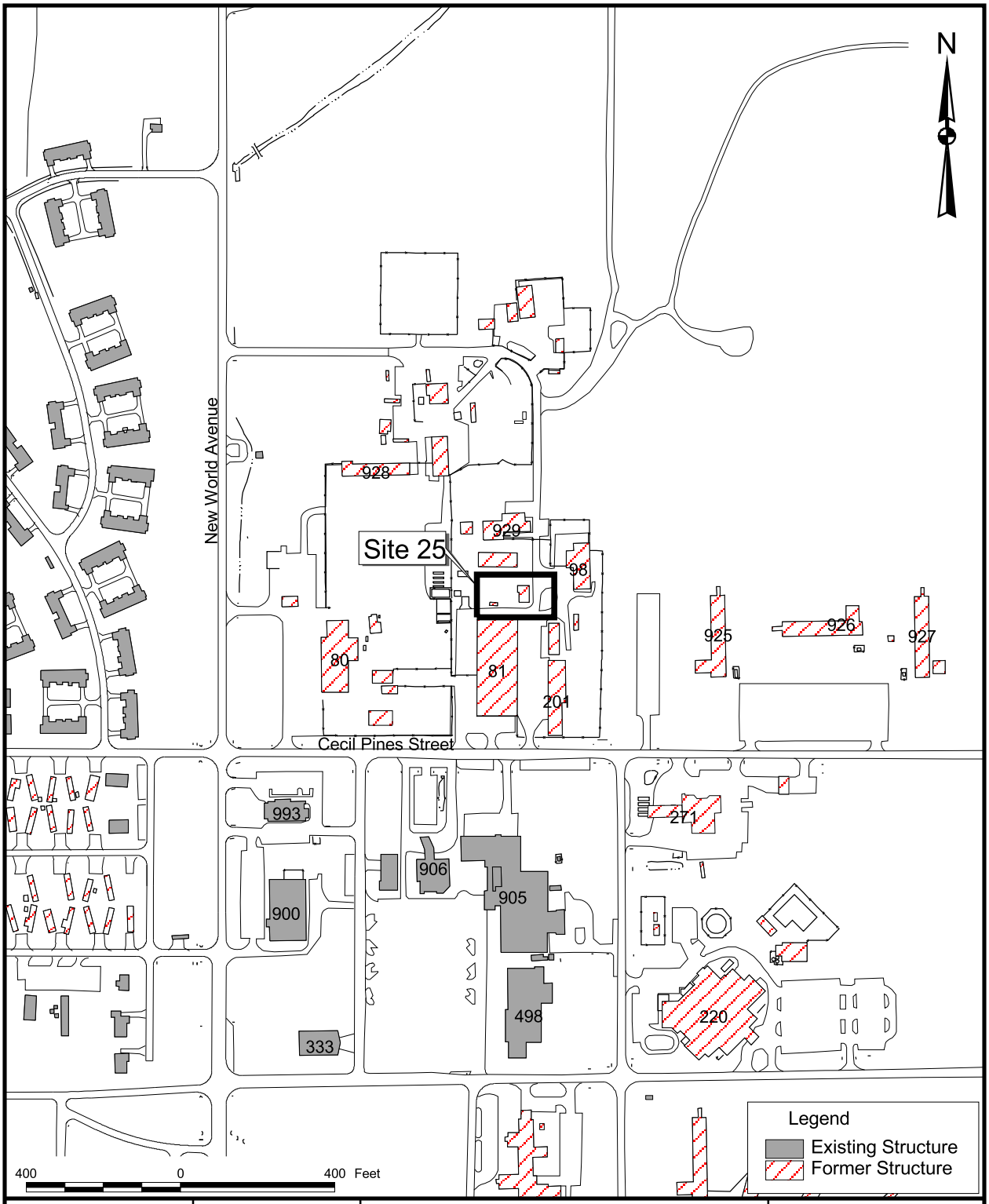
WELL ID	SAMPLING DATE		ALPHA-BHC (ug/L)	BETA-BHC (ug/L)	GAMMA-BHC (ug/L) Lindane	DIELDRIN (ug/L)
FDEP GCTLs*			0.006	0.020	0.2	0.002
Laboratory PQL			0.05	0.050	0.05	0.1
CEF-P25-01S	Jul-99	Sample	**0.12**	**0.12**	**0.43**	0.05 U
		Duplicate	**0.12**	**0.12**	**0.42**	0.05 U
	Apr-00	Sample	**0.058 J**	**0.074**	**0.16**	0.060 U
		Duplicate	**0.074**	**0.069**	**0.16**	0.055 U
	Jul-02	Sample	0.052 U	0.052 U	0.052 U	**0.015 J**
		Duplicate	0.051 U	0.051 U	0.051 U	**0.014 J**
	Feb-03	Sample	0.002 U	**0.020**	**0.0025 J**	**0.020**
		Duplicate	0.002 U	**0.019**	**0.0037 J**	**0.018**
	Aug-03	Sample	0.010 U	**0.100**	0.01 U	**0.081**
		Duplicate	0.010 U	**0.087**	0.01 U	**0.082**
	Jan-04	Sample	0.00051 U	**0.026**	0.0051 U	**0.026**
		Duplicate	0.0005 U	**0.028**	0.005 U	**0.026**
	Jul-04	Sample	0.0051 U	0.0063 U	0.011 U	**0.044 I**
		Duplicate	0.0051 U	0.0063 U	0.011 U	**0.031 I**
	Jul-05	Sample	**0.0015 J**	**0.089**	0.011 U	**0.071 I**
		Duplicate	**0.0012 J**	**0.088**	0.011 U	**0.07 I**
	Jul-06	Sample	0.00052 U	**0.014 I**	0.011 U	**0.066 I**
	Feb-07	Sample	0.00051 U	**0.018 I**	0.011 U	**0.076 I**
		Duplicate	0.00053 U	0.0065 U	0.011 U	**0.0015 I**
CEF-081-02S	Feb-97		0.050 U	0.050 U	0.050 U	0.050 U
	Jul-02		0.052 U	0.052 U	0.052 U	0.052 U
	Feb-03		0.002 U	0.004 U	0.002 U	0.002 U
	Aug-03		0.010 U	0.021 U	0.010 U	0.010 U
	Jan-04		0.0056 U	0.011 U	0.0056 U	0.0056 U
	Jul-04		0.00051 U	0.0063 U	0.011 U	0.00086 U
	Jul-05		0.00053 U	0.00053 U	0.00053 U	0.00090 U
	Jul-06		0.00054 U	0.0066 U	0.012 U	0.00091 U
	Feb-07		0.00051 U	0.0063 U	0.011 U	0.00086 U
CEF-081-03S	Feb-97		0.055 U	0.055 U	0.055 U	0.055 U
	Jul-02		0.052 U	0.052 U	0.052 U	0.052 U
	Feb-03		0.002 U	0.004 U	0.002 U	0.002 U
	Aug-03		0.010 U	0.021 U	0.010 U	0.010 U
	Jan-04		0.0054 U	0.011 U	0.0054 U	0.0054 U
	Jul-04		0.00051 U	0.0063 U	0.011 U	0.00086 U
	Jul-05		0.00053 U	0.0066 U	0.011 U	0.00090 U
	Jul-06		0.00053 U	0.0065 U	0.011 U	0.00089 U
	Feb-07		0.00053 U	0.0066 U	0.011 U	0.00090 U

Shaded values exceed Cleanup Goals.
Bolded values exceed detection limit.
*Florida Department of Environmental Protection Groundwater Cleanup Taget Levels as stated in FAC 62-777.
NA = Not applicable
I = Estimated concentration between the Method Detection Limit and Practical Quantitation Limit.
J = Estimated concentration.
U = Not detected at or above detection limit.
Not detected values shown are either the Reporting Limits or the PQL as reported by the laboratory.
alpha-BHC = hexachlorocyclohexane, alpha-
beta-BHC = hexachlorocyclohexane, beta-
gamma-BHC = hexachlorocyclohexane, gamma-
MCLs: only Gamma-BHC (Lindane) has an MCL and it is 0.2 ug/l.
ug/L - micrograms per liter



DRAWN BY MJJ	DATE 13Oct09	SITE VICINITY MAP OPERABLE UNIT 10, SITE 21 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-1 / REV 0

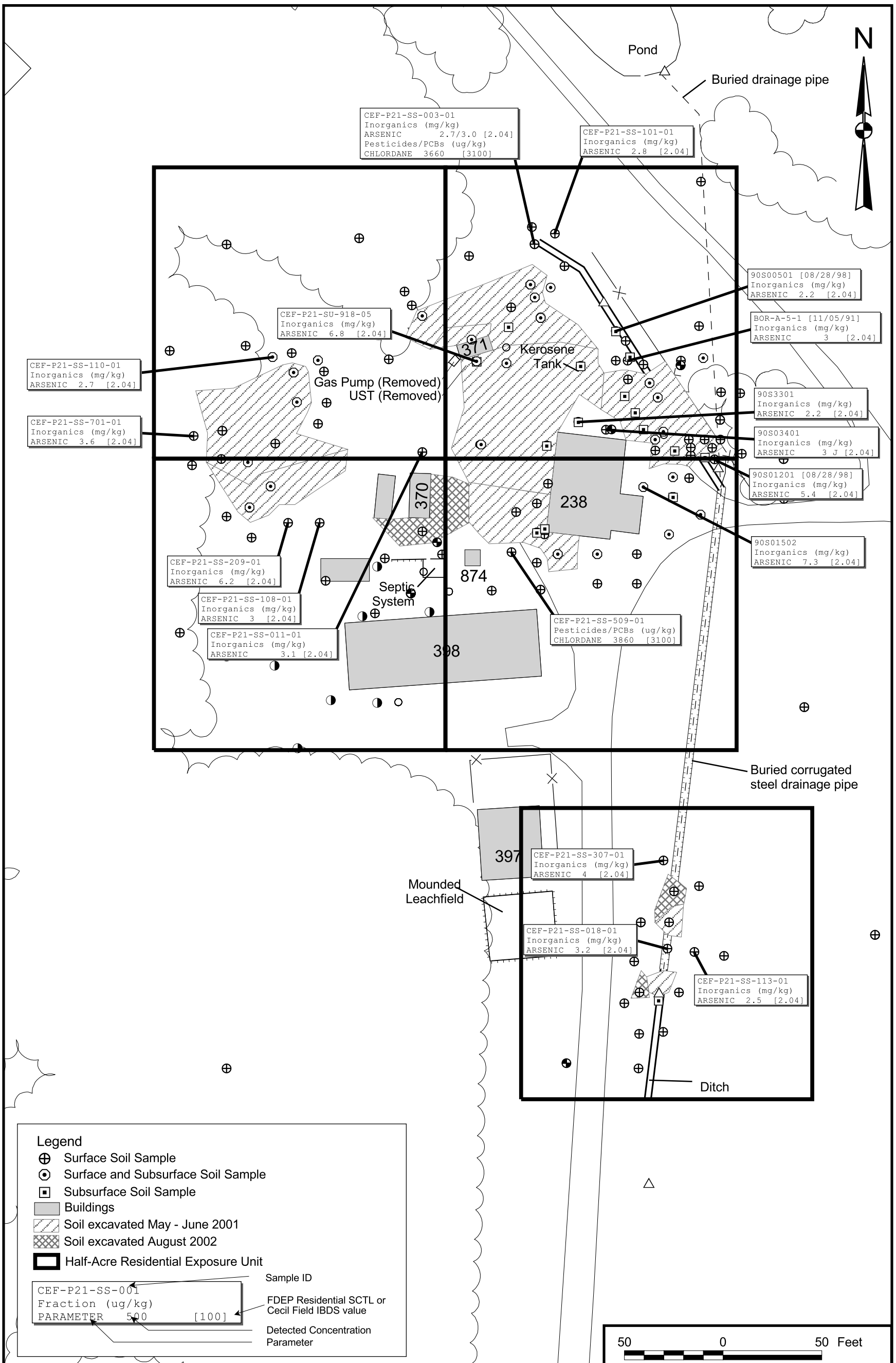
site-21_20091013_ops.apr 13Oct09 Layout02



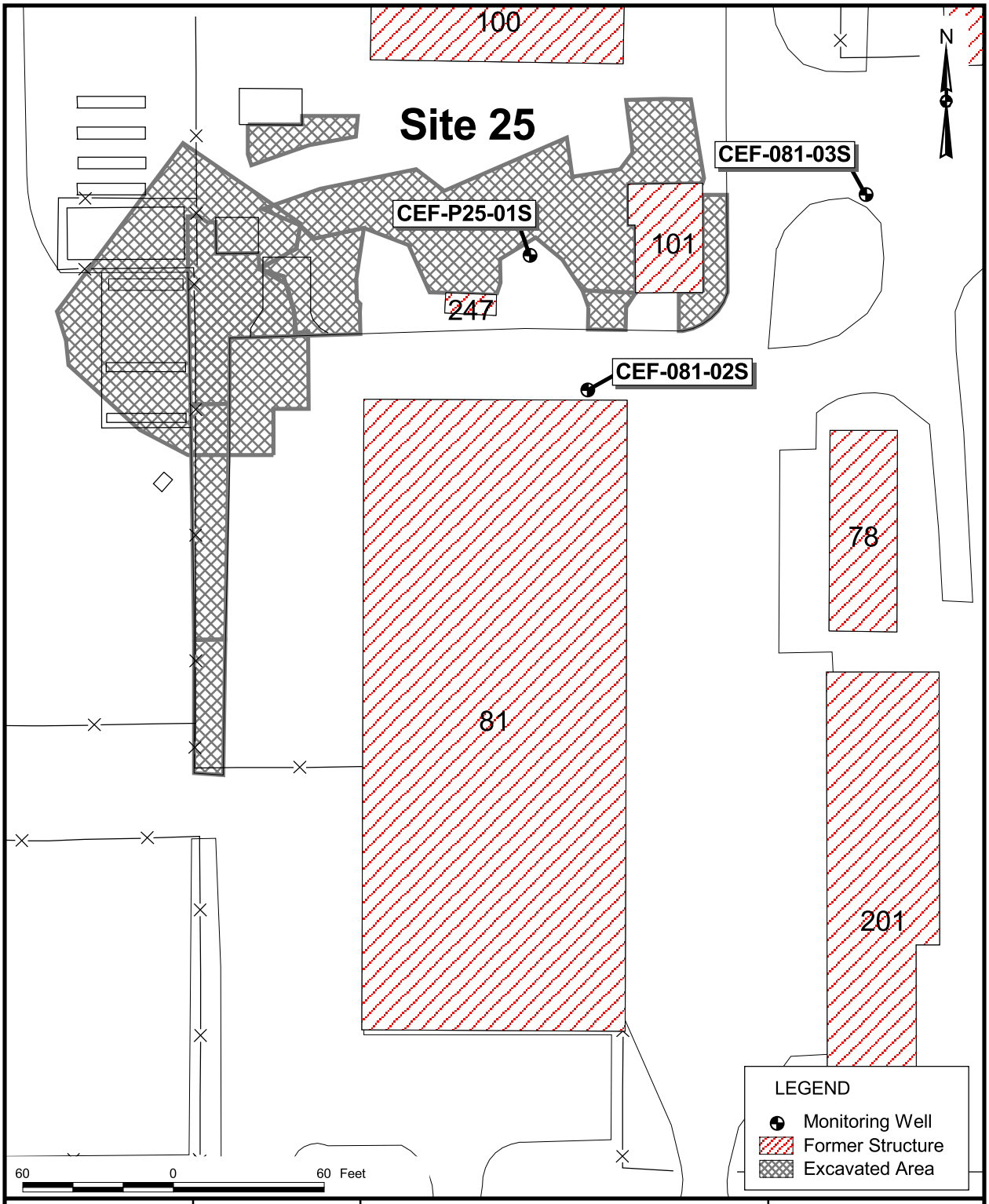
DRAWN BY MJJ	DATE 13Oct09	SITE VICINITY MAP OPERABLE UNIT 10, SITE 25 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-2 / REV 0

site-25_20091013.apr 13Oct09 Layout 1-2

site-21_20091013_ops.apr 13Oct09 Layout04

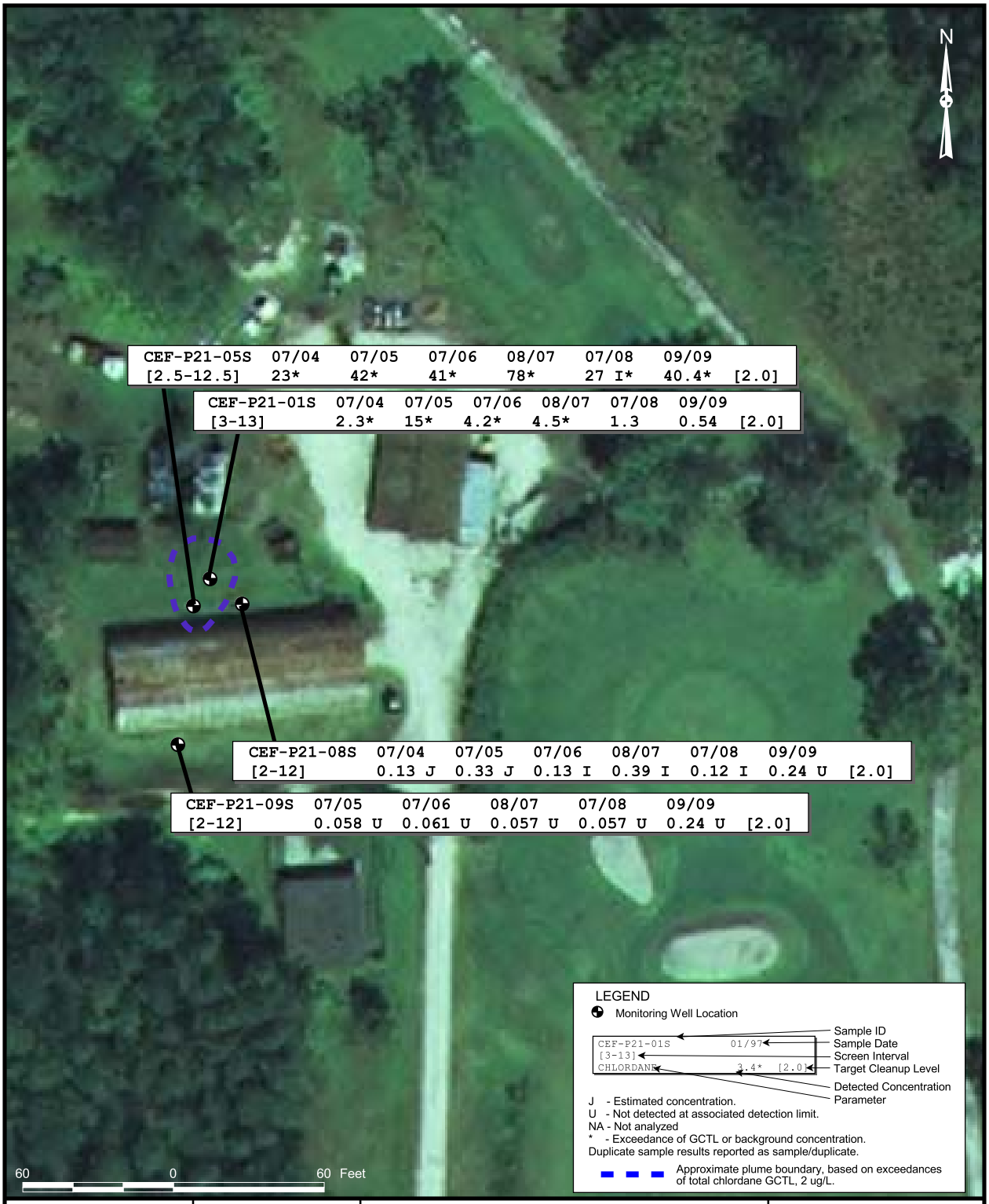


DRAWN BY MJJ	DATE 13Oct09	AREAS OF EXCAVATION AND SOIL CONCENTRATIONS GREATER THAN IBDS VALUE AND THREE TIMES RESIDENTIAL SCTLs (POST-EXCAVATION) OPERABLE UNIT 10, SITE 21 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 9-3 REV 1



DRAWN BY MJJ	DATE 13Oct09	AREA OF EXCAVATION OPERABLE UNIT 10, SITE 25 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-4 / REV 0

site-25_20091013.apr 13Oct09 Layout 1-4



DRAWN BY MJJ	DATE 14Oct09	CHLORDANE CONCENTRATIONS IN GROUNDWATER OPERABLE UNIT 10, SITE 21 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-5 / REV 0

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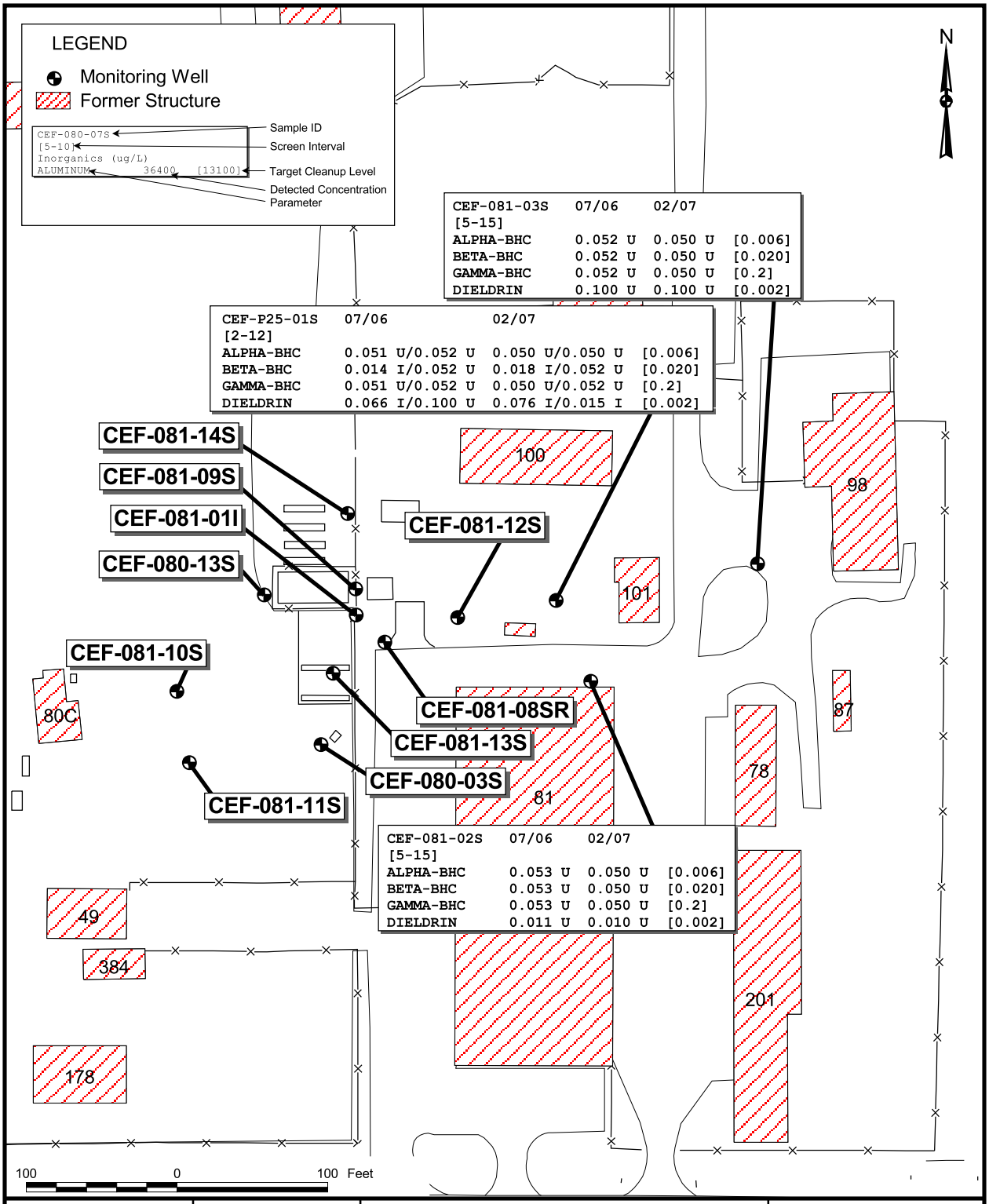


DRAWN BY MJJ	DATE 13Oct09	GROUNDWATER RESULTS OPERABLE UNIT 10, SITE 25 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 9-6 REV 0

site-25_20091013.apr 13Oct09 Layout 3-2

10.0 OPERABLE UNIT 11, SITE 45

10.1 INTRODUCTION

Implementation of the remedial actions at OU 11 began in 2002. This five-year review consists of an approximate 7-year period of data and provides a current status update for OU 11. A detailed review of the remedial actions will be presented, as the previous five-year review contained only 3 years of data which is insufficient for drawing conclusions or accurately establishing trends. Site 45 was not evaluated in the first five-year review because the ROD had not been signed at that time.

This five-year review is being conducted as a statutory review because even after groundwater cleanup levels are achieved, unlimited use and unrestricted exposure to soils will remain unacceptable. OU 11 consists of Site 45, Former Steam-Generating Plant.

10.2 SITE CHRONOLOGY

A list of important OU 11, Site 45 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Operation of Buildings 2, 7, 11, and 12	1941 through 1999
Investigations of Buildings 7 and 11 under BRAC and UST programs	1995 through 1998
Designation as PSC 45	January 1999
PSC Investigation	June 1999 through March 2000
Designation as IR Site 45	February 2000
RI	April 2000 through August 2000
Action Memorandum for Soil Removal Action	May 2000
Soil Removal Action	August 2000
Final RI	June 2001
Final FS	August 2001
Annual Groundwater Sampling	July 2002 to present
Proposed Plan	July 2003
ROD	October 2003
LUC RD	April 2004
Interim Remedial Action Report	December 2004
OPS Demonstration	November 2005
Site 45 FOST	October 30, 2006
NFA with LUCs Proposal (Draft)	May 2008

10.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 11. OU 11, Site 45 is primarily unpaved and covers an area of approximately 2 acres. As shown on Figure 10-1, Site 45 is located north of Crossover Street (formerly Second Street) and east of Authority Avenue (formerly "C" Avenue). Investigations at the site were originally focused on Buildings 7 (Flammable and Hazardous Materials Storage Building) and 11 (Steam Generating Plant). The site included Buildings 2, 7, 11, and 12, and the adjacent area. Three ASTs and a concrete containment area were located east of Building 11. The buildings have been demolished, and the ASTs have been removed from the site. A UST previously located south of Building 11 was removed in 1986.

Land and Resource Use/History of Contamination

Building 11 was the Steam Generating Plant and included a large room for three boilers and several smaller rooms for office space, workshops, and restrooms. Building 2 was an administrative office. Building 7 was used to store flammable and hazardous materials used for operations in Building 11. Building 12 was originally built as a utility building and hospital, and was converted in 1943 to a headquarters administrative facility. In 1989, the building began being used for Operations Training activities.

A soil removal action to meet industrial land use criteria was conducted in August 2000 (prior to the RI) based on the Action Memorandum. CH2MHill, the Navy's RAC, removed approximately 363 tons of soil contaminated with arsenic and PAHs, and the soil was properly disposed off site. Figure 10-2 shows the areas of excavation, and post-excavation soil concentrations greater than residential SCTLs that remain on site.

Initial Response and Basis for Taking Action

Site 45 was not identified in the 1985 IAS by Envirodyne Engineers or the base-wide RFI conducted by HLA in 1988. Building 11 was identified in the EBS as requiring further investigation. When soil contamination was detected over an extensive area, the site was redesignated as PSC 45. When groundwater contamination was detected during the PSC investigation, the site was again redesignated as IR Site 45 within OU 11.

10.4 REMEDIAL ACTIONS

10.4.1 Remedy Selection

The three RAOs identified in the ROD for soil and groundwater at Site 45 were developed based on investigations indicating that the presence of surface soil and groundwater contamination posed a potential risk to public health, welfare, or the environment. The RAOs were:

- Prevent unacceptable risk from exposure to soil with concentrations of BaPEqs and TRPH greater than FDEP residential SCTLs, and concentrations of arsenic greater than the site-specific IBDS value.

- Prevent unacceptable risk from ingestion of groundwater with concentrations of vanadium greater than the FDEP GCTL.

- Reduce concentrations of vanadium in groundwater to less than the FDEP GCTL.

The selected remedial alternative at Site 45 for soil included LUCs and soil monitoring at 5-year intervals to verify that contaminant migration from soil to groundwater is not occurring, and to assess the natural attenuation of soil contamination. The selected remedial alternative for groundwater included LUCs, natural attenuation, and annual monitoring. The selected alternatives were considered to be protective of human health and the environment, capable of attaining ARARs, and cost-effective. The remedial alternatives selected for soil and groundwater at Site 45 will not achieve ARARs immediately, but compliance will eventually be achieved through natural processes, and monitoring will verify compliance.

10.4.2 Remedy Implementation

Soil Monitoring

Two soil sampling events have been conducted at Site 45 in accordance with the ROD. The results are discussed in the Five Year Reviews only, rather than in separate reports. Results from the second soil sampling event are presented below.

Groundwater Monitoring

Seven groundwater sampling events have been conducted at Site 45 in accordance with the Long-Term Monitoring Plan and recommendation of annual monitoring reports.

Land Use Controls

LUCs required at Site 45 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit residential reuse of the site.
- Prohibit the excavation and uncontrolled removal of soil from the site.
- Prohibit all uses of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing of future monitoring and remediation system(s)

The LUC requirements went into effect upon finalization of the LUC RD for Site 45 in April 2004 and they remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 45 property, as required by FDEP. Therefore, the LUCs have remained in effect after the site was transferred to the City of Jacksonville, and will also apply to any subsequent owners.

10.4.3 System Operations/Operation and Maintenance

10.4.3.1 Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted at the site in accordance with the ROD, Long-Term Monitoring Plan for Operable Unit 10, Sites 21 and 25 and Operable Unit 11, Site 45, and recommendations of the annual reports. Annual monitoring began in July 2002 and is ongoing. A total of seven wells, including wells within and downgradient of the plume, were sampled and analyzed for vanadium, the only groundwater COC at the site. Three downgradient wells were added during the most recent event for a total of ten groundwater monitoring wells.

During the most recent sampling event, ten groundwater monitoring wells were sampled for vanadium. Sampling has been performed at varying frequencies at certain wells at the site. Two wells, CEF-P45-08S and CEF-P45-13S, have been sampled annually; five wells were sampled annually from 2002 through 2004, and in 2008 and 2009: CEF-P45-03S, CEF-P45-02S, CEF-F11-1Sa, CEF-007-01Sa, and CEF-P45-04S; two wells were sampled in 2000 and during the most recent event in 2009 (CEF-P45-06S and CEF-P45-12S); and well CEF-F11-02Sb was sampled for the first time in September 2009. The BCT will determine, based on the latest data, if additional downgradient wells are necessary. Also, optimization of the long-term monitoring program will continue to be considered after each round of data is collected and analyzed.

10.4.3.2 Soil Monitoring Program

In accordance with the ROD, soil sampling was to be conducted at 5-year intervals, and the first soil monitoring event was conducted in May and July 2004, with the second being completed in July 2009. The BCT determined that soil sampling was no longer necessary because the TRPH, arsenic, and PAHs concentrations have met the necessary criteria based on the industrial reuse of the site. Soil sampling will be discontinued with the acceptance of this document, but additional soil sampling would be required if removal of the LUC restriction is requested in the future.

10.4.3.3 Cost

The estimated capital cost of soil removal at Site 45 was $52,000, and the actual cost of the soil removal was approximately $49,000. The Navy's original NPW cost estimate for implementation of the selected remedy was approximately $133,000 over a period of 30 years. The monitoring wells used for the implementation of long-term groundwater monitoring were installed as part of the RI. The total cost to conduct the first seven rounds of groundwater monitoring was approximately $13,000. The actual total cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

10.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The protectiveness statement from the Second Five Year review, below, details the standing of OU 11 during the past review period.

> The remedy at OU 11 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. Implementation of LUCs 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. Soil monitoring results do not indicate a future risk of migration of contaminants to groundwater.
>
> LUCs will be implemented before the transfer of the property to the City of Jacksonville. The Navy will temporarily retain control of OU 11, Site 45 and will transfer the property when it has determined that the remedial action is OPS or when the remedial action achieves cleanup levels that result in unlimited use and unrestricted exposure.

The remedial actions have been implemented as designed and are measures that will prevent exposure. The remedial actions that are currently in operation (groundwater and soil monitoring) are operating as designed. Based on the activities that are underway, the intent and goals of the ROD for OU 11 will be met.

The recommendations and follow-up actions developed by the BCT based on the previous five-year review for OU11, Site 45 are:

Previous Recommendation/ Required Actions	Projected Completion Date	Current Status
Continue Long-Term Monitoring Program.	Annually for groundwater and every 5 years for soil (unless recommendation for discontinuation is approved)	Long-term groundwater monitoring continuing annually at Site 45. Most recent sampling in September 2009. Soil sampling continued every five years. Most recent sampling event in July 2009.
Implement LUCs.	Upon finalization of the LUC RD	The LUC RD was finalized April 16, 2004 and LUCs are in place at Site 45 in the form of the recorded deed.

10.6 FIVE-YEAR REVIEW PROCESS

10.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for Site 45 including the ROD, the RI and FS reports, the Long-Term Monitoring Plan for Sites 21, 25, and 45, long-term groundwater monitoring reports, and the NFA with LUCs Proposal. The following section summarizes groundwater results for Site 45 based on a review of associated documents. Groundwater monitoring for vanadium is ongoing annually at Site 45.

Total vanadium concentrations have increased slightly in samples from two of the source area wells, but concentrations have decreased slightly in the samples from the sidegradient and downgradient wells. Concentrations of vanadium in samples from the downgradient and sidegradient wells are less than the FDEP GCTL. Concentrations of vanadium in samples from the source area wells still exceed the FDEP GCTL. The vanadium results are summarized on Figure 10-3.

As noted, concentrations of vanadium in samples from the source area wells still exceed the FDEP GCTL. In the most recent (July and September 2009) event, concentrations exceeded the vanadium GCTL at six of the wells sampled. The highest concentration detected was 807 µg/L, found at CEF-F11-1Sa, which is the only concentration detected that also exceeds the U.S. EPA PRG for tap

water, 260 µg/L. This well has historically exhibited the highest vanadium concentrations detected at the site in each sampling round. Vanadium concentrations increased during the September 2009 sampling event at wells CEF-P45-06S, CEF-P45-03S, CEF-F11-1Sa, and CEF-P45-04S, two of which are located within the source area, and one is immediately outside of the defined source area. CEF-P45-06S is located northwest (upgradient) of the groundwater plume, and has not had an exceedance in past sampling events, but the concentration of the filtered sample from this well (59.8 µg/L) was not significantly greater than the GCTL.

Wells CEF-P45-06S, CEF-F11-02Sb, and CEF-P45-12S had been added to the LTM program for this site for the first time in September 2009, and are located downgradient of the plume. It was decided at the November 2009 BCT meeting that CEF-P45-06S and CEF-F11-02Sb would be resampled, because they were the new, downgradient wells with exceedances. These wells were resampled in late November 2009, and the exceedances were confirmed. The BCT will discuss these results and reevaluate the LTMP at the site.

At Site 45, natural attenuation relies on natural processes such as dispersion, advection, and adsorption to eventually reduce the groundwater concentrations of vanadium to the GCTL. Biological degradation does not play a role, and therefore typical natural attenuation geochemical parameters are not measured.

Modeling performed during the FS indicated that 900 to 1,300 years may be needed to achieve the GCTL; therefore, changes in concentrations from year to year may be small. For example, in comparing the Year 3 event results to the Year 1 event results, the vanadium concentrations increased in samples from two source area wells and decreased in samples from three other source area wells. Vanadium concentrations in the sidegradient and downgradient wells are less than GCTLs in all sampling events before 2009, which suggest that the plume is not changing in size. The recent, September 2009 exceedances in downgradient wells will be further investigated to determine if there is any possibility of plume migration. Therefore, based on the small changes in vanadium concentrations in the source area wells and on the absence of clear evidence of vanadium migration, the results suggest that natural processes are attenuating the vanadium.

As required by the ROD for Site 45, soil sampling is to be conducted every 5 years at a minimum to evaluate potential contaminant migration from soils to groundwater, and to assess natural attenuation of soil contamination. The first soil sampling event was conducted in May 2004 and consisted of the collection of six surface soil samples from locations with the highest post-excavation concentrations of arsenic, PAHs, and TPRH. Two samples were analyzed for arsenic, three for PAHs, and one for TRPH. Sample results for arsenic and TRPH were less than residential SCTLs; however, benzo(a)pyrene results in the three PAH samples exceeded the industrial SCTL. The BCT decided to resample the locations

with PAH concentrations greater than the benzo(a)pyrene pick-up level (1,200 µg/kg), which is a statistically derived value used to determine areas requiring soil removal such that that the site-wide UCL of the remaining concentrations is less than the industrial SCTL. The two locations were resampled in July 2004; the benzo(a)pyrene results were less than the pick-up level, and other PAH concentrations were less than residential SCTLs. The second soil sampling was competed July 2009. The sampling and analysis performed were identical to that done in 2004, with two samples analyzed for arsenic, three for PAHs, and one for TRPH. The arsenic concentration in one sample exceeded the residential SCTL but was less than the industrial SCTL. There were residential SCTL BaPEq and BaP exceedances at all three of the locations analyzed for PAHs, with two of the BaPEq samples also exceeding the industrial SCTL. The BaPEq concentration in the duplicate sample was less than the residential and industrial SCTLs. Based on these results, soil sampling at Site 45 is discontinued upon approval of this five-year review unless removal of the soil industrial LUC is requested.

10.6.2 Site Inspection

The site inspection for OU 11 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at Site 45 included visual observations of the site area and associated groundwater monitoring wells. The inspection identified that the implementation of the remedy and monitoring program were operating as designed and they are protective of human health and the environment. Signs remained intact and no damage was observed. TtNUS conducted site visits at Site 45 as part of the field activities in 2002 through 2009. Activities conducted during the site visits included groundwater sampling and site walkovers, and the 2004 and 2009 visits included soil sampling as well. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Navy transferred the site and surrounding property to the City of Jacksonville for use as an industrial/commercial area, per the FOST, dated October 30, 2006. The land is currently a vacant, relatively featureless area with no structures.

Site 45 LUC inspections have been completed annually by JEDC since 2007. The LUC inspections indicate that Site 45 groundwater is not being used, monitoring wells are not being disturbed, and subsurface soils have not been disturbed.

10.6.3 Interviews

There were no interviews conducted in the course of the five year review.

10.7 TECHNICAL ASSESSMENT

10.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the ROD.

The exceedances of vanadium that were detected in the September 2009 sampling event will be addressed by the BCT, and the detections at all other wells indicate that natural attenuation is working at the site. The implementation of LUCs is protective of human health and the environment by preventing exposure to contaminated soil and groundwater that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure to receptors. The remedial actions that are currently in operation (groundwater monitoring and soil sampling – if it is not discontinued) are operating as designed, and the data indicate progress toward meeting the RAOs.

10.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

10.7.2.1 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).

Contaminant	ARAR		Source
SOIL			
TRPH	Previous	340 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (1999)
	New	460 mg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Rule (2005)

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The only ARAR that was changed for Site 45 is for TRPH, and the concentration increased. Thus, this change will not negatively affect the protectiveness of the remedial design or the time or resources to complete the remedial action.

Other federal and state ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

10.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RI. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing the risk-based cleanup level. No changes to these assumptions, or the cleanup level developed from them, are warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 11.

10.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. The September 2009 exceedances in downgradient wells will be addressed by the BCT in a manner that ensures that human health and the environment remain protected. No other information has been identified that calls into question the protectiveness of the remedy.

10.7.4 Technical Assessment Summary

According to the data reviewed and the site inspections, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COC, or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

10.8 ISSUES

All soil cleanup goals have been met, thus NFA is appropriate for soil at Site 45, other than the continued applicability of LUCs. When the Navy transferred the property to the City of Jacksonville, the LUCs, by way of deed restrictions, notices, or other agreements, were adopted, and it is imperative that they be continued by the City of Jacksonville. The current and future land use at this site suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

The exceedances detected in the downgradient wells during the most recent sampling event present an issue at this site, which will be addressed by the BCT in a way that protects human health and environment.

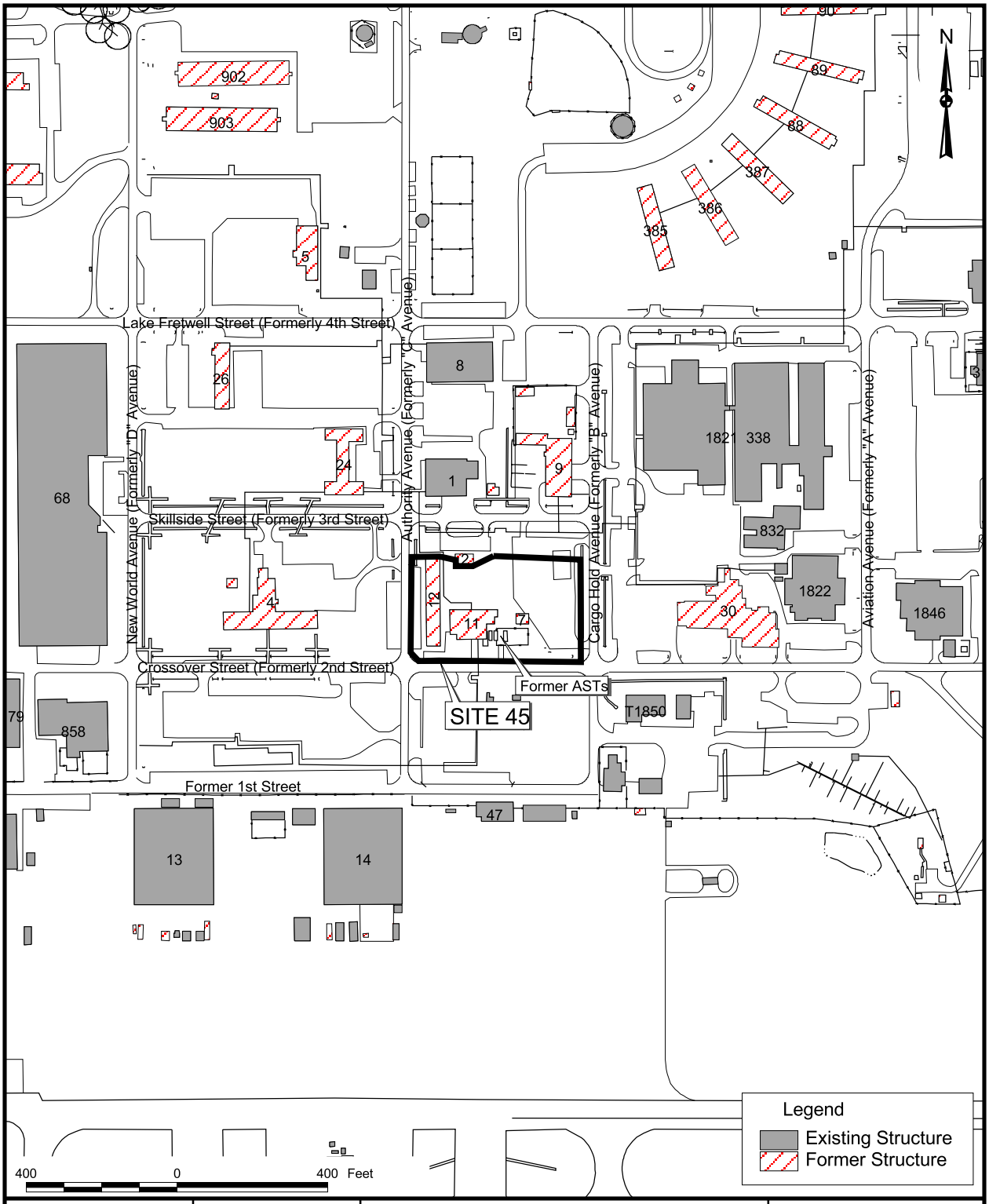
10.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and follow-up actions developed by the BCT based on the inspections, five-year review, and transfer of the property to the City of Jacksonville are shown in the table below.

Issue	Recommendations/ Required Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Soil cleanup goals have been met	Discontinue Soil Sampling	Navy	U.S. EPA and FDEP	April 29, 2011	No	No

10.10 PROTECTIVENESS STATEMENT

The Site 45 remedy is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Natural attenuation processes continue to make progress toward meeting groundwater remedial goals, and implementation of soil and groundwater LUCs provides a significant degree of protection of human health and the environment until completion of the remedy is achieved to provide full protectiveness. The natural attenuation and associated groundwater and soil monitoring programs were implemented as designed, and results indicate progress in achieving groundwater cleanup goals, and that soil cleanup goals have been met. LUCs were implemented by the Navy upon finalization of the LUC RD in April 2004, and in accordance with the LUC RD, are being continued after transfer of Site 45 to the City of Jacksonville per the FOST dated October 2006. Groundwater LUCs will be required until groundwater COC concentrations decrease to levels that allow for unlimited use and unrestricted exposure. Soil LUCs will be required as long as soil COCs are at concentrations that prevent unlimited use and unrestricted exposure. Soil monitoring results do not indicate a future risk of migration of contaminants to groundwater. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (natural attenuation, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 45 have been or will be met.



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AS NOTED				FIGURE 10-1 / 0

SITE VICINITY MAP
OPERABLE UNIT 11, SITE 45
FIVE-YEAR REVIEW
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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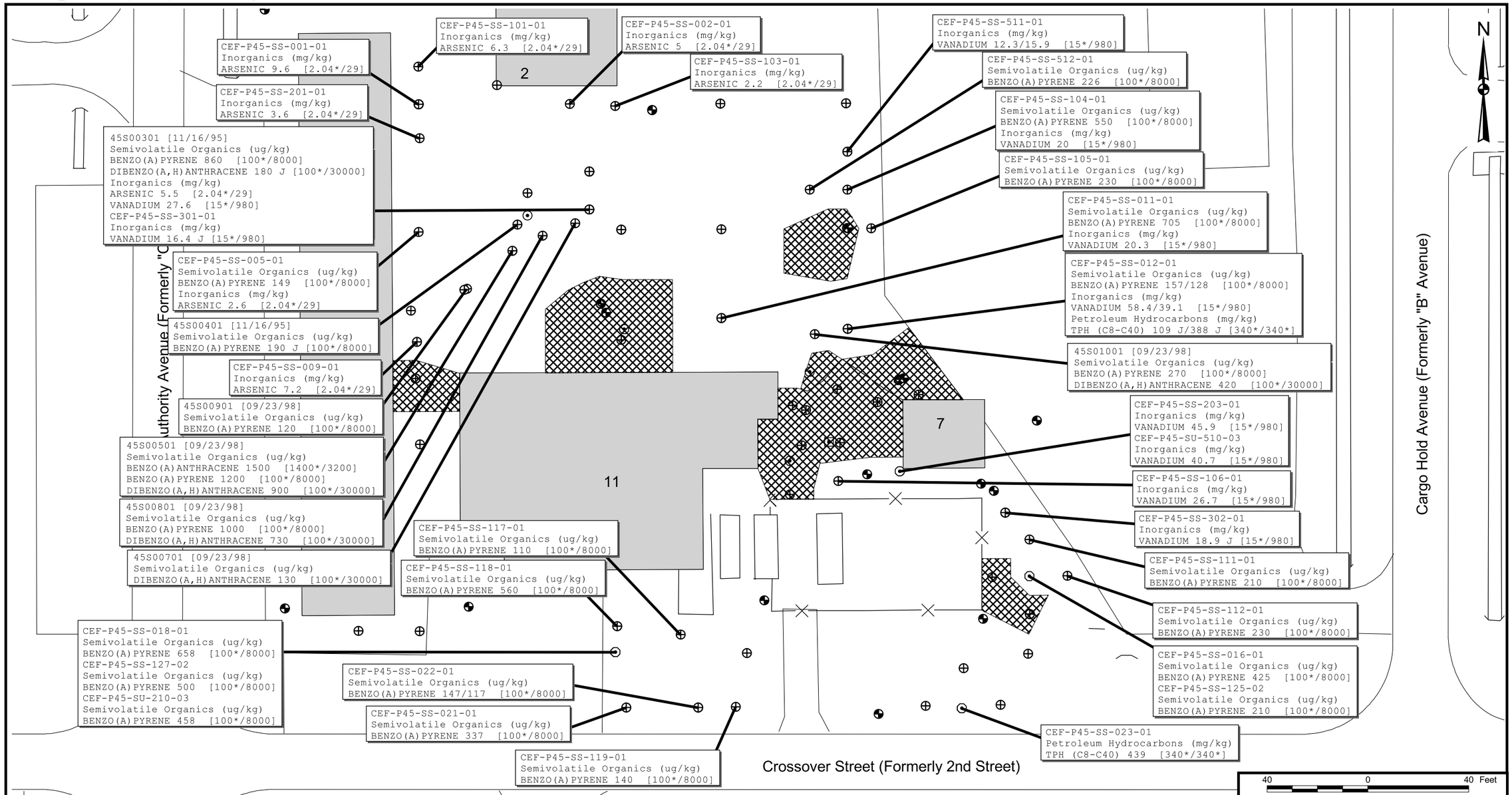

Legend

- Monitoring Well
- Surface Soil Sample
- Surface and Subsurface Soil Sample
- Subsurface Soil Sample
- Buildings
- Excavation Area

CEF-P46-SS-001 — Sample ID
Fraction (ug/kg) — FDEP Residential SCTL / FDEP Leachability SCTL
PARAMETER 500 [100/100] — Detection Concentration
Parameter

DRAWN BY MJJ	DATE 13Oct09	AREAS OF EXCAVATION AND SOIL CONCENTRATIONS GREATER THAN RESIDENTIAL SCTLs (POST-EXCAVATION) OPERABLE UNIT 11, SITE 45 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
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COST/SCHED-AREA			APPROVED BY / DATE
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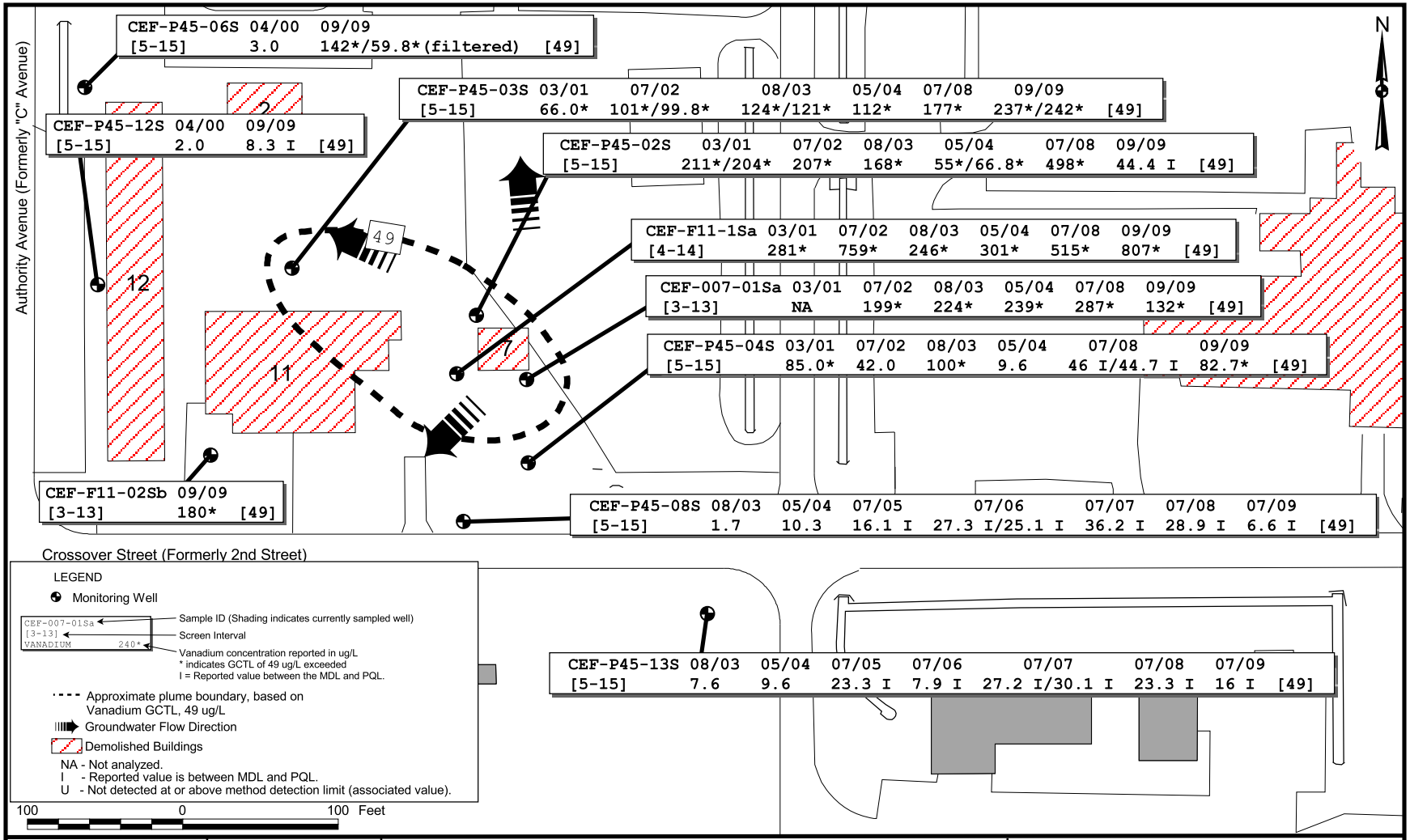

DRAWN BY MJJ	DATE 14Oct09	VANADIUM IN GROUNDWATER OPERABLE UNIT 11, SITE 45 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
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COST/SCHEDULE-AREA			APPROVED BY DATE
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site-45_200607a-5yr-review.apr 14Oct09 03 [Lab Result] Vanadium Layout

11.0 OPERABLE UNIT 12, SITE 32

11.1 INTRODUCTION

Implementation of the remedial actions at OU 12 began with the first groundwater monitoring event performed on May 10, 2004. The ROD for the site was approved on November 22, 2004. This five-year review consists of an approximate 5-year period of data and provides a current status update for OU 12. A detailed review of the remedial actions will be presented, as Site 32 was not included in the previous five-year review because the ROD had not been signed at the time it was written.

This five-year review is being conducted as a statutory review because even after groundwater cleanup levels are achieved, unlimited use and unrestricted exposure to soils will remain unacceptable.

OU 12 consists of Site 32, Defense Reutilization and Marketing Office (DRMO) Asphalt Storage Yard, and Sites 42, 44, and the Old Golf Course. Site 32 is the only OU 12 site included in this five-year review because the selected remedies in the RODs for Sites 42, 44, and the Old Golf Course were No Further Action.

11.2 SITE CHRONOLOGY

A list of important Site 32 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Operation of Hazardous Materials Warehouse/Storage Area	1941 through 1999
Investigations of AOI 32	1994 through 1998
Designation as IR Site 32	February 2000
RI	April 2000 through August 2000
Action Memorandum for Soil Removal Action	May 2000
Soil Removal Action	August 2000
EE/CA	August 2002
Proposed Plan	September 2003
Five-Year Groundwater Sampling	May 2004 to present
ROD	September 2004
LUC RD	May 2006
OPS Demonstration Approved	August 2006
Site 32 FOST	October 30, 2006
Field Task Modification Request (FTMR)	August 2009

11.3 BACKGROUND

Physical Characteristics

Figure 1-2 is a generalized map of NAS Cecil Field that shows the location of OU 12. Site 32 covers an area of approximately 3.4 acres, with approximately 1.4 acres being paved and 2 acres being unpaved. As shown on Figure 11-1, Site 32 is located just north of the western edge of Crossover Street (formerly Second Street) and west of New World Avenue (formerly "D" Avenue). The site includes Buildings 325 and 335, and the adjacent area. The portion of the site in the vicinity of Building 325 (approximately 1.4 acres) was a fenced storage area.

Land and Resource Use/History of Contamination

Site 32 was used for initial storage and warehousing of materials as they arrived at the base. Historically, the site was used for unpermitted storage of hazardous materials; first-hand accounts have been documented of leaking and poorly maintained drums at the site (ABB-ES, 1994). Building 325 was the Hazardous Materials Storage, and the building is not fully enclosed. Building 335 was known as the Hazardous Materials Warehouse.

A soil removal action to meet industrial land use criteria was conducted in August 2000 [prior to the Engineering Evaluation/Cost Analysis (EE/CA)] based on the Action Memorandum. CH2MHill, the Navy's RAC, removed approximately 142 tons of soil contaminated with petroleum, and the soil was properly disposed off site. Figure 11-2 shows the areas of excavation and Figure 11-3 shows post-excavation soil concentrations greater than industrial SCTLs that remain on site.

Initial Response and Basis for Taking Action

Site 32 was not identified in the 1985 IAS by Envirodyne Engineers or the base-wide RFI conducted by HLA in 1988. AOI 32 was identified in the EBS as requiring further investigation. A Sampling and Analysis Report (SAR) was completed for AOI 32 in 1996 by ABB-ES. Exceedances were detected in surface soil during the SAR, but the sediment and groundwater samples collected did not exceed screening criteria for any organic or inorganic chemicals analyzed. When soil contamination was detected over an extensive area, the site was re-designated as PSC 32. The area was again re-designated prior to the EE/CA as IR Site 32 within OU 12.

11.4 REMEDIAL ACTIONS

11.4.1 Remedy Selection

The RAOs identified in the ROD for soil and groundwater at Site 32 were developed based on investigations indicating that the presence of surface soil contamination and the possibility of that contamination leaching to groundwater posed a potential risk to public health, welfare, or the environment. The RAOs were:

- Prevent unacceptable risk from exposure to soil with concentrations of PAHs and inorganics in excess of the FDEP residential SCTL.

- Address the potential risk of transfer of organic and inorganic contamination from soil to groundwater from soils with concentrations that exceed the FDEP SCTL for leachability.

The selected remedial alternative at Site 32 for soil included the use of the existing asphalt cap, LUCs, and groundwater monitoring at 5-year intervals to verify that contaminant migration from soil to groundwater is not occurring and to assess the natural attenuation of soil contamination. The selected alternative was considered to be protective of human health and the environment, capable of attaining ARARs, and cost-effective. The remedial alternative selected for soil at Site 32 will not achieve ARARs immediately, but compliance will eventually be achieved through natural processes, and monitoring will verify compliance.

11.4.2 Remedy Implementation

Asphalt Cap

The asphalt cap already existed at Site 32, and remained in place as an Engineering Control (EC) to prevent exposure to contaminated soils beneath the asphalt.

Groundwater Monitoring

Three monitoring wells were installed at Site 32. Two groundwater sampling events have been conducted at Site 32 on a 5-year basis in accordance with the ROD. Groundwater samples are collected from two wells to verify that no unacceptable contaminant migration is occurring, and groundwater levels are measured at three wells.

Land Use Controls

LUCs required at Site 32 to ensure protection of human health and the environment are documented in a LUC RD, which, upon finalization, implemented the associated LUCs until the property was transferred. The LUC RD included the following LUC objectives:

- Prohibit residential, recreational, or agricultural reuse of the site.
- Prohibit the excavation of soil from the site.
- Maintain the integrity of the 63,000 square feet of asphalt cover that surrounds Building 325.
- Maintain the integrity of any existing or future monitoring and remediation system(s).

The LUC requirements took effect upon finalization of the LUC RD for Site 32 on May 5, 2006 and remained applicable during Navy ownership. LUC objectives and LUC requirements were also incorporated into the Quitclaim deed by which the Navy transferred the Site 32 property, as required by FDEP. Therefore, upon conveyance of the property to the City of Jacksonville per the FOST, dated October 30, 2006, the City of Jacksonville became responsible for the continued implementation of the LUCs, and any subsequent owners will be required to do the same.

11.4.3 System Operations/Operation and Maintenance

11.4.3.1 Long-Term Groundwater Monitoring Program

Long-term groundwater monitoring is being conducted at the site in accordance with the ROD and groundwater monitoring reports (presentations). Groundwater monitoring was to be conducted every 5 years, began in May 2004, and is ongoing. Two wells, including one well in the middle of the site and one well downgradient of the site, were to be sampled and analyzed for VOCs, SVOCs, and metals. No VOCs or SVOCs were detected during the 2004 sampling event, and all metals concentrations were less than GCTLs. Therefore, an FTMR was approved in August 2009 to limit the analysis of chemicals at Site 32 to only the COCs in soil remaining onsite under the asphalt cap that have been identified as exceeding leachability criteria. Thus, the only COCs to be analyzed are: 4-methylphenol, antimony, arsenic, barium, cadmium, lead, nickel, selenium, and vanadium. Optimization of the long-term monitoring program is considered after each round of data is collected and analyzed.

11.4.3.2 Asphalt Cap

There has been no maintenance required on the asphalt cap at Site 32. An OPS Demonstration Report was approved for the site in August 2006, which stated that the cap and all other remedial actions were in place and functioning as expected. The Site 32 property has been transferred to the City of Jacksonville

via a Quitclaim deed dated May 18, 2007 and recorded on June 12, 2008. The new owner is responsible for future cap maintenance.

11.4.3.3 Cost

The Navy's original NPW cost estimate for implementation of the selected remedy was approximately $49,000 over a period of 30 years. The total cost to conduct the first two rounds of groundwater monitoring was approximately $3,000 per round. The actual total cost for the implementation of the remedial design has not yet been tabulated because the remedial actions are ongoing.

11.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

OU 12, Site 32 was not included in the previous five-year review because the ROD was not signed and remedial activities had not been performed at the time of the second five-year review.

11.6 FIVE-YEAR REVIEW PROCESS

11.6.1 Document and Analytical Data Review

This five-year review consisted of a review of relevant documents for Site 32 including the ROD, the EE/CA and Source Removal reports, long-term groundwater monitoring reports, the FTMR, the OPS Demonstration report, and the LUC RD. The following section summarizes groundwater results for Site 32 based on a review of associated documents. Groundwater monitoring for select metals and 4-methylphenol is ongoing every 5 years at Site 32.

The soil removal action conducted at Site 32 removed soil that had concentrations of COCs greater than SCTLs; however, soil contaminant concentrations beneath the asphalt cap continued to exceed leachability criteria and SCTLs. Groundwater was sampled at Site 32 on May 10, 2004. There were no VOCs or SVOCs found at concentrations greater than detection limits, and metals concentrations were greater than detection limits, but were less than their respective GCTLs.

As required by the ROD for Site 32, groundwater sampling is to be conducted every 5 years because the selected remedy allows for COCs to remain in soil at levels that exceed cleanup goals. The second long-term monitoring event was conducted in November 16, 2009. The list of Site 32 COCs was changed by a FTMR in August 2009, limiting the COCs to be analyzed during the second sampling event. The sampling event was scheduled to be completed in May 2009, but the date was changed due to turbidity issues at the site. Replacement wells were installed in order to collect non-turbid samples. There were no detections of 3&4-methylphenol, antimony, arsenic, cadmium, or lead at any of the wells. Barium, nickel, selenium, and vanadium were detected at concentrations that exceeded detection limits but were

considered estimated concentrations because they were less than the laboratory practical quantitation limit (PQL). All estimated concentrations of these COCs were significantly less than their respective GCTLs.

11.6.2 Site Inspection

The site inspection for OU 12 was conducted on February 4, 2010. The group that participated in the site inspection included: Greg Fraley (USEPA), David Grabka (FDEP), Art Sanford (BRAC PMO), Mark Davidson (BRAC PMO SE), Rob Simcik (Tetra Tech), Mark Jonnet (Tetra Tech), and Mike Halil (CH2MHill). Site inspections conducted at Site 32 included visual observations of the site area and associated asphalt cap and groundwater monitoring wells. The inspection identified that the implementation of the remedy and monitoring program were operating as designed and they are protective of human health and the environment. TtNUS conducted site visits at Site 32 as part of the field activities in 2004 through 2009. No unusual observations were documented during these site visits.

The land use for the site has remained unchanged. The Navy transferred the site and surrounding property to the City of Jacksonville which intends to use the land as an industrial/commercial area. The land is currently used for industrial purposes and includes storage areas and a storm water retention pond.

Site 32 LUC inspections have been completed annually by JEDC since 2007. The LUC inspections indicate that Site 32 monitoring wells are not being disturbed, the land is not being used for residential use, the surface soils have not been disturbed, subsurface soils have not been disturbed, and the paved area has been maintained.

11.6.3 Interviews

There were no interviews conducted in the course of the five year review.

11.7 TECHNICAL ASSESSMENT

11.7.1 Question A: Is the Remedy Functioning as Intended by Decision Documents?

The review of documents, ARARs, and risk assumptions and the results of the site inspections indicate that the remedy is functioning as intended by the ROD.

The implementation of the long-term groundwater monitoring program is ongoing and indicates that contaminants are not migrating at the site. The implementation of LUCs through the recorded deed is

protective of human health and the environment by preventing exposure to contaminated soil and groundwater that may pose a risk.

The remedial actions are being implemented as designed and include measures that prevent exposure. The remedial actions that are currently in operation (groundwater monitoring and soil cap maintenance) are operating as designed, and the data indicate progress toward meeting the RAOs.

11.7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedy.

11.7.2.1 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).

Contaminant	ARAR		Source
SOIL			
BaP	Previous	500 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (1999)
	New	700 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (2005)
BaPEq	Previous	500 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (1999)
	New	700 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (2005)
Arsenic	Previous	3,700 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (1999)
	New	12,000 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (2005)
Cadmium	Previous	8,000 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Leachability Based on Groundwater Criteria Rule (1999)
	New	7,500 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Leachability Based on Groundwater Criteria Rule (2005)
Lead	Previous	920,000 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (1999)
	New	1,400,000 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Industrial Exposure Rule (2005)

Contaminant	ARAR		Source
Selenium	Previous	5,000 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Leachability Based on Groundwater Criteria Rule (1999)
	New	5,200 µg/kg	FAC 62-777, FL Contaminant Cleanup Target Levels Leachability Based on Groundwater Criteria Rule (2005)

The ARARs and site-specific action levels were reviewed for changes that would affect the protectiveness of the remedial action. The ARAR for cadmium in soil has decreased since the ROD for Site 32 was signed. This new contaminant cleanup target level relies upon a health-based risk assessment and has become more stringent since the signing of the ROD. This change will not affect the protectiveness of the remedial design or the time or resources to complete the remedial action, because soil with cadmium contamination is contained under the asphalt cap, and monitoring is already required to verify that the contamination is not migrating.

Other federal and state ARARs (action-specific and location-specific) have not changed since the signing of the ROD.

11.7.2.2 Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics, and Risk Assessment Methods and Expected Progress Towards Meeting RAOs

There have been no changes in the toxicity factors for the COCs evaluated in the RI. The exposure assumptions used are considered to be conservative and reasonable in evaluating risk and developing the risk-based cleanup level. No changes to these assumptions or the cleanup level developed from them are warranted. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected for OU 12.

11.7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

No human health or additional ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has been identified that calls into question the protectiveness of the remedy.

11.7.4 Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the sites, to toxicity factors for the COC,

or to the standardized risk assessment methodology that would affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

11.8 ISSUES

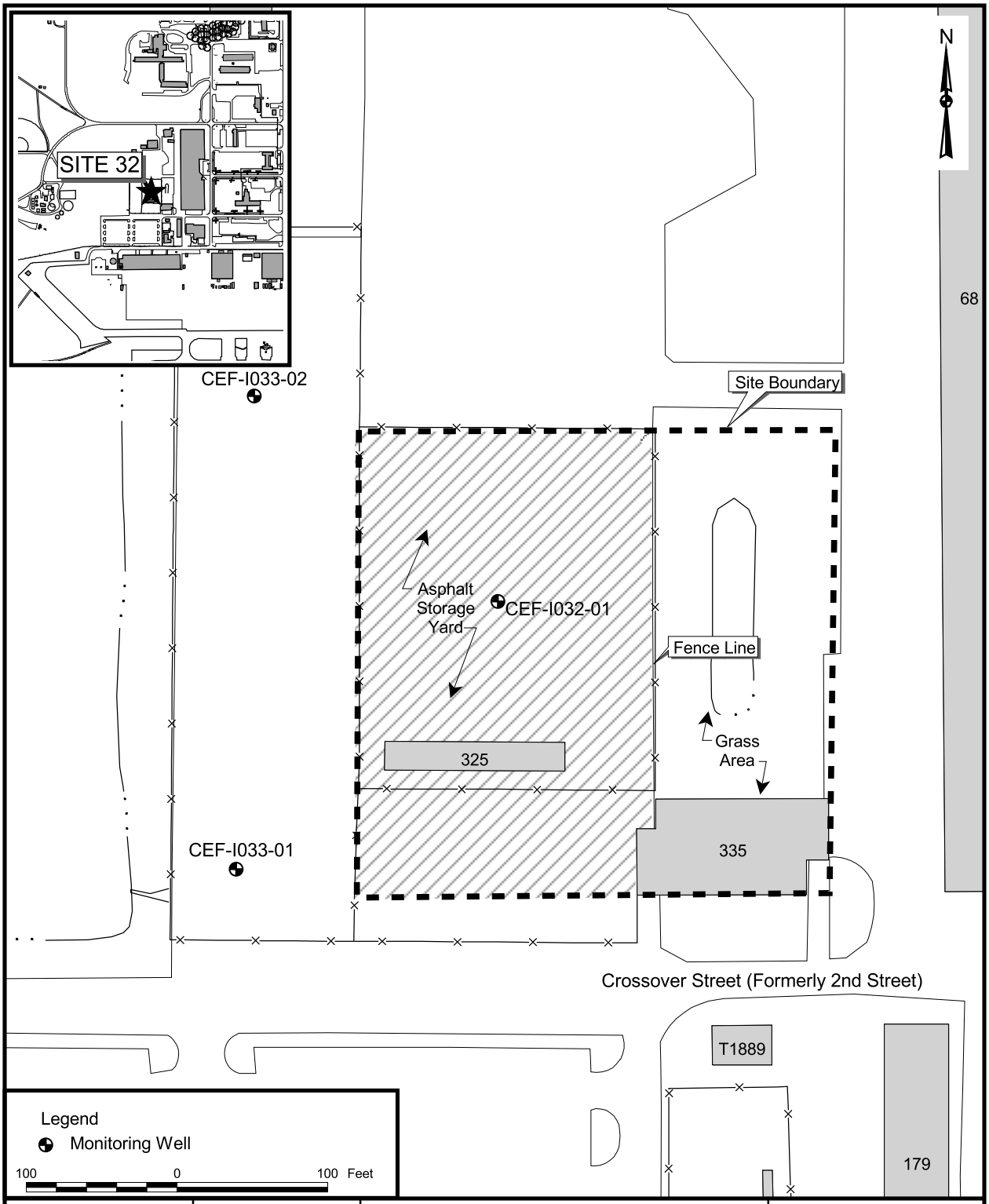
The only issue identified at the site was the need to continue with LUCs at the site after the transfer of Site 32 to the City of Jacksonville. When the Navy transferred the property per the FOST, these LUCs, by way of deed restrictions, notices, or other agreements, were adopted by the City of Jacksonville. The current and future land use at this site suggests that these controls should be effective, and LUC inspections have confirmed that the LUC objectives are being met.

11.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations for OU 12, as no deficiencies were identified during the five-year review.

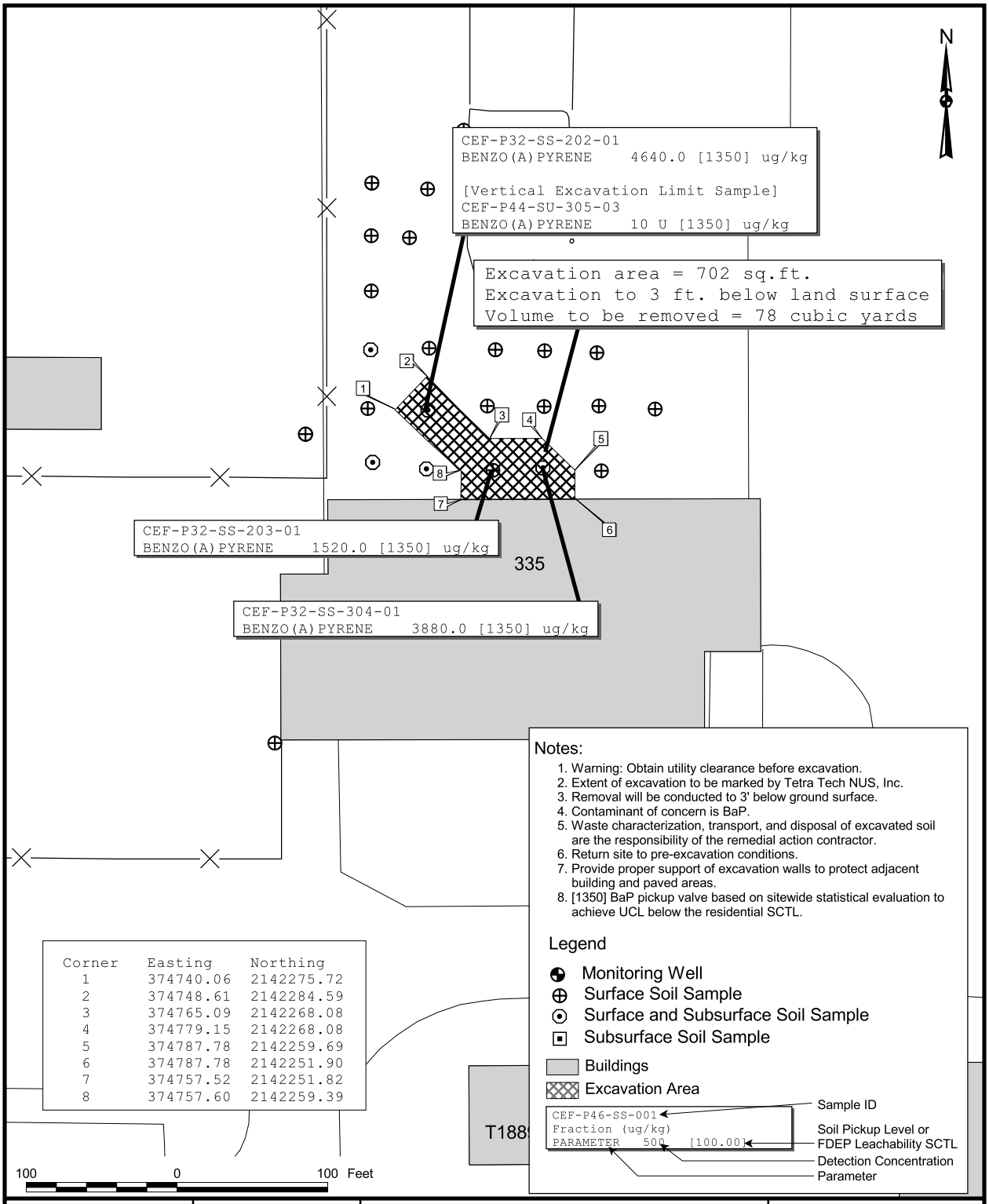
11.10 PROTECTIVENESS STATEMENT

The remedy at Site 32 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Adopted LUCs and continued maintenance of the asphalt pavement, prevent exposures to human health and the environment. Groundwater sampling every 5 years continues to verify that migration of soil contaminants to groundwater at unacceptable levels has not occurred. Cap maintenance and groundwater monitoring programs are being implemented as designed. LUCs were implemented by the Navy upon finalization of the LUC RD in May 2006, and in accordance with the LUC RD, are being continued after transfer of Site 32 to City of Jacksonville per the FOST dated October 2006. Soil LUCs will be required as long as soil COCs are at concentrations that prevent unlimited use and unrestricted exposure. Current protectiveness (until the time of closure) is ensured via LUCs; protectiveness at the time of site closure will be evaluated based on Florida criteria at that time. The applicable Florida criteria are currently risk-based. If this is no longer applicable at the time of site closure, an evaluation to confirm protectiveness based on U.S. EPA criteria will be conducted and documented in the site close-out report. Based on ongoing remedial activities (cap maintenance, groundwater monitoring, and LUCs), the intent and goals for the ROD for Site 32 have been or will be met.



DRAWN BY MJJ	DATE 13Oct09	SITE LAYOUT MAP OPERABLE UNIT 12, SITE 32 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 11-1 / REV 0

psc32_techmemo.apr 23Dec09 Facility Location Layout



Corner	Easting	Northing
1	374740.06	2142275.72
2	374748.61	2142284.59
3	374765.09	2142268.08
4	374779.15	2142268.08
5	374787.78	2142259.69
6	374787.78	2142251.90
7	374757.52	2142251.82
8	374757.60	2142259.39

Notes:

1. Warning: Obtain utility clearance before excavation.
2. Extent of excavation to be marked by Tetra Tech NUS, Inc.
3. Removal will be conducted to 3' below ground surface.
4. Contaminant of concern is BaP.
5. Waste characterization, transport, and disposal of excavated soil are the responsibility of the remedial action contractor.
6. Return site to pre-excavation conditions.
7. Provide proper support of excavation walls to protect adjacent building and paved areas.
8. [1350] BaP pickup valve based on sitewide statistical evaluation to achieve UCL below the residential SCTL.

Legend

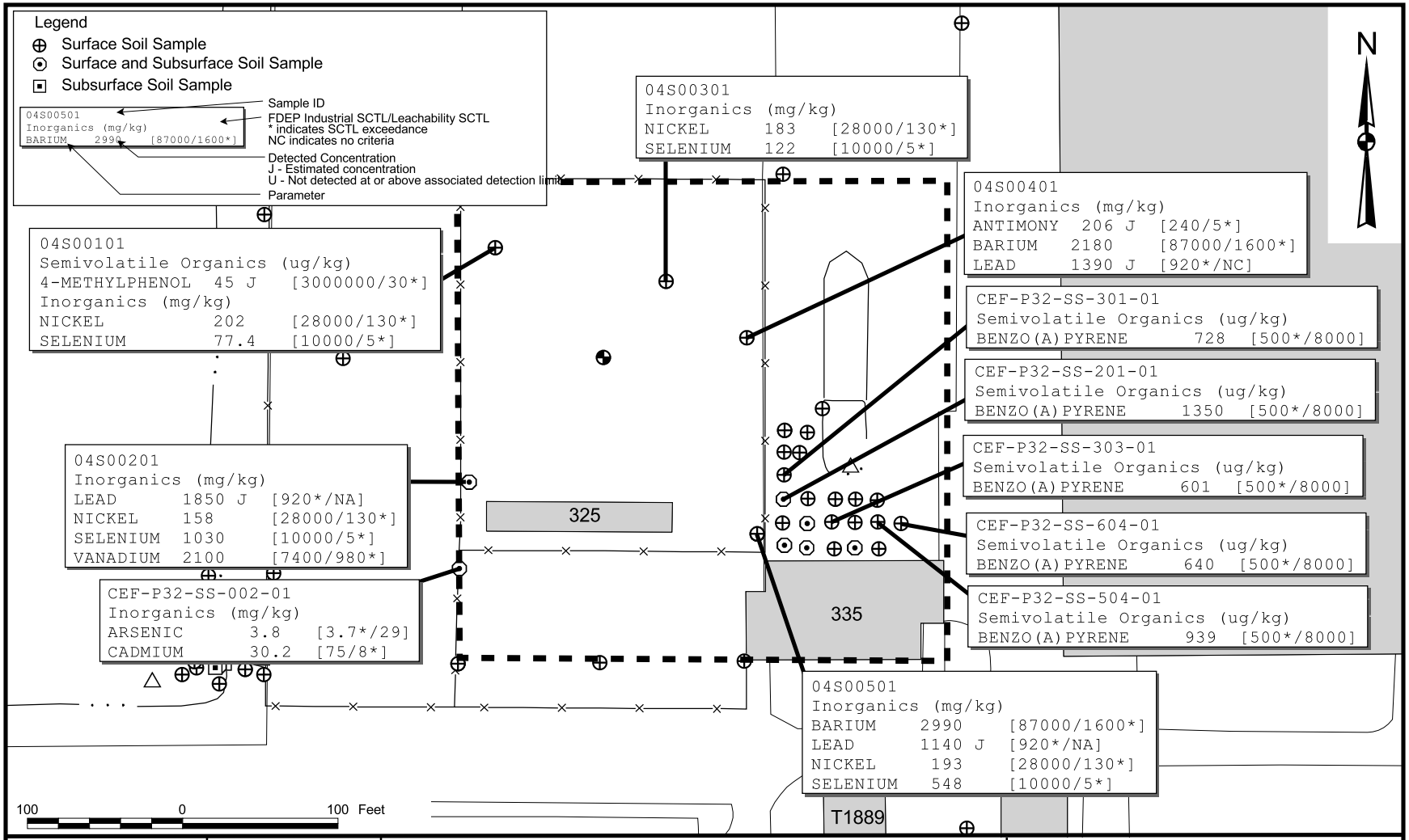
- Monitoring Well
- Surface Soil Sample
- Surface and Subsurface Soil Sample
- Subsurface Soil Sample
- Buildings
- Excavation Area

CEF-P46-SS-001 — Sample ID
Fraction (ug/kg)
PARAMETER 500 [100.00] — Soil Pickup Level or FDEP Leachability SCTL; Detection Concentration; Parameter

DRAWN BY MJJ	DATE 13Oct09	REMOVAL ACTION DESIGN PLAN SOIL EXCAVATION OPERABLE UNIT 12, SITE 32 FIVE-YEAR REVIEW NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 11-2 / REV 0

NAVFAC

site-21_20091013_ops.apr 13Oct09 4_Excavation Area Layout



DRAWN BY	DATE		CONTRACT NUMBER 2267
MJJ	13Oct09	POST-REMOVAL ACTION EXCEEDANCES FOR INDUSTRIAL LAND USE SCENARIO	APPROVED BY / DATE
CHECKED BY	DATE	OPERABLE UNIT 12, SITE 32	APPROVED BY / DATE
COST/SCHEDULE-AREA		FIVE-YEAR REVIEW	
SCALE AS NOTED	NAVFAC	NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	DRAWING NO. FIGURE 11-3 / REV 0

site-32_20091013.apr 13Oct09 Layout 1-3

12.0 BASE-WIDE CONCLUSIONS AND RECOMMENDATIONS

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

12.1 PROTECTIVENESS STATEMENT

The remedial actions at the OUs at NAS Cecil Field are protective or are expected to be protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled through the use of LUCs. Remedial actions for immediate threats of exposure have been completed at: OU 2, Sites 5 and 17; OU 3, Site 8; OU 4, Site 10; OU 5, Site 15; OU 6, Site 11; OU 7, Site 16; OU 8, Site 3; OU 9, Sites 36, 37, and 59; OU 10, Sites 21 and 25; OU 11, Site 45; and OU 12, Site 32. 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 programs for most of the OUs provides a degree of protection of human health and the environment. Implementation of the LUCs will also provide a significant degree of protectiveness of human health and the environment until completion of the remedies is achieved to provide full protectiveness. Upon completion of the ongoing remedial actions (monitoring and operation of the AS, AS/SVE, and in-situ bioremediation systems; and groundwater monitoring), 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, and to optimize monitoring programs to the maximum extent practical for each OU.

12.2 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 third five-year review conducted at NAS Cecil Field. The next five-year review will be required to be completed within 5 years of the date of U.S EPA approval of this review. 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 9, Site 59 because the groundwater sampling activities reviewed for this report have occurred for less than 5 years. The review should include, too, a detailed review of sediment toxicity testing at OU 1, Sites 1 and 2, as it is anticipated that the BCT will hold discussions within the next five years to determine whether biologically suppressed conditions can be said to have recovered in Rowell Creek and the tributary stream, and thus, if sediment toxicity testing is still necessary at OU 1. The implementation of LUCs at all sites has been completed at the time of this review; therefore, the future five year reviews will confirm that LUCs continue to be implemented as necessary.

12.2.1 Statutory Review

OU 1, Sites 1 and 2; OU 2, Site 5; OU 5, Site 15; OU 8, Site 3; OU 10, Site 21; OU 11, Site 45; and OU 12, Site 32 will require a statutory review during the next five-year review for NAS Cecil Field. Five-year reviews will continue at these sites because hazardous substances, pollutants, and contaminants remain at the sites at levels that will not allow for unlimited use or unrestricted exposure, and the LUCs at these sites are expected, at this time, to be permanent.

OU 3, Site 8 will not be included in the next five-year review because no further action is required at this site based on completion of the groundwater monitoring program and acceptance of the Remedial Action Completion Report.

12.2.2 Policy Review

OU 2, Site 17; OU 7, Site 16; and OU 9, Sites 36, 37, 57, 58, and 59 will require ongoing policy five-year reviews until cleanup levels are achieved thereby allowing unlimited use and unrestricted exposure. Hazardous substances, pollutants or contaminants currently remain at these sites that will not allow for unlimited use or unrestricted exposure.

OU 10, Site 25 will not be included in the next five-year review because no further action is required at this site based on completion of the groundwater monitoring program and acceptance of Remedial Action Completion Report.

12.2.3 Reviews for Sites with RODs Published After This Five-Year Review

There are no sites at which RODs are anticipated, therefore, the next five-year review is likely to include only the sites mentioned above.

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OPERABLE UNIT 9

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OPERABLE UNIT 10

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OPERABLE UNIT 11

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TtNUS, 2003. Record of Decision, Operable Unit 11, Site 45, Former Steam Generating Plant at Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. October.

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OPERABLE UNIT 12

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TtNUS, 2002. Record of Decision, Operable Unit 12, Old Golf Course, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. July.

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TtNUS, 2004. Record of Decision, Operable Unit 12, Site 32, DRMO Asphalt Storage Yard, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. September.

TtNUS, 2006. Naval Air Station Cecil Field, Land Use Control Remedial Design, Operable unit 12, Site 32. May.

TtNUS, 2006. Operating Properly and Successfully Demonstration Report for Operable Unit 12, Site 32, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. July.

TtNUS, 2009. Field Task Modification Request Form, Site 32. August.

APPENDIX A

PHOTOS

OU 1, Sites 1&2: Looking north from Perimeter Road bridge over Rowell Creek.

OU 1, Sites 1&2: Looking west from Perimeter Road bridge over Rowell Creek. Same location as previous photo.

OU 1, Sites 1&2: Looking east on Perimeter Road toward bridge over Rowell Creek.

OU 1, Sites 1&2: Looking west from Perimeter Road bridge over Rowell Creek. Same location as previous photo.

OU 1, Sites 1&2: Looking west on Perimeter Road. Site 2 is on the right. Approximately 1,250 feet north of previous photo.

OU 1, Sites 1&2: Survey monument and sign approximately 50 feet from previous photo location.

OU 2, Site 5: View from Perimeter Road from northwestern corner of site looking southeast. Monitoring well CEF-5-LTM-01 on left.

OU 2, Site 5: View of drainage ditch along southern edge of site looking east.

OU 2, Site 17:
Looking east at site from Perimeter Road. Monitoring well CEF-017-LTM1 is on right side of photo.

OU 3, Site 8: Looking north on access road. Runway is at end of road. Site 8 is on left and right side of road.

OU 3, Site 8: Looking south on access road Approximately 500 feet north of previous photo.

OU 3, Site 8: Panoramic view of boresite overhang.

OU 3, Site 8: Panoramic view of firefighting training pits. Monitoring well CEF-8-16S in foreground.

OU 5, Site 15: Concrete Footings at the edge of the Burn Area.

OU 5, Site 15: Empty Munitions box.

OU 5, Site 15: Fire Lanes Looking Northeast

OU 5, Site 15: Looking West-Northwest from bike trail.

OU 7, Site 16: Facing southeast, Building 825 far right, Site 16 air sparging system near right, northern end of Building 313 on left.

OU 7, Site 16: View of AS/VE system equipment.

OU 7, Site 16: View of AS/VE well system components.

OU 7, Site 16: View of AS/VE system equipment, carbon units in background.

OU 7, Site 16: View of surface area above storm sewer repair area facing southeast from the northern end of the repair area.

OU 8, Site 3: View of AS system from the Lake Fretwell access road facing north.

OU 8, Site 3:
Starting on left (looking west on Perimeter Road)
Moving toward center (looking north from Perimeter Road at AS system equipment building)
Moving right (looking east on Perimeter Road)

OU 9, Sites 36 and 37: Facing southeast. Building 72 on the left.

OU 9, Sites 36 and 37: Hot Spot No. 2 treatment system building. Facing north. Building 72 on the left.

OU 9, Sites 36 and 37: Facing west. Hangar 14 on the right.

OU 9, Sites 36 and 37: Sites 36 and 37 plume area. Facing south. Area between Hot Spots Nos. 2 and 3.

OU 9, Sites 36 and 37: Hot Spot No. 3 treatment system building. Facing north. Building 14 in background.

OU 9, Sites 36 and 37: Hot Spot No. 3 treatment system building. Facing west. Building 14 on the right.

OU 9, Sites 36 and 37: East-west view of plume area. Facing east. Building 82, Control Tower, near center.

OU 9, Site 57

OU 9, Site 57: Looking to the right of the previous photo and from standing behind the fence.

OU 9, Site 58

OU 9, Site 58: Building 312 is on the left.

OU 9, Site 59: Building 1845 and surround area.

OU 9, Site 59: Southern Plume Area

OU 9, Site 59: Building 815 and flightline

OU 10, Site 21: To the West of Building 874.

OU 10, Site 21: Building 398 is on the left, and 238 is in the center.

OU 10, Site 25: Building 81 is on the right, Building 100 is on the far left, Building 247 is straight ahead, and Building 101 is behind Building 247.

OU 11, Site 45: Facing South

OU12, Site 32: Building 335 and grassy and paved areas.

APPENDIX B

FIVE-YEAR REVIEW SITE INSPECTION CHECKLISTS

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 1, Sites 1 and 2	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Long-Term Sediment/Surface Water/Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks: HASP prepared by Tt for Monitoring Program at Site 1&2.

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest monitoring report submitted on 3/31/2009 (Year 11 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☒ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
Original O&M cost estimate $266,400 ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks No damage to fencing identified.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks No damage, new signs were recently installed by JAA.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy. No violations were identified or reported.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Perimeter Road around the site remains accessible.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks Dense wooded area.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Sites 1 and 2 are historic landfills that have waste that has remained in place. The remedial objective is to prevent exposure to the contamination associated with the landfills to comply with ARARs. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objective of the remedial effort at Sites 1 and 2 is to prevent transport and accumulation of flocculent material at Site 2, reduce unacceptable exposure of ecological receptors to metals in sediments, and to reduce unacceptable aquatic receptor responses to surface water contamination. As identified in the approved final OPS report (Sites 1 and 2 OPS Report, April 2005), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the monitoring program is currently operating as designed and O&M efforts are proceeding in a manner consistent with the work plan. These efforts are currently protective and are anticipated to be protective in the future.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Sites 1 and 2.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 2, Site 5	**Date of inspection: 02/04/2010**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Annual Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact	Name	Title	Date	Phone no.
	Art Sanford	Navy RPM	2/4/2010	843-743-2135

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact	Name	Title	Date	Phone no.
	Greg Fraley	US EPA RPM	2/4/2010	404-562-8544

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact	Name	Title	Date	Phone no.
	David Grabka	FDEP RPM	2/4/2010	850-245-8997

Problems; suggestions; ☐ Report attached

Agency City of Jacksonville

Contact	Name	Title	Date	Phone no.
	Ed Randolph	Jacksonville EDC	2/4/2010	904-630-1185

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 01/07/2009 (Year 11 –Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☒ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
Original O&M cost estimate $236,000 ☐ Breakdown attached

Total annual cost by year for review period if available

From (Date)	To (Date)	Total cost	
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached
			☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks: No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks: Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency Jacksonville EDC
Contact Ed Randolph (Name) Site-Specific Contact (Title) 2/4/2010 (Date) 904-630-1185 (Phone no.)

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to Jacksonville EDC; however, the Navy retains ultimate responsibility for the remedy. Monitoring wells are inspected to verify operating properly during the annual groundwater sampling events.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks: Site appears to be well maintained and no tampering with the monitoring wells were observed.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent _____
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent ____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability
Areal extent _____
Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial effort at Site 5 was designed to remediate contamination that exceeded the remedial action levels in the ROD by means of monitoring natural attenuation. The remedial objectives are being accomplished through long-term monitoring and land-use controls, and a previous soil removal action. The objectives of the remedial effort at Site 5 are to clean up contamination in the unsaturated soil above the water table, remove free product to reduce the source of groundwater contamination, clean up surface soil to reduce human health risks, and protect humans from exposure through potable use of Site 5 groundwater. As identified in the approved final OPS report (Site 5 OPS Report, July 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells are inspected during each monitoring event to assure they continue to operate properly and are repaired or replaced if they fail.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 5.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 2, Site 17	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Annual Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 01/07/2009 (Year 12 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $232,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
   Remarks No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent _____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial effort at Site 17 was designed to remediate contamination that exceeded the remedial action levels presented in the ROD through monitored natural attenuation. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objective of the remedial effort at Site 17 is to reduce the source of contaminants to groundwater and to remediate contaminated surface soil to reduce health risks from direct contact exposure. As identified in the final OPS report (Site 17 OPS Report, April 2005), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and the O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells are inspected during each monitoring event to assure they continue to operate properly and are repaired or replaced if they fail.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 17.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 3, Site 8	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Annual Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 3/30/2009 (Year 11 – Draft Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $465,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks Site 8 is located within the secured JAA flight line and that fence is intact with no damage observed.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs remain intact and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks This site is in the close-out process and it is anticipated that by the next 5-year review, it will be closed out.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks ____None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial effort at Site 8 was designed to remediate contamination that exceeded the remedial action levels in the ROD. The remedial objectives were accomplished through long-term monitoring and land-use controls. The objective of the remedial effort at Site 8 was to reduce the source of contaminants to groundwater and to remediate contaminated surface soil to reduce health risks from direct contact exposure. As identified in the final OPS report (Site 8 OPS Report, April 2005), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

Site 8 was identified for close-out in the most recent groundwater monitoring report, and a draft Remedial Action Completion Report (TtNUS, 2009) was prepared in December 2009 to move forward with the close-out process. A final report is pending regulatory review and incorporation of comments.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The LTM program is currently operating as designed and the O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells were inspected during each monitoring event to assure they continued to operate properly and are repaired or replaced if they fail. Upon site closeout the monitoring wells will be properly abandoned/removed and efforts to remove the LUCs will be implemented in accordance with the LUC RD.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 8.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revisions to the Long-Term Monitoring program were conducted throughout the implementation of the LTM program. The LTM program has been completed and site closeout procedures are underway.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 5, Site 15	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Soil Removal, Munitions Removal, post excavation groundwater sampling to verify no further actions is required for groundwater.

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks Post soil removal action groundwater sampling was conducted in accordance with the ROD.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $35,000* ☐ Breakdown attached

   *O&M cost only associated with groundwater sampling to verify aquifer not impacted by remedial actions conducted. Soil remedial action and MEC activities do not require ongoing O&M activities.

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks No damage to the gates was observed and gates remain locked at all times. The site is not surrounded by fencing, however all road access is restricted via gates.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs remain in place and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Quarterly
Responsible party/agency Navy
Contact Mark Davidson (Name) RPM (Title) 2/4/2010 (Date) 843-820-5526 (Phone no.)

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Continued MEC activities are being conducted at the site. Property transfer to Parks and Recreational pending resolution of MEC issues anticipated in 2011.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A

Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A

Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent _____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial objectives for Site 15 include preventing unacceptable human health risk associated with exposure to contaminated surface soil. The soil removal action is complete and investigation and removal of MEC at Site 15 is ongoing.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The soil removal action has been completed and MEC activities are ongoing. Maintenance of the site with regards to signage and access are ongoing.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs,that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 15.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Monitoring is not required at this site and the remedial action is complete with regards to environmental condition of property, however UXO issues are still being addressed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 7, Site 16	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, Mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Air Sparging/Vapor Extraction, Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks A discharge permit associated with the vapor extraction system was not required.

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 7/31/2009 (Year 11 – First Semi-Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $780,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: System repairs were conducted, but they were not significant. The system is only operated as needed based on observed rebound of contaminants above the system action level. The system is currently off.

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks No damage to the fence protecting the remedial system.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs are in place and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks _____

_____

_____

_____

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths _____ Widths _____ Depths _____

Remarks _____

_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth_____

Remarks _____

_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident

Areal extent _____ Depth_____

Remarks _____

_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress

☐ Trees/Shrubs (indicate size and locations on a diagram)

Remarks _____

_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A

Remarks _____

_____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Site 16 was installed to remediate contamination that exceeded the remedial action levels in the ROD. The remedial objectives are being accomplished through long-term monitoring, land-use controls, and an air sparge/vapor extraction system that is currently off-line. The objective of the remedial effort is to prevent unacceptable human health risks from exposure to contaminated groundwater. The AS/VE remedial system was successful in decreasing groundwater contamination to levels less than the system remedial action levels. After system shut down, rebound of contamination was observed. Reactivation of the system was successful in again reducing contaminant concentrations. The AS/VE system was shut down in January 2005. The AS/VE system was returned to operational status in April 2009. As identified in the final approved OPS report (Site 16 OPS Report, April 2005), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The active remedial system operated as designed and O&M efforts were implemented in a manner consistent with the system design. The LTM efforts are ongoing and the monitoring wells are inspected during each sampling event. The active remedial system is turned back on as needed and continues to reduce contamination when rebound is observed.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

Due to the rebounding of contaminant concentrations observed once the system was taken off line, a more permanent solution was investigated. Costs were observed due to the implementation of a pilot study work plan for in-situ biological remediation, ISCO pilot study, and a DPT investigation. The data was reported in a Technical Memorandum. The report identified that site conditions are not favorable for biological treatment.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 8, Site 3	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Air Sparging, Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒Up to date	☐N/A
☒As-built drawings	☒Readily available	☒Up to date	☐N/A
☒ Maintenance logs	☒Readily available	☒Up to date	☐N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒Readily available ☒Up to date ☐N/A

Remarks _____

4. **Permits and Service Agreements**

☐Air discharge permit	☐Readily available	☐Up to date	☒ N/A
☐Effluent discharge	☐Readily available	☐Up to date	☒N/A
☐Waste disposal, POTW	☐Readily available	☐Up to date	☒N/A
☐Other permits _____	☐Readily available	☐Up to date	☐N/A

Remarks _____

5. **Gas Generation Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

6. **Settlement Monument Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒Readily available ☒Up to date ☐N/A

Remarks Latest LTM report (presentation report) submitted on 01/07/2009 (Year 10 – Draft Annual)

8. **Leachate Extraction Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

9. **Discharge Compliance Records**

☐Air	☐Readily available	☐Up to date	☒N/A
☐Water (effluent)	☐Readily available	☐Up to date	☒N/A

Remarks _____

10. **Daily Access/Security Logs** ☐Readily available ☐Up to date ☒N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $780,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks No damage to fence surrounding remedial system and the gate is secured.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs are in place and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Site 3 was installed to remediate contamination that exceeded the remedial action levels as identified in the ROD. The remedial objectives are being accomplished through long-term monitoring, land-use controls, and an air sparge system for the source area. The active remedial system is currently shut down. As identified in the approved final OPS report (Site 3 OPS Report, April 2005), the remedial system was operating properly and successfully until shutdown in May 2003. Currently, Long-Term Monitoring is being conducted on an annual basis.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The active remedial system operated as designed and O&M efforts were implemented in a manner consistent with the system design. The LTM efforts are ongoing and the monitoring wells are inspected during each sampling event. The active remedial system can be turned back on as needed if rebound is observed.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 3.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 9, Site 59	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other In-Situ Biological Treatment, Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 10/19/2009 (Year 1 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $1,003,000* ☐ Breakdown attached

   * Active remedial system currently operational.

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: Costs associated with the implementations of these systems are as expected. The main lines have been shut off and only the expansion portion is operational, which will reduce operation costs.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks Site 59 is located within the secured JAA flight line and that fence is intact with no damage observed.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs remain intact and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Quarterly
Responsible party/agency Navy
Contact Mark Davidson | Base Environmental Coordinator | 2/4/2010 | 843-820-5526
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of a portion of the site, the Navy transferred responsibilities for that portion of land to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks Within restricted airport area and secured military operations area.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Site 59 was installed to remediate contamination that exceeded the remedial action levels as identified in the ROD. The remedial objectives are being accomplished through in-situ biological treatment, long-term monitoring, and land-use controls. The objective of the remedial effort at Site 59 is to prevent unacceptable human health risks and restore groundwater quality to meet drinking water standards. As identified in the submitted OPS report, the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.
The concentrations in source areas were reduced to less than the remedial system action levels and have been turned off. However, it was necessary to expand the system near monitoring well CEF-059-013-053 and operation of this portion of the active remedial system is ongoing.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The system is currently operating as designed and the O&M efforts are proceeding in a manner consistent with the system design.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 59.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports. Operation and optimization of the active remedial system is also discussed with the BCT on a quarterly basis during the team meetings.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 9, Sites 36 and 37	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Air Sparging, Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Frayley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒Up to date	☐N/A
☒As-built drawings	☒Readily available	☒Up to date	☐N/A
☒ Maintenance logs	☒Readily available	☒Up to date	☐N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒Readily available ☒Up to date ☐N/A

Remarks _____

4. **Permits and Service Agreements**

☐Air discharge permit	☐Readily available	☐Up to date	☒ N/A
☐Effluent discharge	☐Readily available	☐Up to date	☒N/A
☐Waste disposal, POTW	☐Readily available	☐Up to date	☒N/A
☐Other permits _____	☐Readily available	☐Up to date	☐N/A

Remarks _____

5. **Gas Generation Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

6. **Settlement Monument Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒Readily available ☒Up to date ☐N/A

Remarks Latest LTM report submitted on 7/30/2009 (Year 8 – Annual)

8. **Leachate Extraction Records** ☐Readily available ☐Up to date ☒N/A

Remarks _____

9. **Discharge Compliance Records**

☐Air	☐Readily available	☐Up to date	☒N/A
☐Water (effluent)	☐Readily available	☐Up to date	☒N/A

Remarks _____

10. **Daily Access/Security Logs** ☐Readily available ☐Up to date ☒N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $1,280,000* ☐ Breakdown attached

   * The remedial system is currently operational.

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: Unexpected costs for repairs from October 2006 through August 2009 due to catastrophic failure of the system cause by severe weather. Site 36 and 37 system expansion conducted in August 2009 was required because concentrations in the shallow source area wells were not decreasing like expected. The system is back on line with a new blower and modified wells.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks This site is on the flight line which is secured by a fence. The fence doesn't show signs of damage and the fence is maintained by JAA.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Sites 36 and 37 was installed to remediate contamination that exceeded the remedial action levels in the ROD. The remedial objectives are being accomplished through long-term monitoring, land-use controls, and an active air sparge remedial system. The objective of the remedial effort at Sites 36 and 37 is to prevent unacceptable human health risks, prevent contaminant migration from groundwater to surface water, and to restore surficial aquifer quality to meet PRGs. The active remedial system was expanded in August 2009. As identified in the approved final OPS report (Sites 36 and 37 OPS Report, August 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The active remedial system is currently operating as designed and O&M efforts are implemented in a manner consistent with the system design. The LTM efforts are ongoing and the monitoring wells are inspected during each sampling event. The full site is currently being sampled semi-annually by Solutions-IES and the source area wells at Site 37 are sampled by Tetra Tech during the quarters in which full-site sampling is not taking place.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

Unexpected costs have been reported due to catastrophic failure of the system caused by severe weather. As a result, the system was taken offline for repairs from October 2006 through August 2009. During this time, a remedial system expansion also took place. The system was restarted in August 2009. The system is fully functional and appears to be effective. No problems are expected with the system.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports. System performance has been discussed in the OPS report and system optimization has been conducted through a remedial system expansion.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 9, Sites 57	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest Site 57 LTM report submitted on 04/06/2009 (Year 6 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $346,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
   Remarks No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs remain intact and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Sites 57 was designed to remediate contamination that exceeded the remedial action levels in the ROD. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objectives of the remedial effort at Sites 57 are to prevent unacceptable human health risks from exposure to groundwater and restore surficial aquifer quality to meet PRGs. As identified in the approved final OPS report (Sites 57 OPS Report, August 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells are inspected during each monitoring event to assure they continue to operate properly and are repaired or replaced if they fail.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Sites 57.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revisions to the Long-Term Monitoring program are being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 9, Sites 58	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency JAA

Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest Site 58 TM report submitted on 7/22/2009 (Year 6 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $173,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
   Remarks No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs remain intact and no damage was observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency JAA
Contact Rusty Chandler | Cecil Field Airport Manager | 2/4/2010 | 904-573-1613
Name | Title | Date | Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to JAA; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Site 58 was designed to remediate contamination that exceeded the remedial action levels in the ROD. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objectives of the remedial effort at Site 58 are to prevent unacceptable human health risks from exposure to groundwater and restore surficial aquifer quality to meet PRGs. As identified in the approved final OPS report (Site 28 OPS Report, August 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells are inspected during each monitoring event to assure they continue to operate properly and are repaired or replaced if they fail.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 58.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revisions to the Long-Term Monitoring program are being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 10, Site 21	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached Done

2. **O&M staff** Jessica L. Keener (Name) BOA Project Manager (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 919-873-1060

Problems, suggestions; ☐ Report attached Done

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached Done

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached Done

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached Done

Agency City of Jacksonville

Contact Ed Randolph | Jacksonville EDC | 2/4/2010 | 904-630-1185

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached Done

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 4/6/2009 (Year 7 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $109,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
   Remarks No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency Jacksonville EDC
Contact Ed Randolph (Name) Site-Specific Contact (Title) 2/4/2010 (Date) 904-630-1185 (Phone no.)

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to Jacksonville EDC; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use change.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use change.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Areal extent _____ Depth _____

Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Areal extent _____ Depth _____

Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A

Remarks _____

J. Monitoring Wells (off site)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial system at Site 21 was designed to remediate contaminated groundwater that exceeded the remedial action levels in the ROD. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objective of the remedial effort at Site 21 is to prevent unacceptable risk from exposure to contaminated soil, prevent unacceptable risk from ingestion of contaminated groundwater, and to reduce the concentration of chlordane in groundwater to less than the FDEP GCTL and federal MCL. As identified in the approved final OPS report (Site 21 OPS Report, July 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and O&M efforts are proceeding in a manner consistent with the work plan.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No such issues have arisen with the O&M of Site 21.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 11, Site 45	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, mostly sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls (signage)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Long-Term Groundwater Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency City of Jacksonville

Contact Ed Randolph | Jacksonville EDC | 2/4/2010 | 904-630-1185

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks Latest LTM report submitted on 3/31/2009 (Year 7 – Annual)

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $144,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
   Remarks No fencing at the site. Access control via posted signs.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency Jacksonville EDC
Contact Ed Randolph (Name) Site-Specific Contact (Title) 2/4/2010 (Date) 904-630-1185 (Phone no.)

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to Jacksonville EDC; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks: The ICs currently in place are adequate, however the last LTM event identified the plume may have migrated outside the established site boundaries and if contamination exists beyond these boundaries then the LUCs restrictions will need to be revised to include those areas impacted.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial actions at Site 45 was installed to remediate contaminated groundwater that exceeded the remedial action levels in the ROD through monitored natural attenuation. The remedial objectives are being accomplished through long-term monitoring and land-use controls. The objective of the remedial effort at Site 45 is to prevent unacceptable risk from exposure to contaminated soil, prevent unacceptable risk from ingestion of contaminated groundwater, and to reduce the concentration of chlordane in groundwater to less than the FDEP GCTL and federal MCL. A soil removal action was conducted to address soil contamination. As identified in the approved final OPS report (Site 45 OPS Report, November 2005), the remedial system (monitoring program) is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the LTM program is currently operating as designed and the O&M efforts are proceeding in a manner consistent with the work plan.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

There is a potential that the plume associated with Site 45 might be migrating outside the identified limits of the LUCs. This is currently being investigated.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Continued revision to the Long-Term Monitoring program is being conducted. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: OU 12, Site 32	**Date of inspection: 02/04/10**
Location and Region: NAS Cecil Field – Region 4	**EPA ID: FL5170022474**
Agency, office, or company leading the five-year review: Navy	**Weather/temperature: 65 °F, sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other: Groundwater Monitoring (every 5 years) to verify is not impacted by soil contamination. Inspection of Existing Asphalt Cap (parking lot).

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Robert F. Simcik (Name) Project Manager (Title) 2/3/2010 (Date)

Interviewed ☒ at site ☐ at office ☐ by phone Phone no. 412-921-8163

Problems, suggestions; ☐ Report attached None

2. **O&M staff** David Siefkin (Name) Environmental Scientist (Title) 2/3/2010 (Date)

Interviewed ☐ at site ☐ at office ☒ by phone Phone no. 904-636-6125

Problems, suggestions; ☐ Report attached None

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Navy

Contact Art Sanford | Navy RPM | 2/4/2010 | 843-743-2135

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency EPA

Contact Greg Fraley | US EPA RPM | 2/4/2010 | 404-562-8544

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency FDEP

Contact David Grabka | FDEP RPM | 2/4/2010 | 850-245-8997

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

Agency City of Jacksonville

Contact Ed Randolph | Jacksonville EDC | 2/4/2010 | 904-630-1185

Name | Title | Date | Phone no.

Problems; suggestions; ☐ Report attached None

4. **Other interviews** (optional) ☐Report attached.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

Remarks _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☐ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

IV. O&M COSTS

1. **O&M Organization**
   ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP
   ☐ Federal Facility in-house ☒ Contractor for Federal Facility
   ☐ Other _____

2. **O&M Cost Records**
   ☒ Readily available ☒ Up to date ☒ Funding mechanism/agreement in place
   Original O&M cost estimate $101,000 ☐ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost
   From _____ To _____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: No costs associated with repair to the asphalt cap (parking lot) were required. The monitoring wells at Site 32 would not produce a non turbid sample so they required replacement. Results of the groundwater sampling indicated no contaminant transport. It is anticipated the new wells will remain functional for a long period and no repairs to the asphalt cap will be needed in the near future so no elevated O&M costs are anticipated.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks The site is enclosed by fencing and no damage was observed.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Sign remains intact and no damage observed.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Drive by
Frequency Annual
Responsible party/agency Jacksonville EDC
Contact Ed Randolph (Name) Site-Specific Contact (Title) 2/4/2010 (Date) 904-630-1185 (Phone no.)

Reporting is up to date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached
Comment: Upon conveyance of the site, the Navy transferred responsibilities to Jacksonville EDC; however, the Navy retains ultimate responsibility for the remedy.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks No signs of vandalism/trespassing.

2. **Land use changes on site** ☐ N/A
Remarks No evidence of land use changes.

3. **Land use changes off site** ☐ N/A
Remarks No evidence of land use changes.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Other Site Conditions

Remarks None

VII. LANDFILL COVER ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth_____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth_____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☐ Wet areas ☐ Location shown on site map Areal extent _____

☐ Ponding ☐ Location shown on site map Areal extent _____

☐ Seeps ☐ Location shown on site map Areal extent ____

☐ Soft subgrade ☐ Location shown on site map Areal extent _____

Remarks _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐No evidence of slope instability

Areal extent _____

Remarks _____

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐N/A or okay

Remarks _____

2. **Bench Breached** ☐ Location shown on site map ☐N/A or okay

Remarks _____

3. **Bench Overtopped** ☐ Location shown on site map ☐N/A or okay

Remarks _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement

Areal extent_____ Depth_____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks _____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks _____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

4. **Leachate Extraction Wells**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A

Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement _____ Vertical displacement ____

Rotational displacement _____

Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Areal extent _____ Depth _____

Remarks _____

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Depth _____
Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks _____

4. **Discharge Structure** ☐Functioning ☐ N/A
Remarks _____

J. Monitoring Wells (off site)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐N/A
Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedial actions at Site 32 were to prevent contact with contaminated soil exceeded the remedial action levels in the ROD and determine if these soils leach into the groundwater. The remedial objectives are being accomplished through monitoring, land-use controls, and utilizing an existing asphalt cap as an engineering control. The objective of the remedial effort at Site 32 is to prevent unacceptable risk from exposure to contaminated soil. As identified in the approved final OPS report (Site 32 OPS Report, July 2006), the remedial system is operating properly and successfully. This was confirmed during inspection conducted on February 4, 2010.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Implementation of the monitoring program is currently operating as designed and the O&M efforts are proceeding in a manner consistent with the work plan. Monitoring wells are inspected during each monitoring event to assure they continue to operate properly and are repaired or replaced if they fail. The wells did require replacement this period and are currently functioning as designed.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

The monitoring wells needed replaced this period however they are anticipated to be operational for an extended period.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The monitoring program consists of only 2 wells every five years so optimization or reduction of the sampling program is unlikely. Monitoring reports are presented to the Cecil Field BCT and recommendations for improvements to the program are made and implemented based on these reports.

APPENDIX C

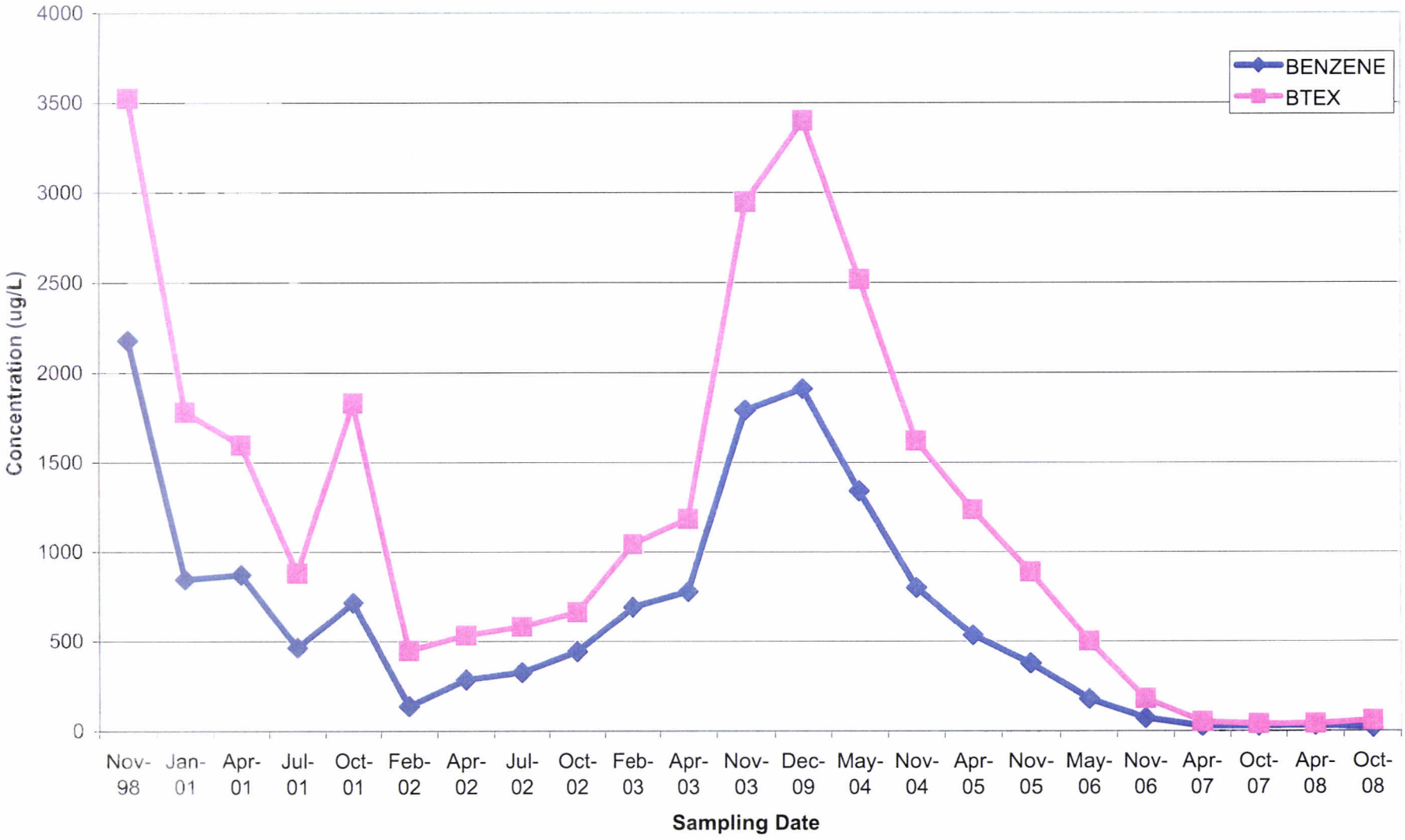
CONCENTRATION TRENDS FOR SELECT VOCs and SVOCs
At SITES 36 & 37 and Site 59

SITES 36 & 37

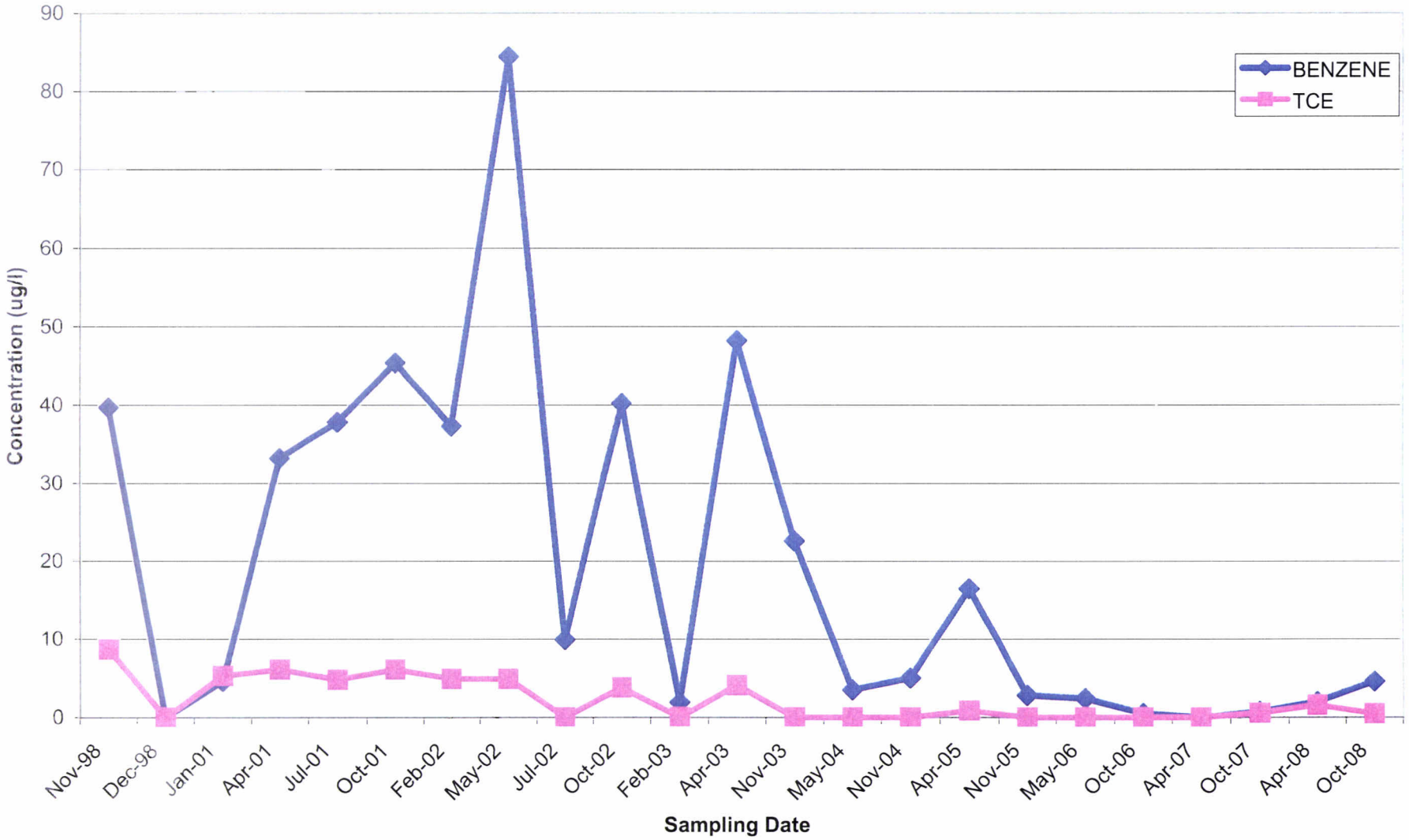
VOCs CONCENTRATION TRENDS

HOT SPOT 1 WELLS- CEF-342-3I, CEF-342-6S, and CEF-342-7I

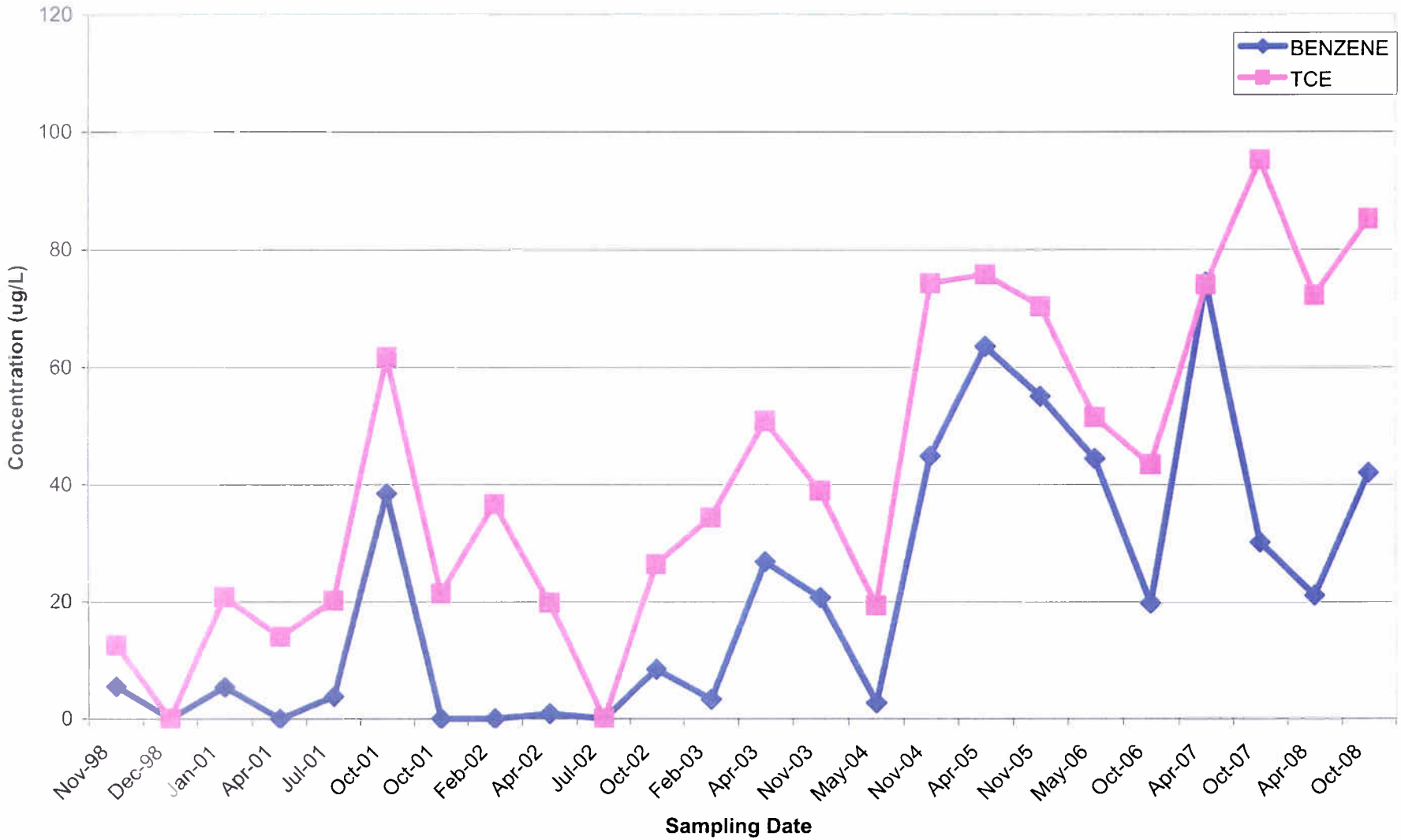
CEF-342-3I

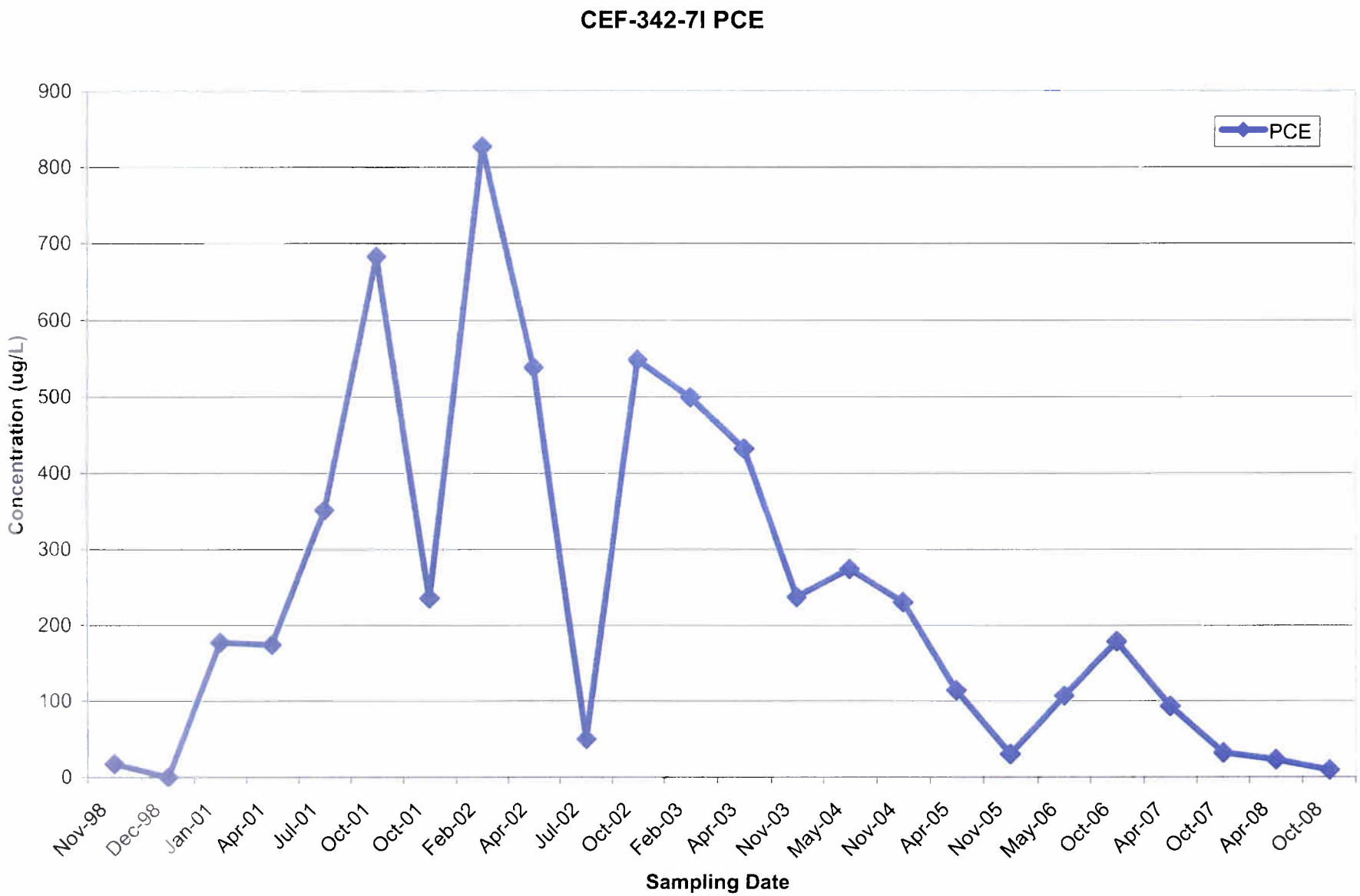

4000
3500
3000
2500
2000
1500
1000
500
0
Concentration (ug/L)
BENZENE
BTEX
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
Dec-09
May-04
Nov-04
Apr-05
Nov-05
May-06
Nov-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

CEF-342-6S


BENZENE
TCE
Concentration (ug/l)
90
80
70
60
50
40
30
20
10
0
Nov-98
Dec-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
May-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

CEF-342-7I Benzene and TCE

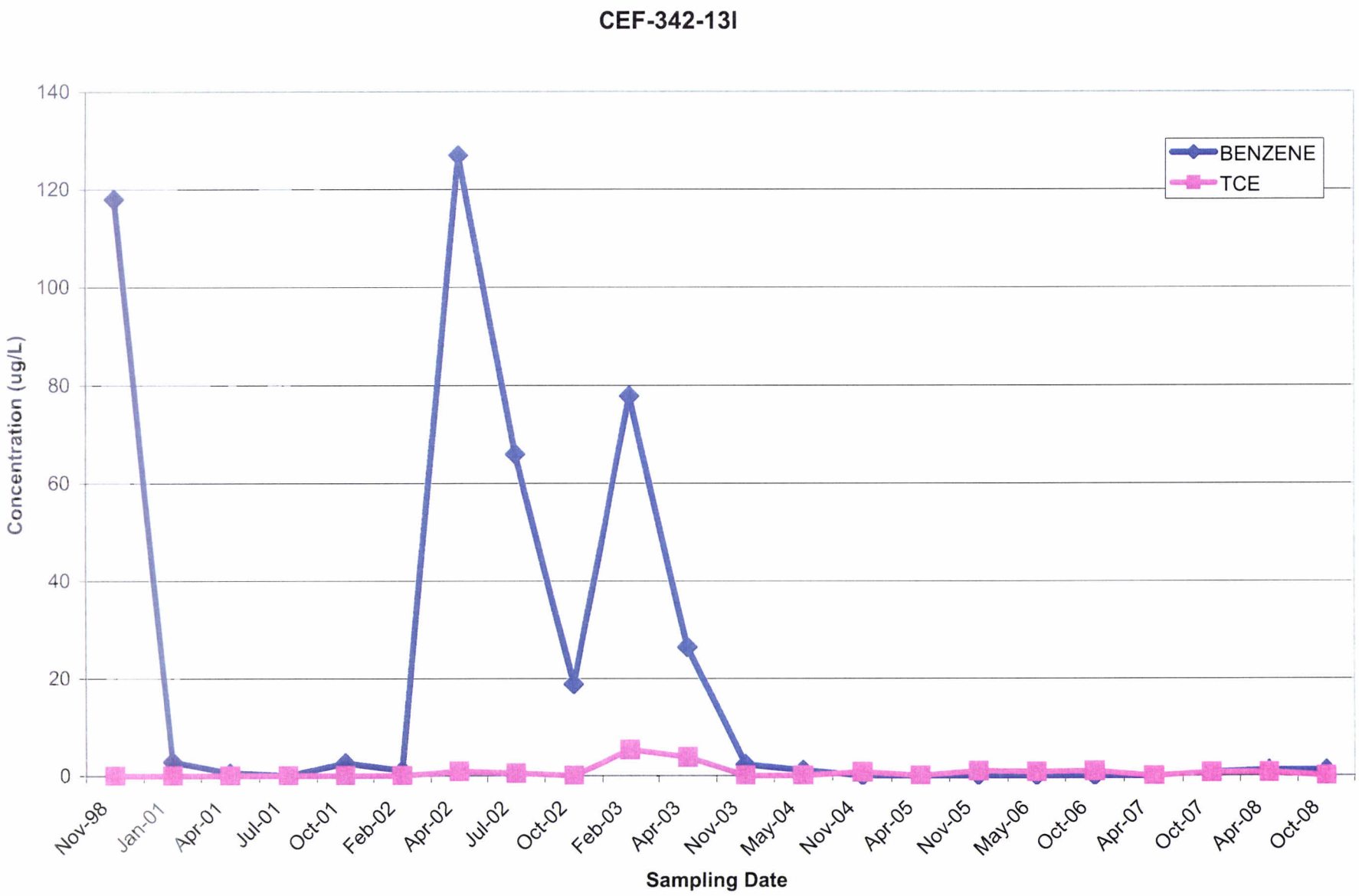


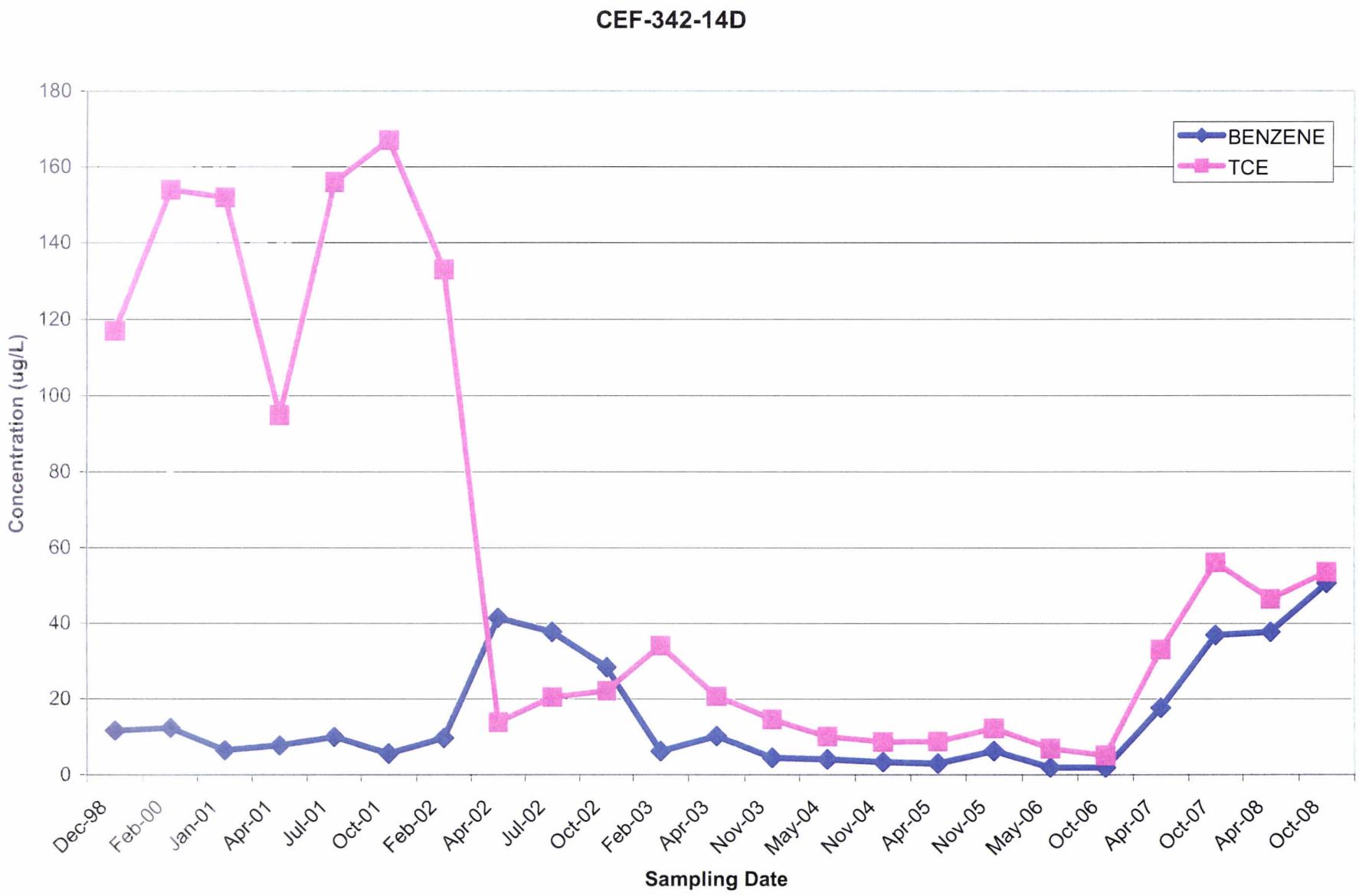

CEF-342-7I PCE
PCE
Concentration (ug/L)
900
800
700
600
500
400
300
200
100
0
Nov-98
Dec-98
Jan-01
Apr-01
Jul-01
Oct-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

SITES 36 & 37

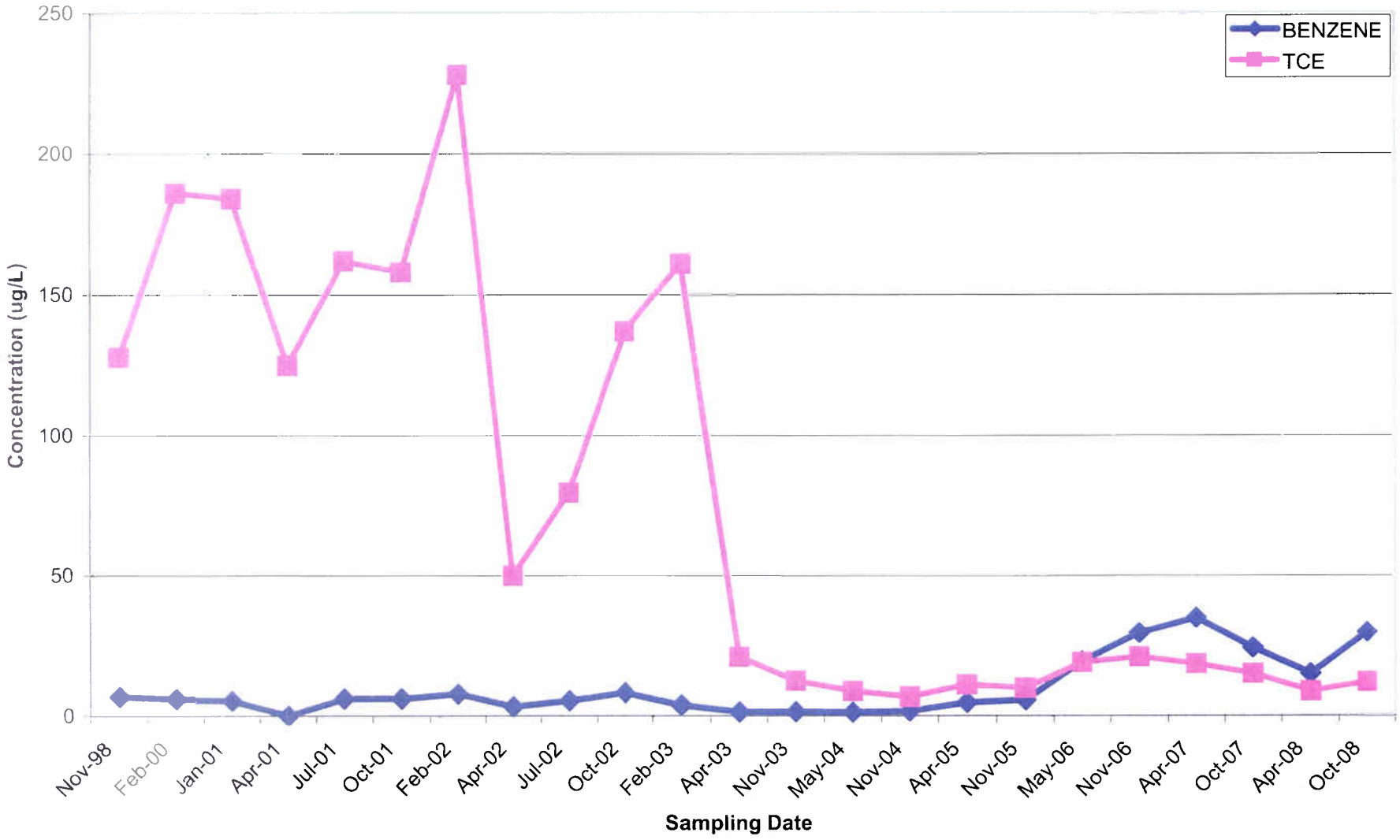
VOCs CONCENTRATION TRENDS

HOT SPOT 2 WELLS- CEF-342-13I, CEF-342-14D, CEF-342-17D, CEF-342-19I, CEF-342-20D, and CEF-36-33D

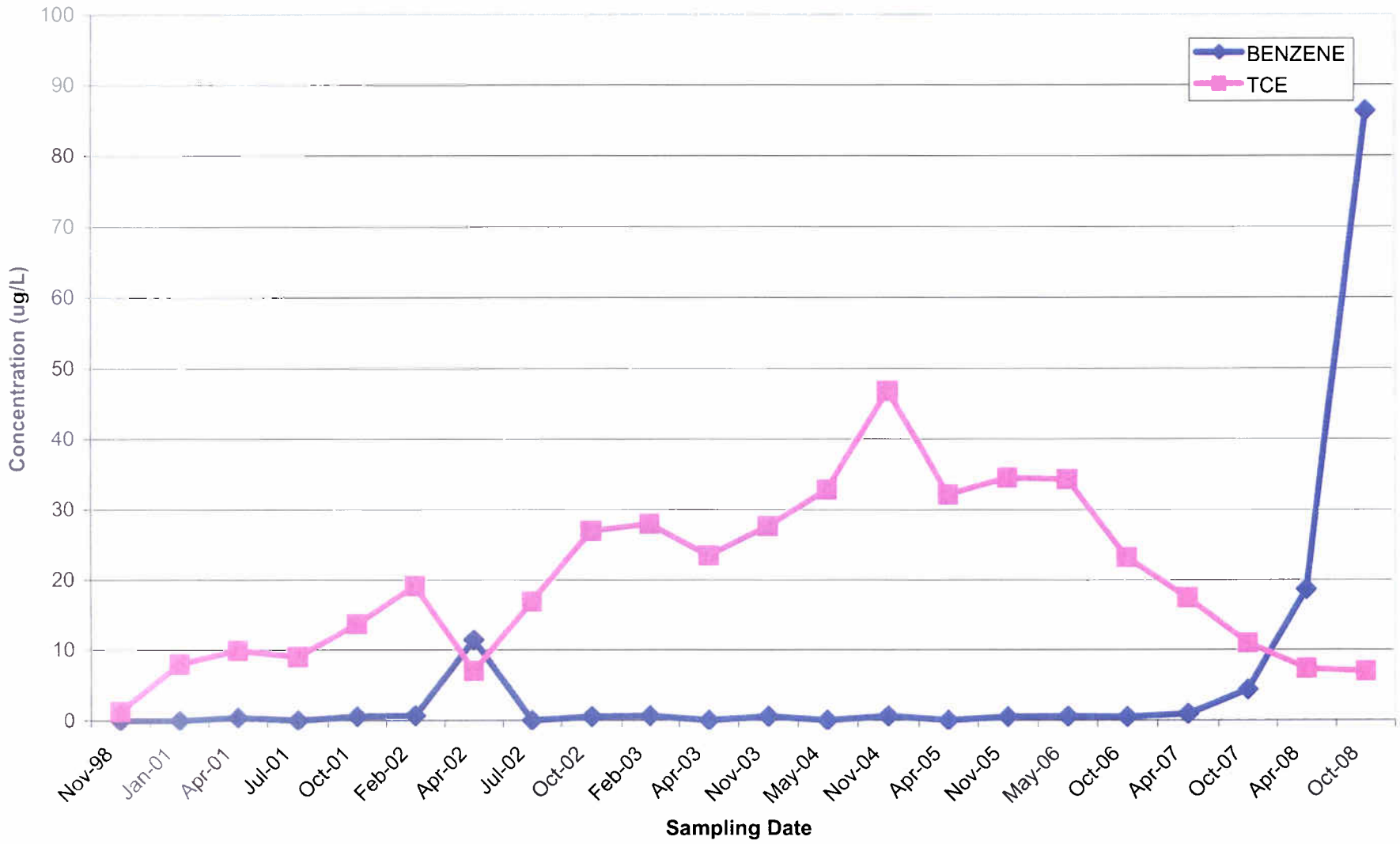

CEF-342-13I
BENZENE
TCE
Concentration (ug/L)
140
120
100
80
60
40
20
0
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date


CEF-342-14D
BENZENE
TCE
Concentration (ug/L)
180
160
140
120
100
80
60
40
20
0
Dec-98
Feb-00
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

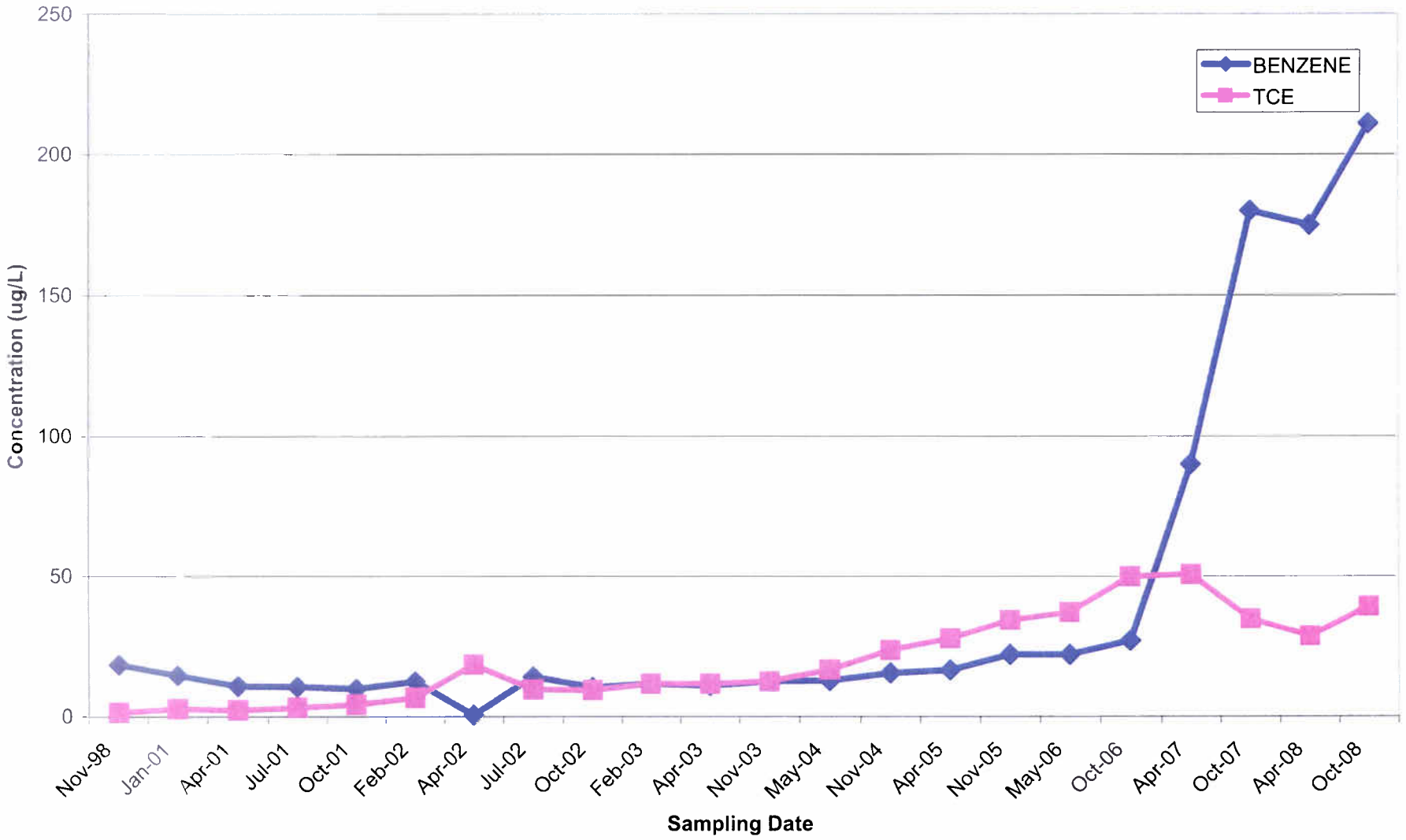
CEF-342-17D


BENZENE
TCE
Concentration (ug/L)
250
200
150
100
50
0
Nov-98
Feb-00
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Nov-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

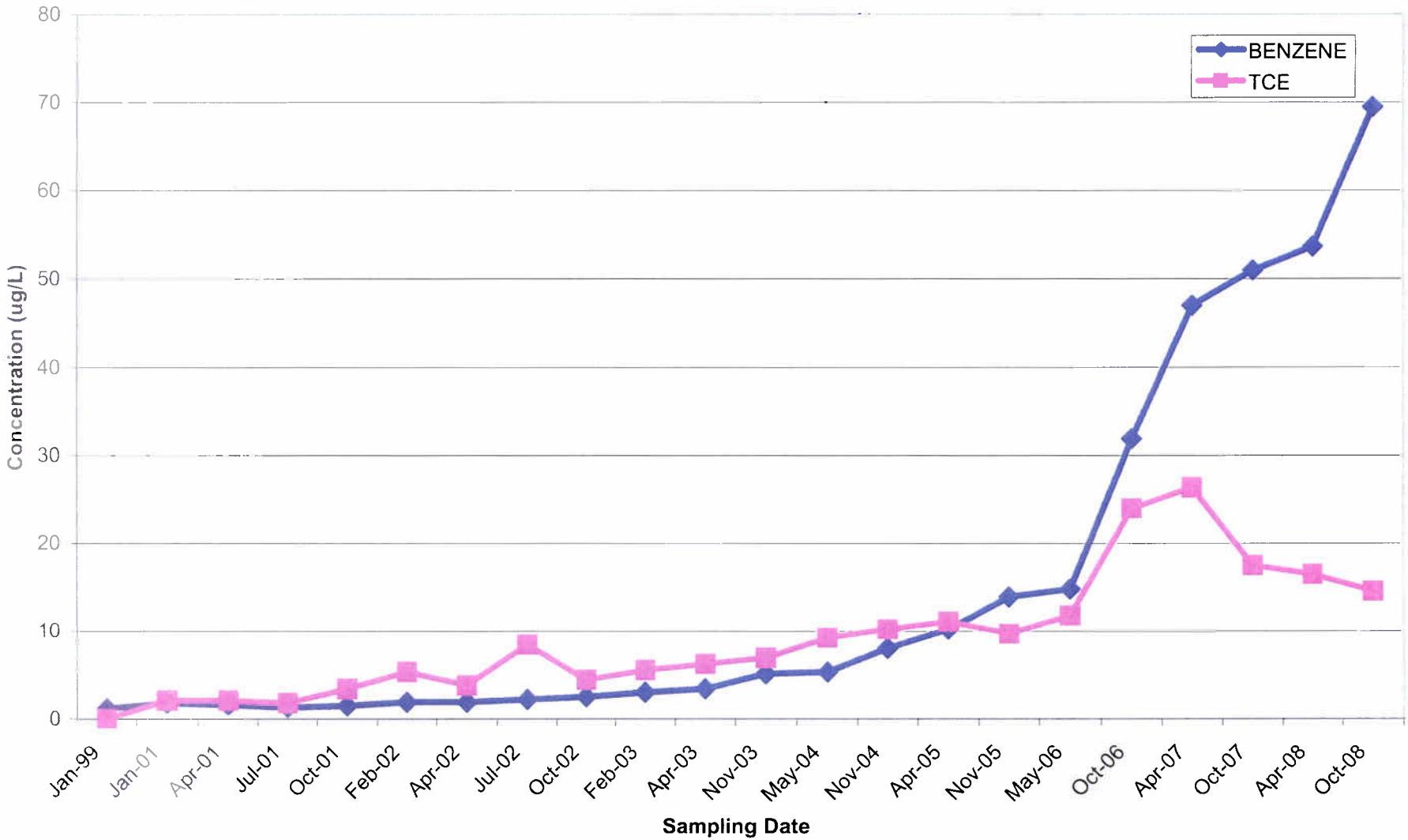
CEF-342-19I


BENZENE
TCE
Concentration (ug/L)
100
90
80
70
60
50
40
30
20
10
0
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

CEF-342-20D


250
200
150
100
50
0
Concentration (ug/L)
BENZENE
TCE
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

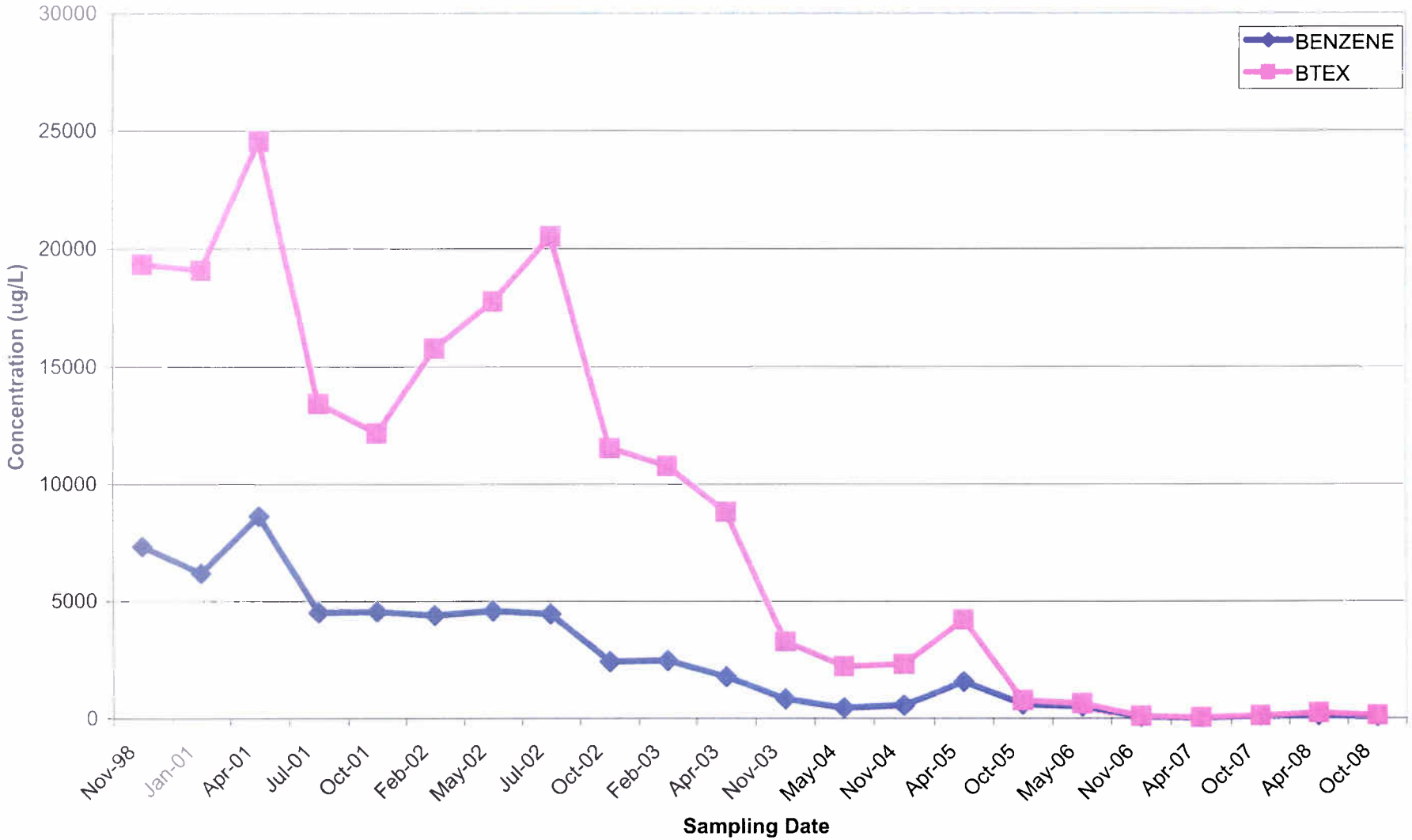
CEF-36-33D


BENZENE
TCE
Concentration (ug/L)
0
10
20
30
40
50
60
70
80
Jan-99
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
Apr-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Nov-05
May-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date

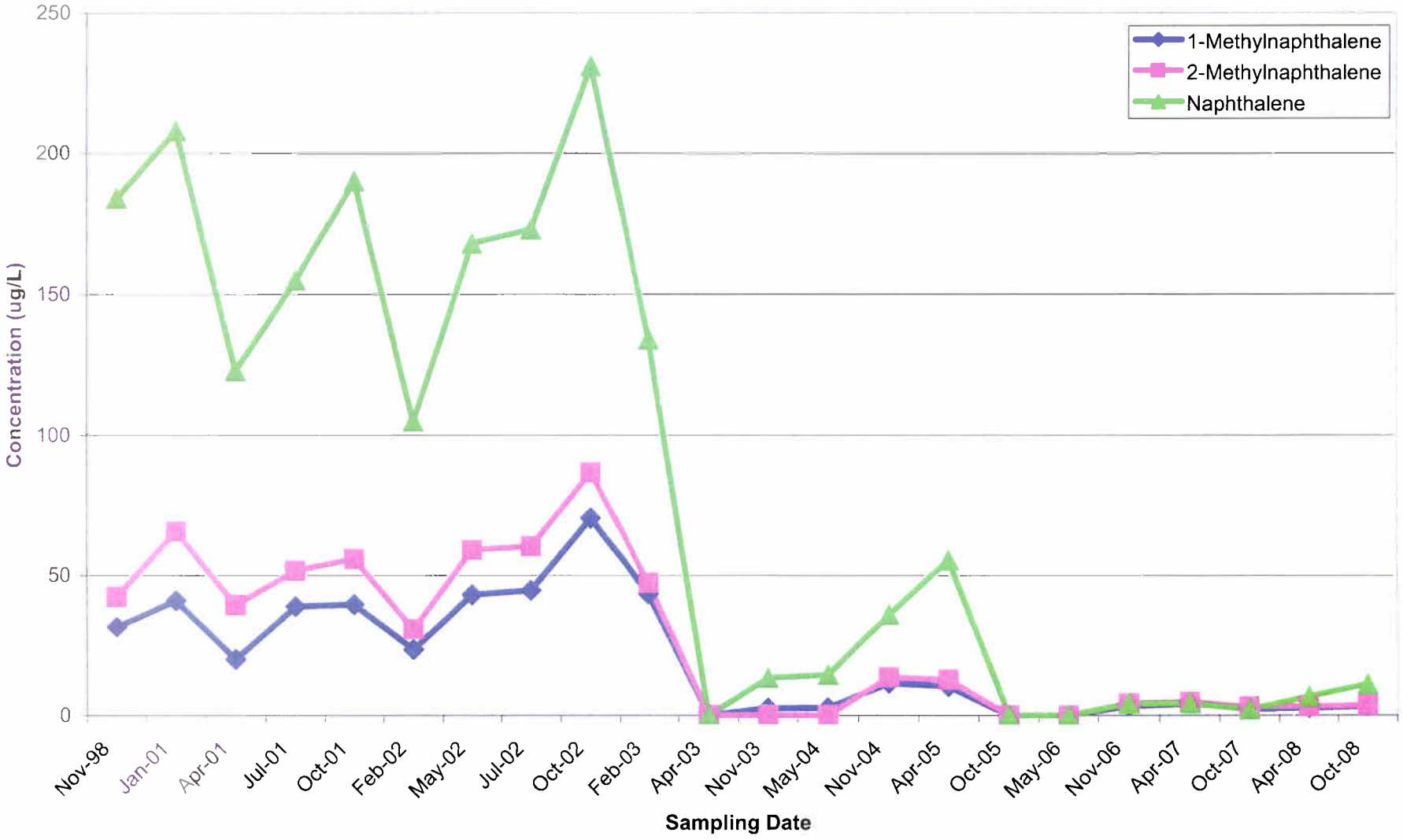
SITES 36 & 37

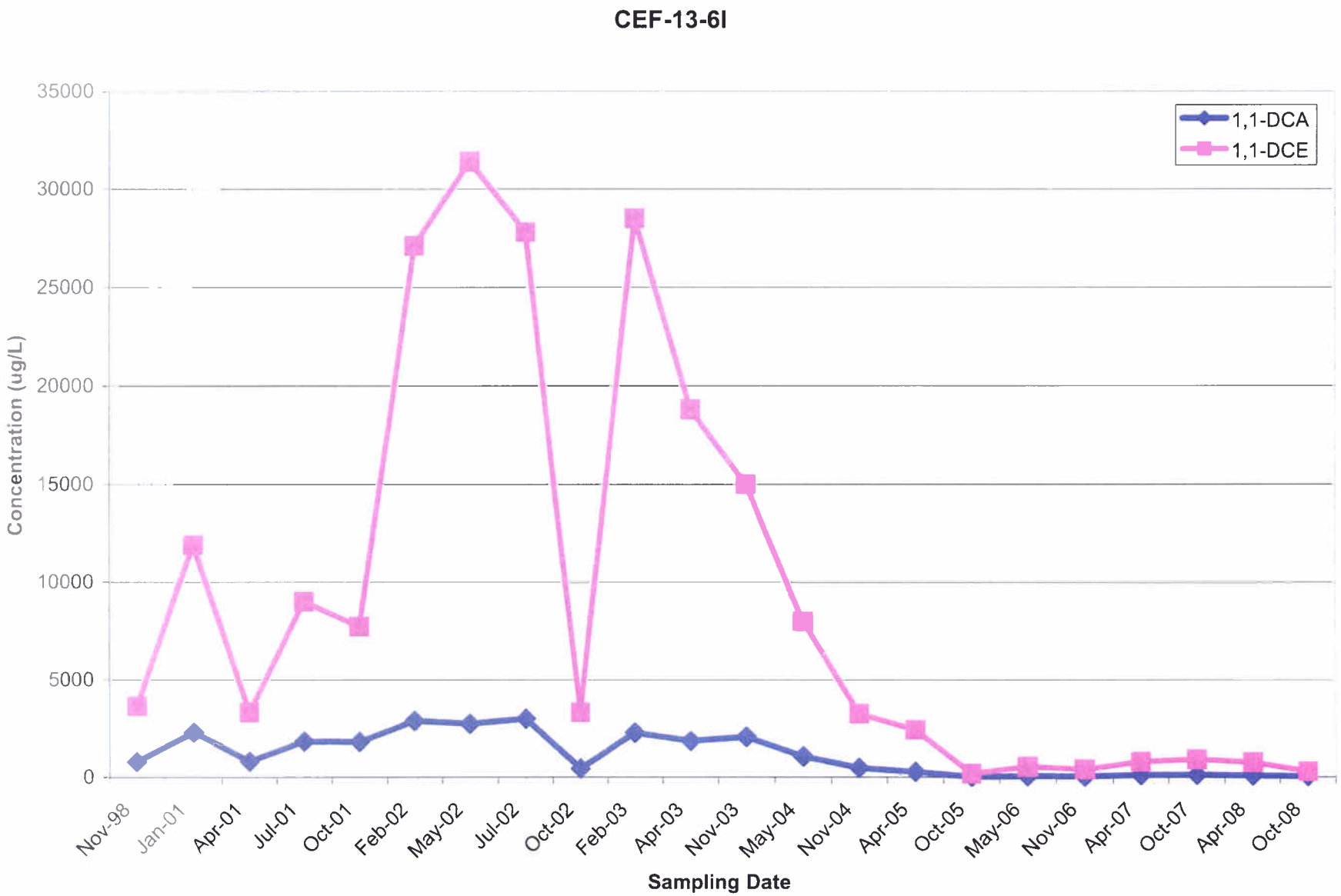
VOCs and SVOCs CONCENTRATION TRENDS
HOT SPOT 3 WELLS- CEF-13-5S, CEF-13-6I, and CEF-13-8S

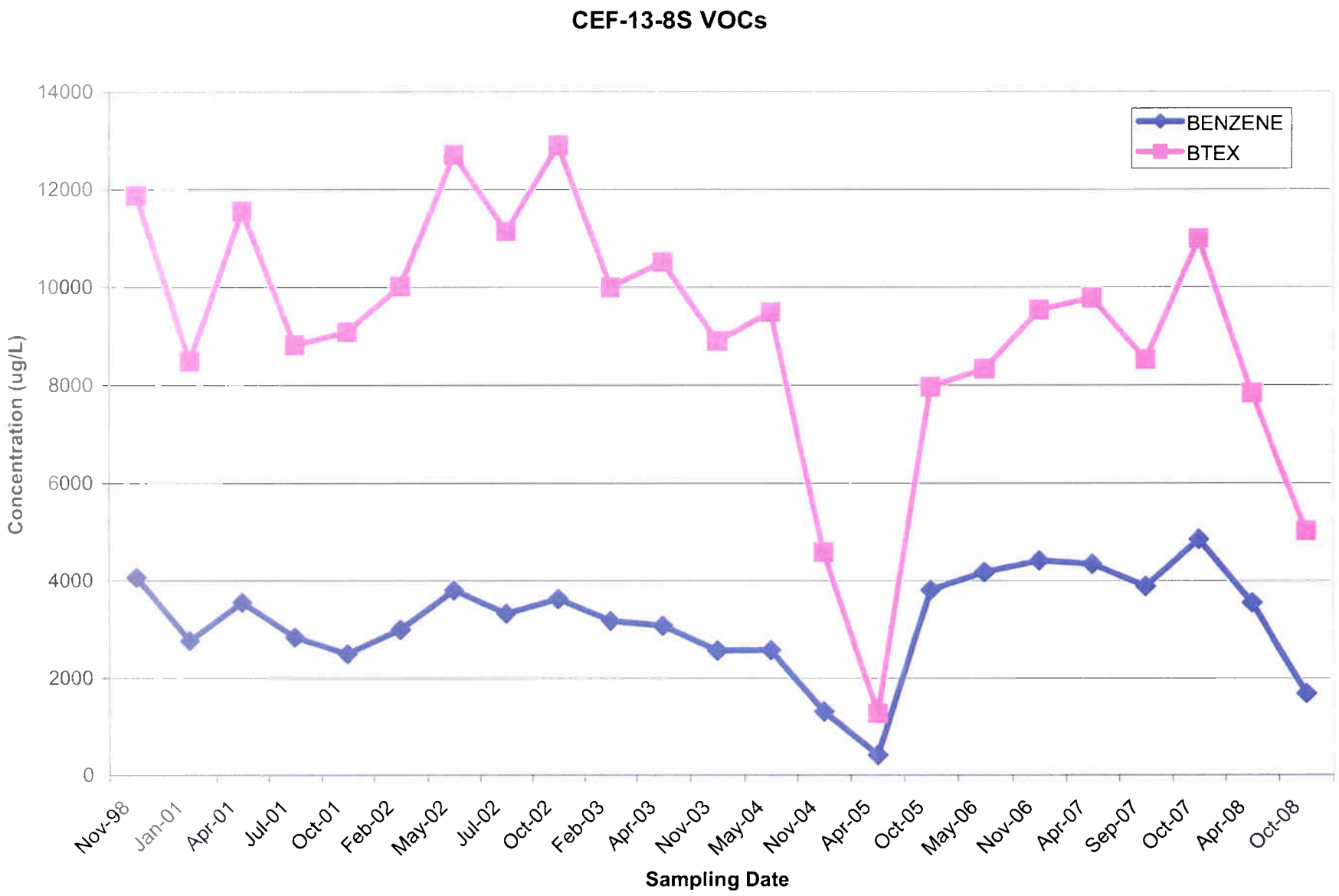
CEF-13-5S VOCs



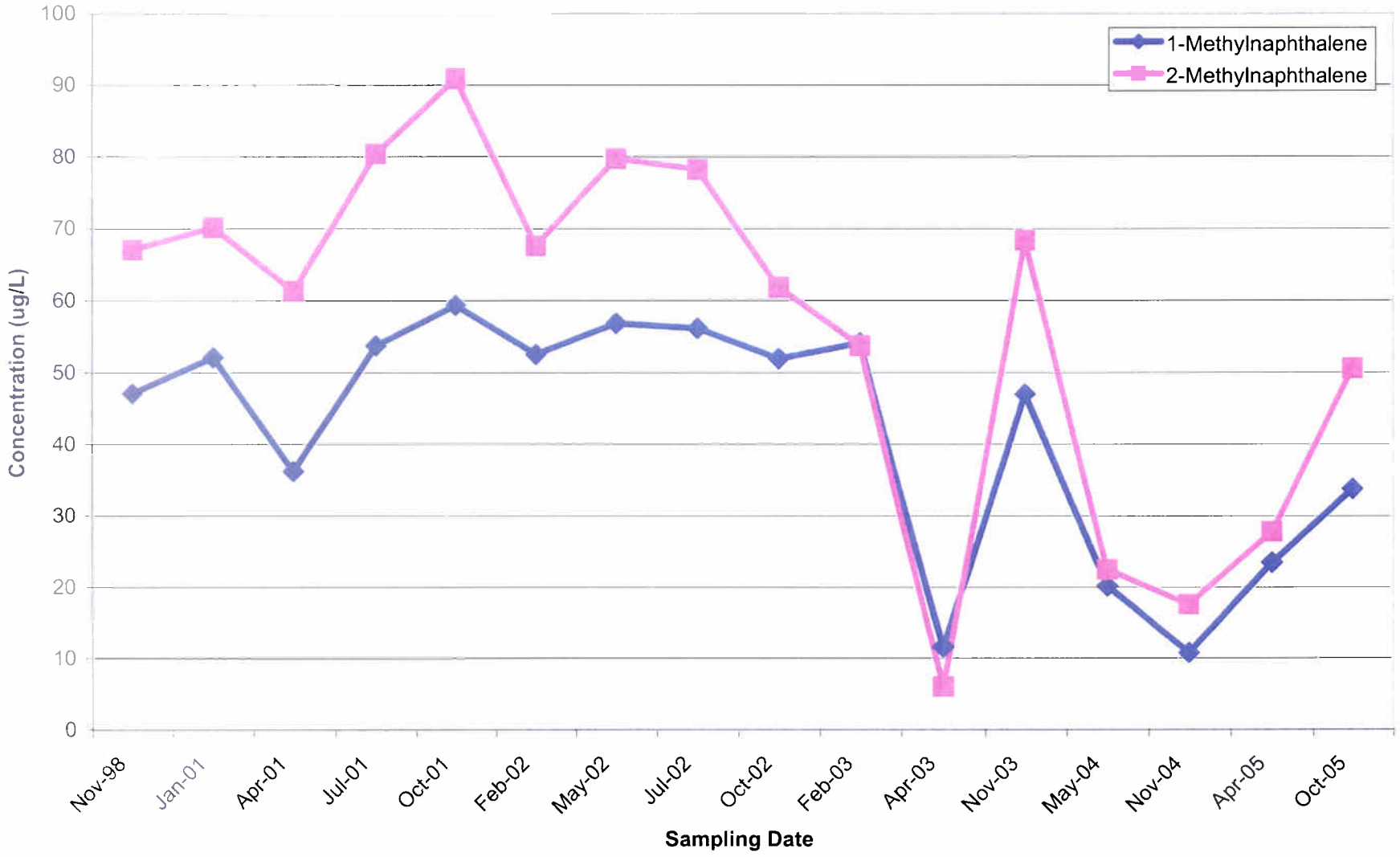
CEF-13-5S SVOCs




CEF-13-6I
1,1-DCA
1,1-DCE
Concentration (ug/L)
35000
30000
25000
20000
15000
10000
5000
0
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
May-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Oct-05
May-06
Nov-06
Apr-07
Oct-07
Apr-08
Oct-08
Sampling Date


CEF-13-8S VOCs
BENZENE
BTEX
Concentration (ug/L)
14000
12000
10000
8000
6000
4000
2000
0
Nov-98
Jan-01
Apr-01
Jul-01
Oct-01
Feb-02
May-02
Jul-02
Oct-02
Feb-03
Apr-03
Nov-03
May-04
Nov-04
Apr-05
Oct-05
May-06
Nov-06
Apr-07
Sep-07
Oct-07
Apr-08
Oct-08
Sampling Date

CEF-13-8S SVOCs

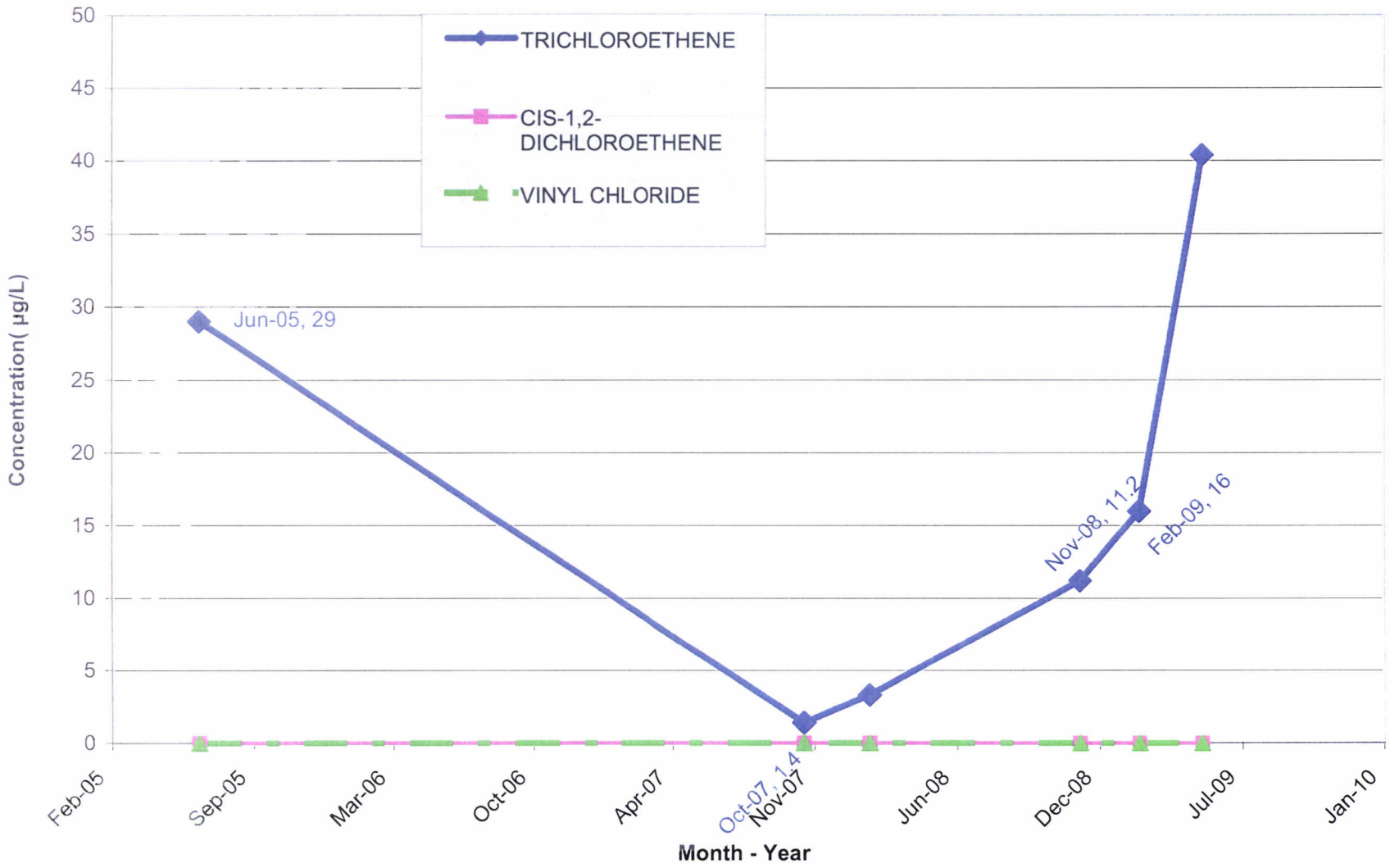


SITE 59

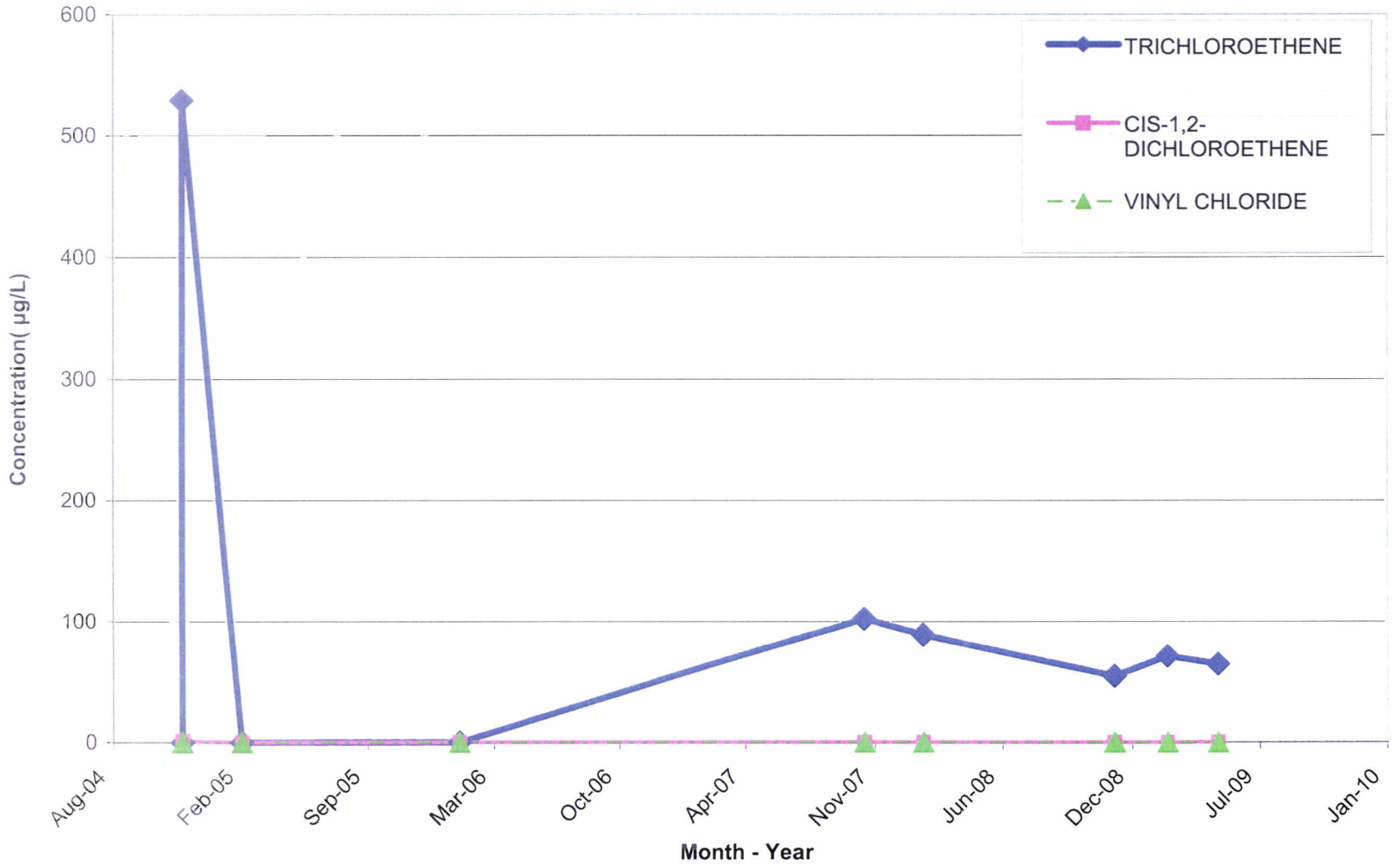
VOCs CONCENTRATION TRENDS

SOURCE AREA WELLS- Clusters 004, NG-02, and NG-12

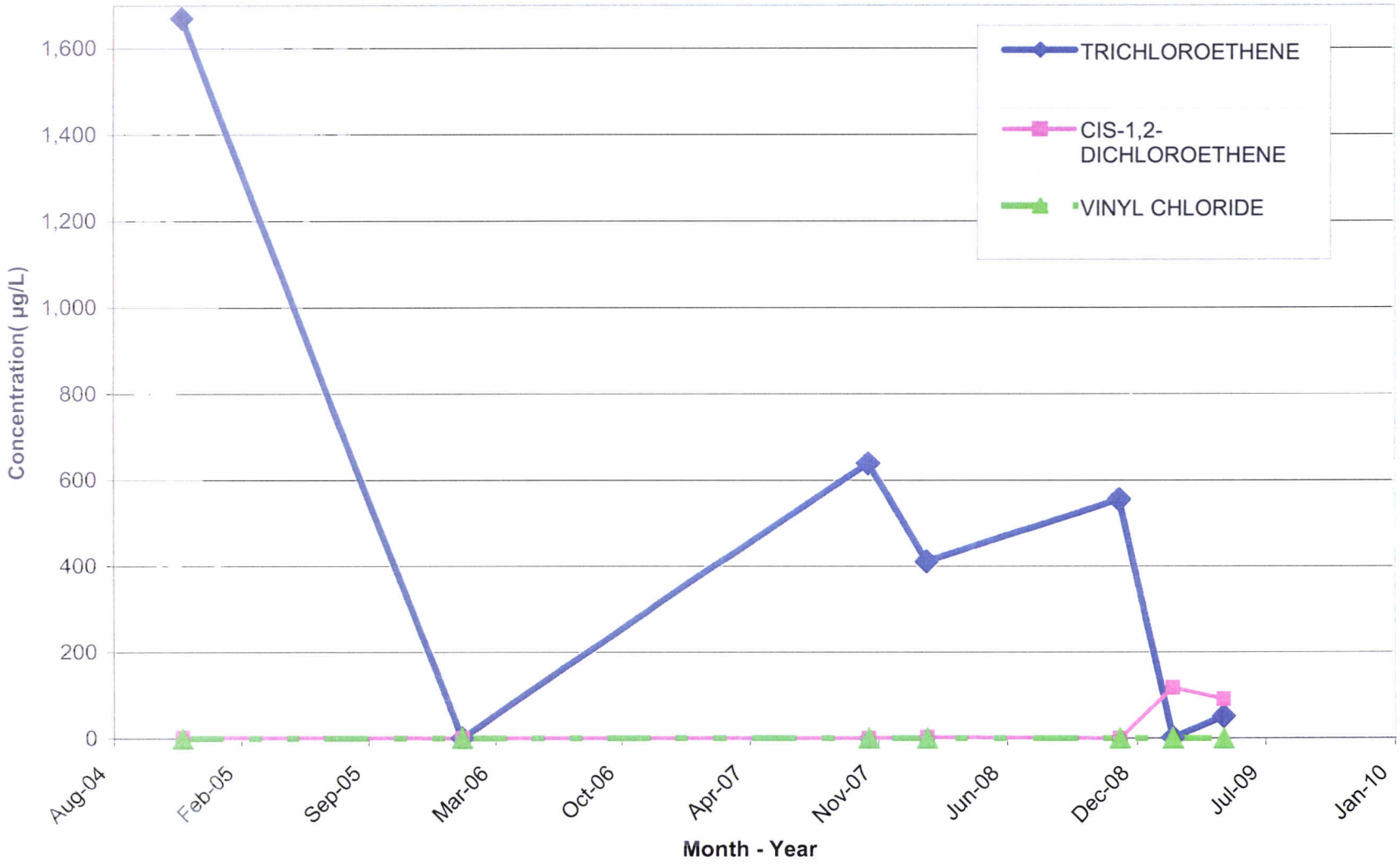
CEF-059-004-033



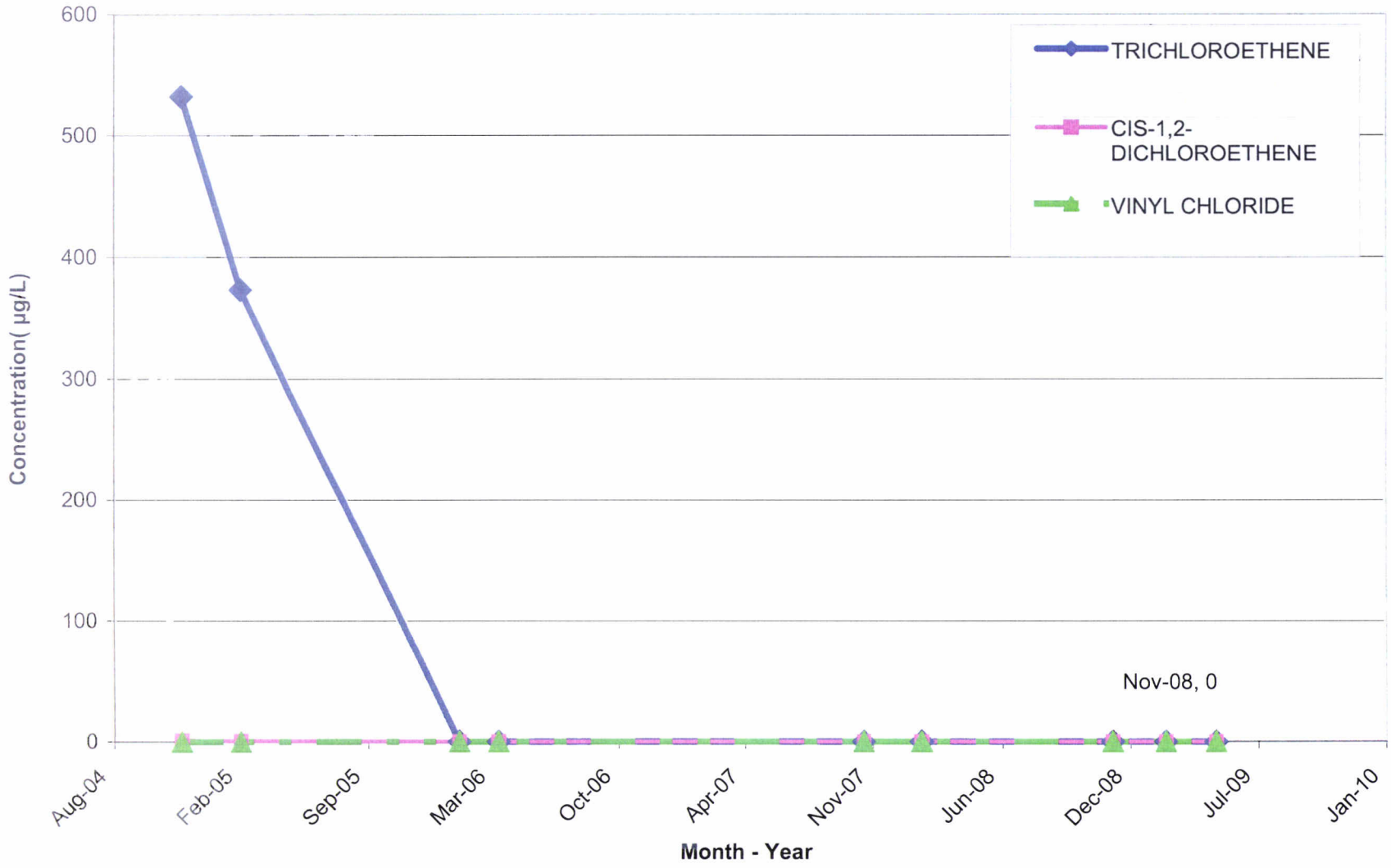
CEF-059-004-053



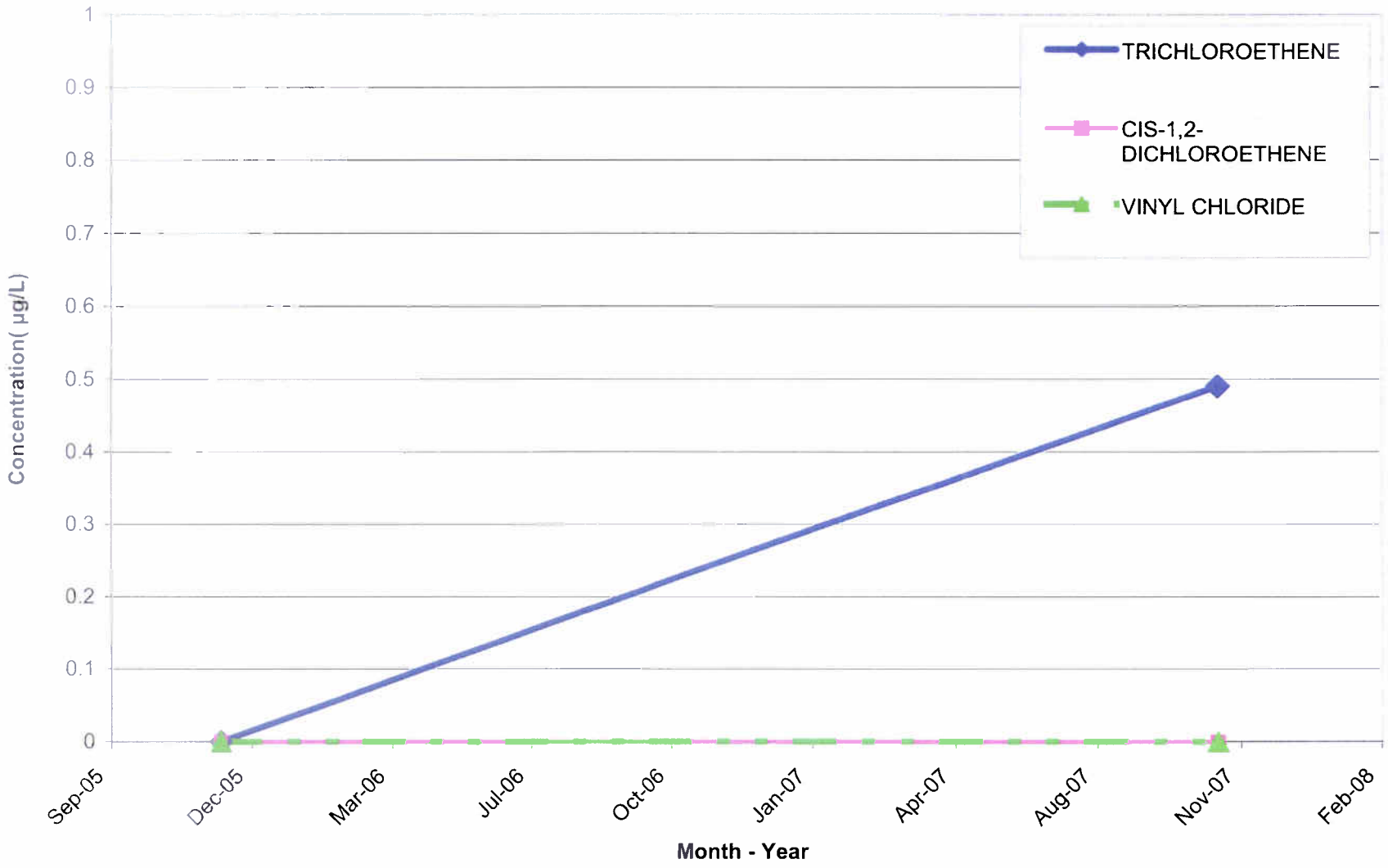
CEF-059-004-073



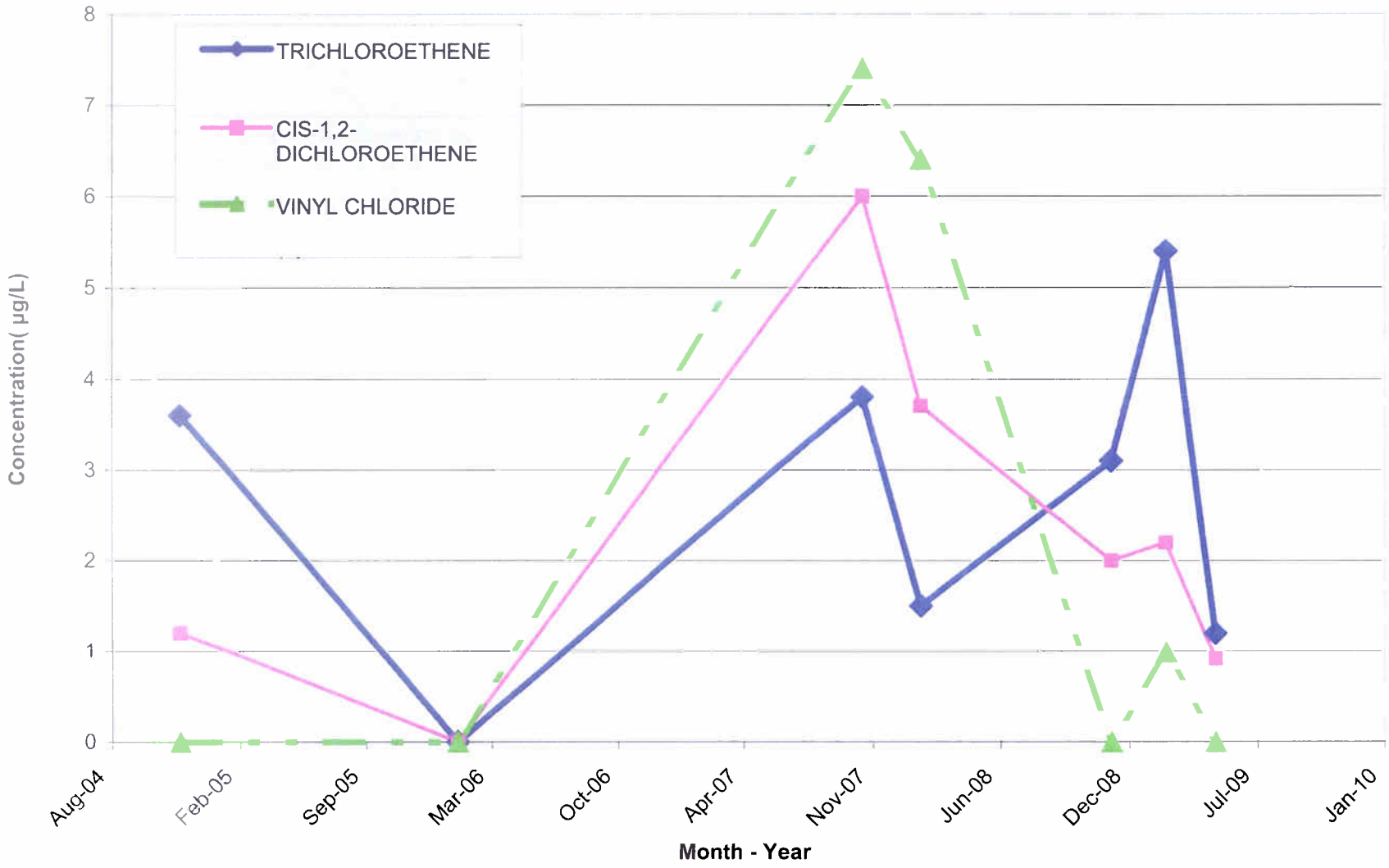
CEF-059-004-112



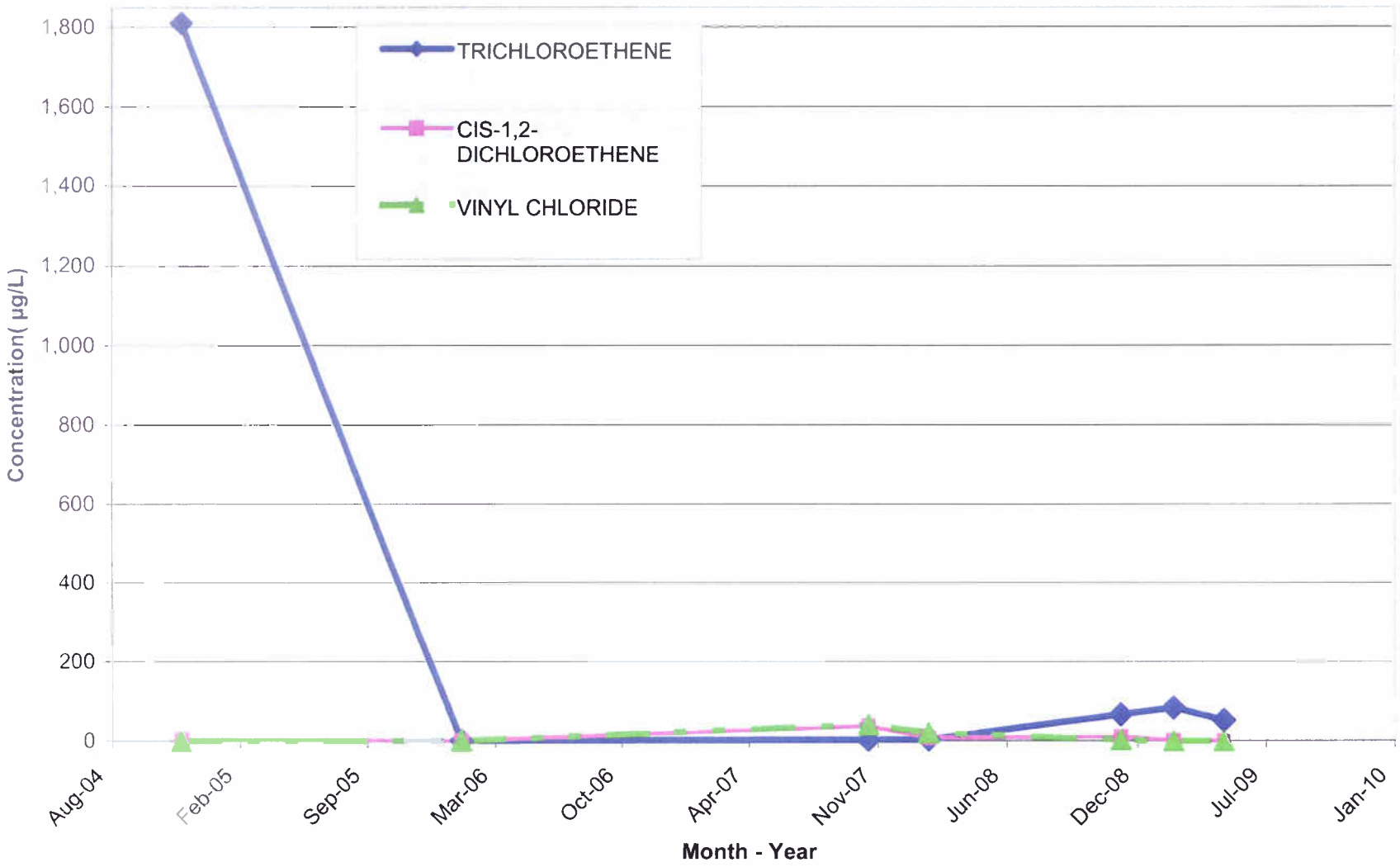
CEF-059-004-135



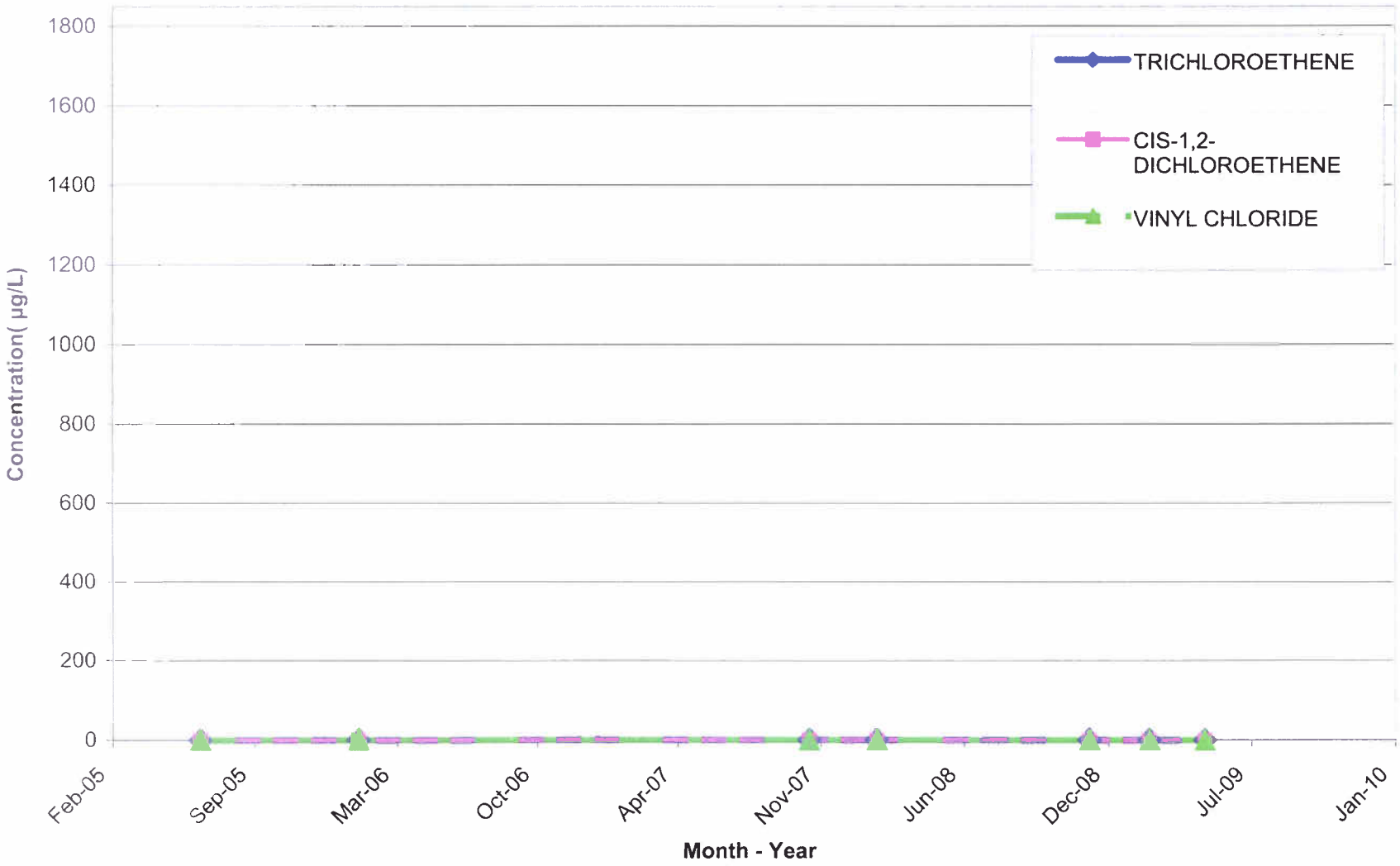
Location 006 - NG-12I

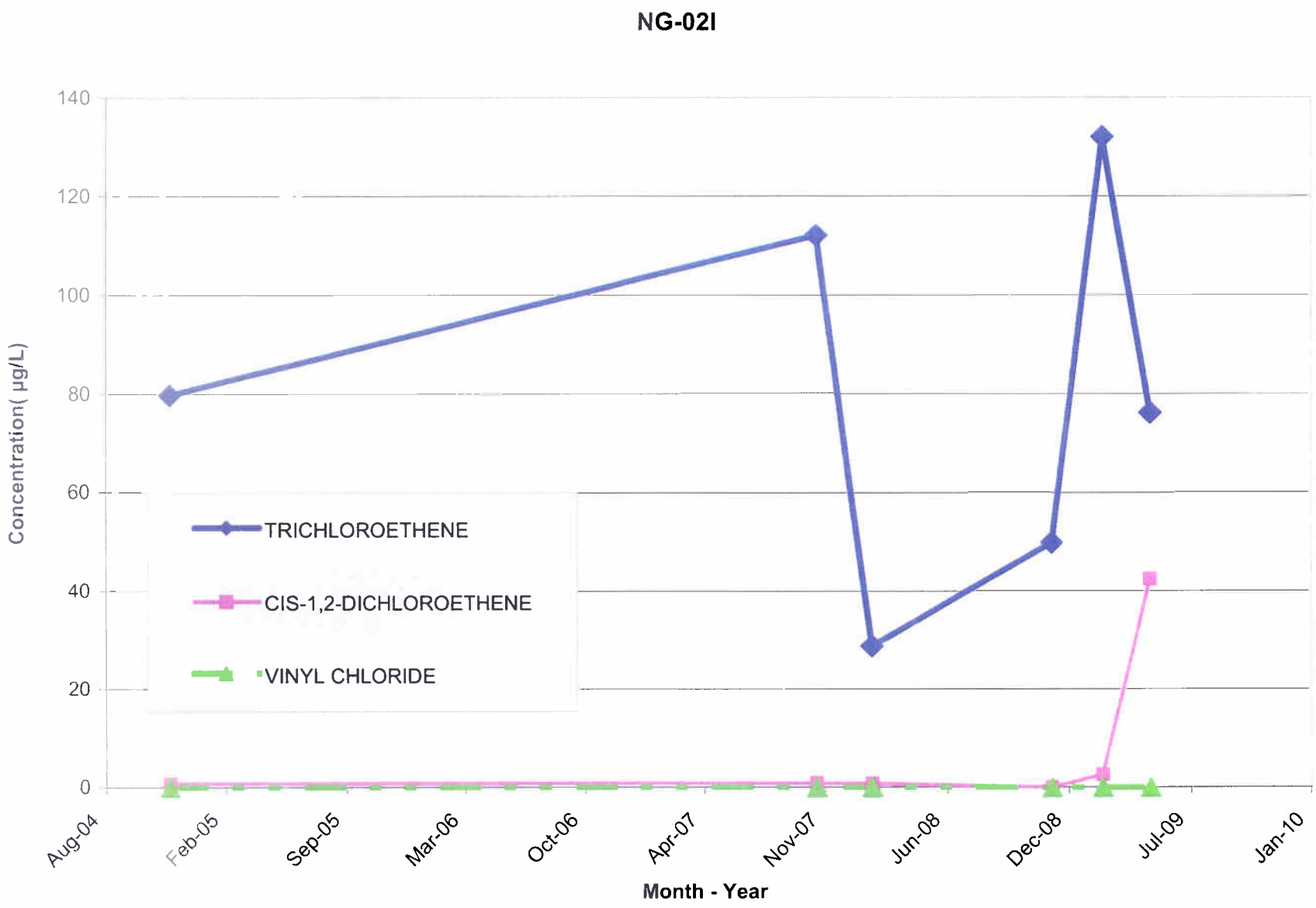


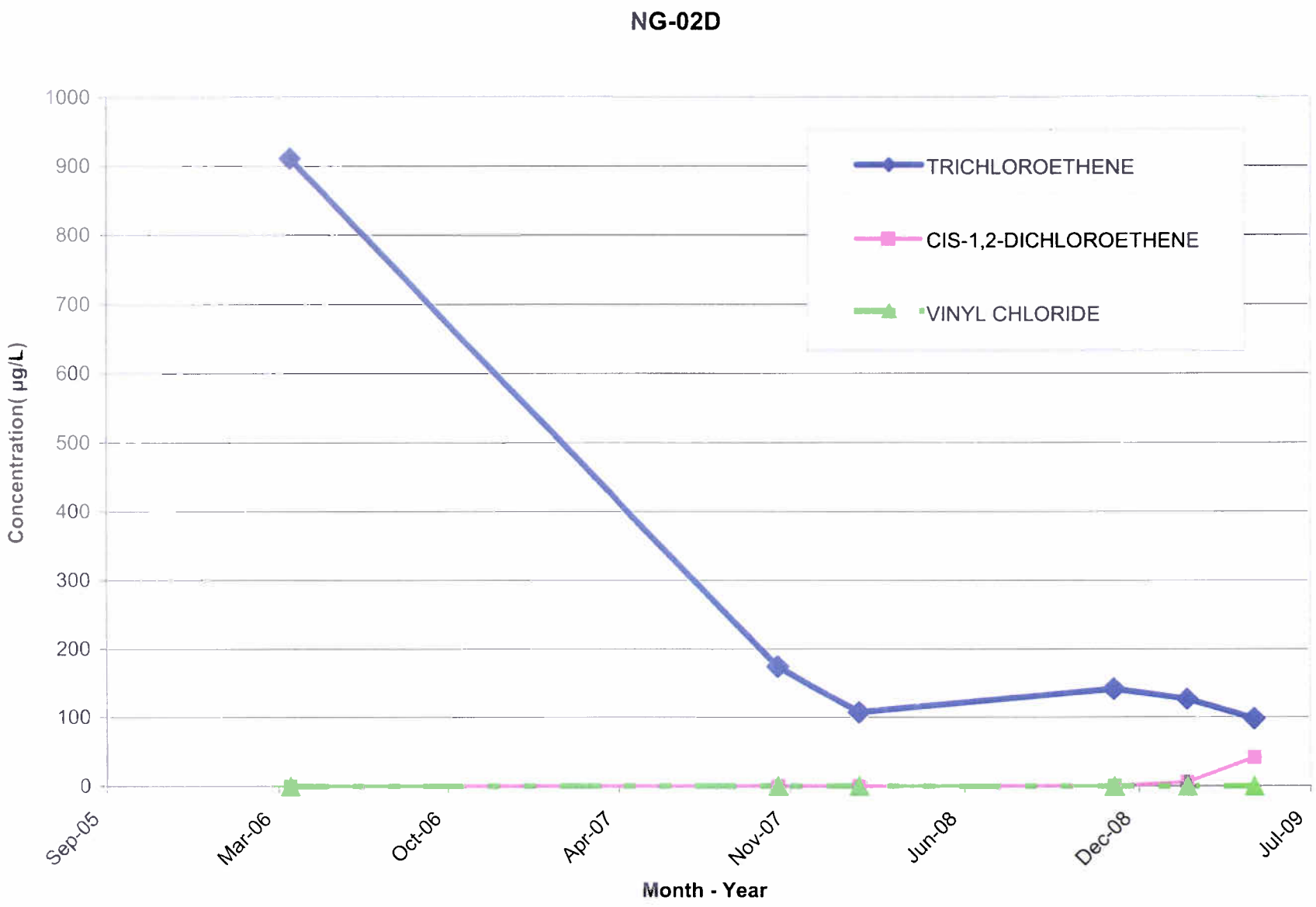
Location 006 - NG-12D



CEF-059-006-078




NG-02I
140
120
100
80
60
40
20
0
Concentration(µg/L)
TRICHLOROETHENE
CIS-1,2-DICHLOROETHENE
VINYL CHLORIDE
Aug-04
Feb-05
Sep-05
Mar-06
Oct-06
Apr-07
Nov-07
Jun-08
Dec-08
Jul-09
Jan-10
Month - Year

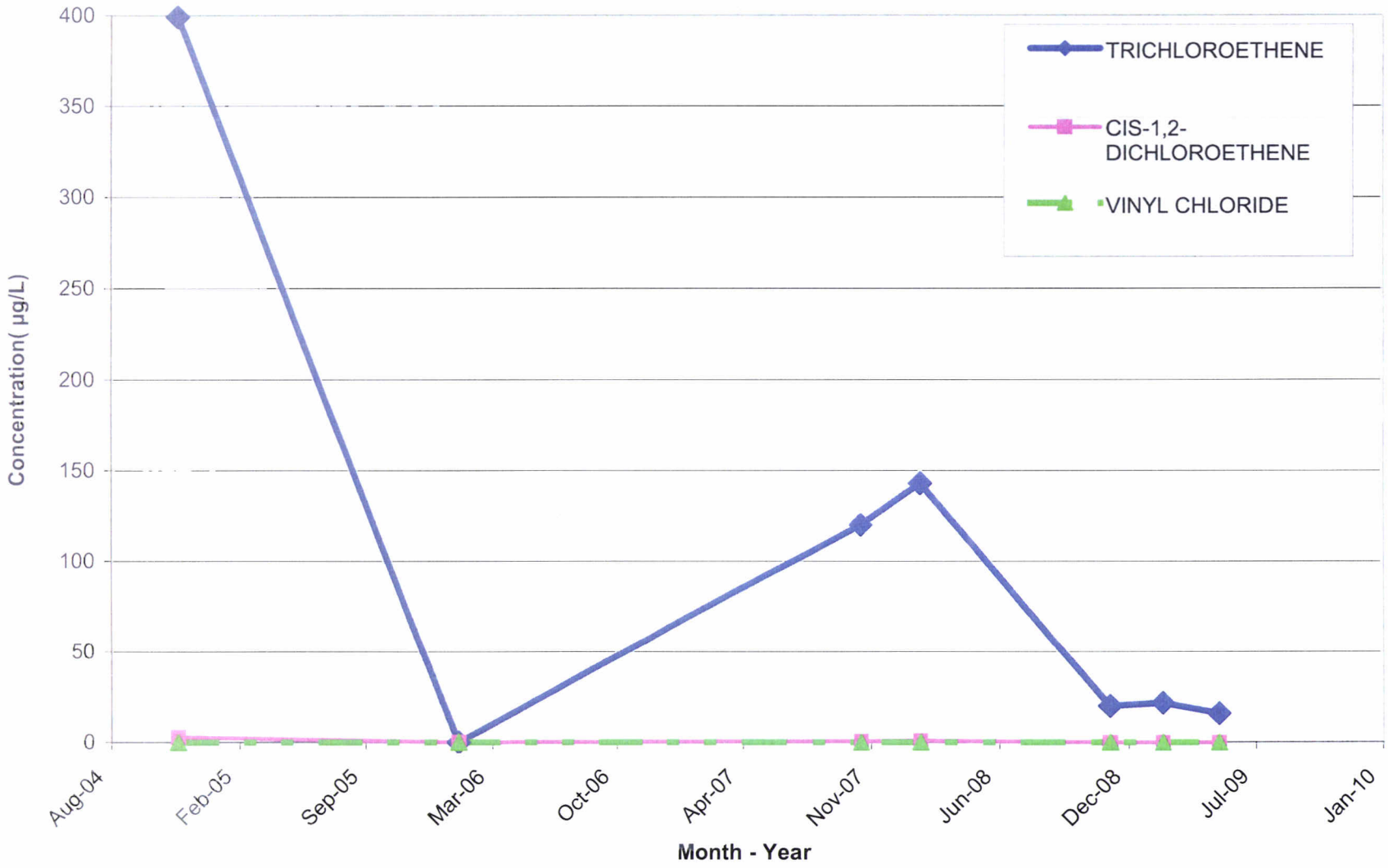

NG-02D
1000
900
800
700
600
500
400
300
200
100
0
Concentration(µg/L)
TRICHLOROETHENE
CIS-1,2-DICHLOROETHENE
VINYL CHLORIDE
Sep-05
Mar-06
Oct-06
Apr-07
Nov-07
Jun-08
Dec-08
Jul-09
Month - Year

SITE 59

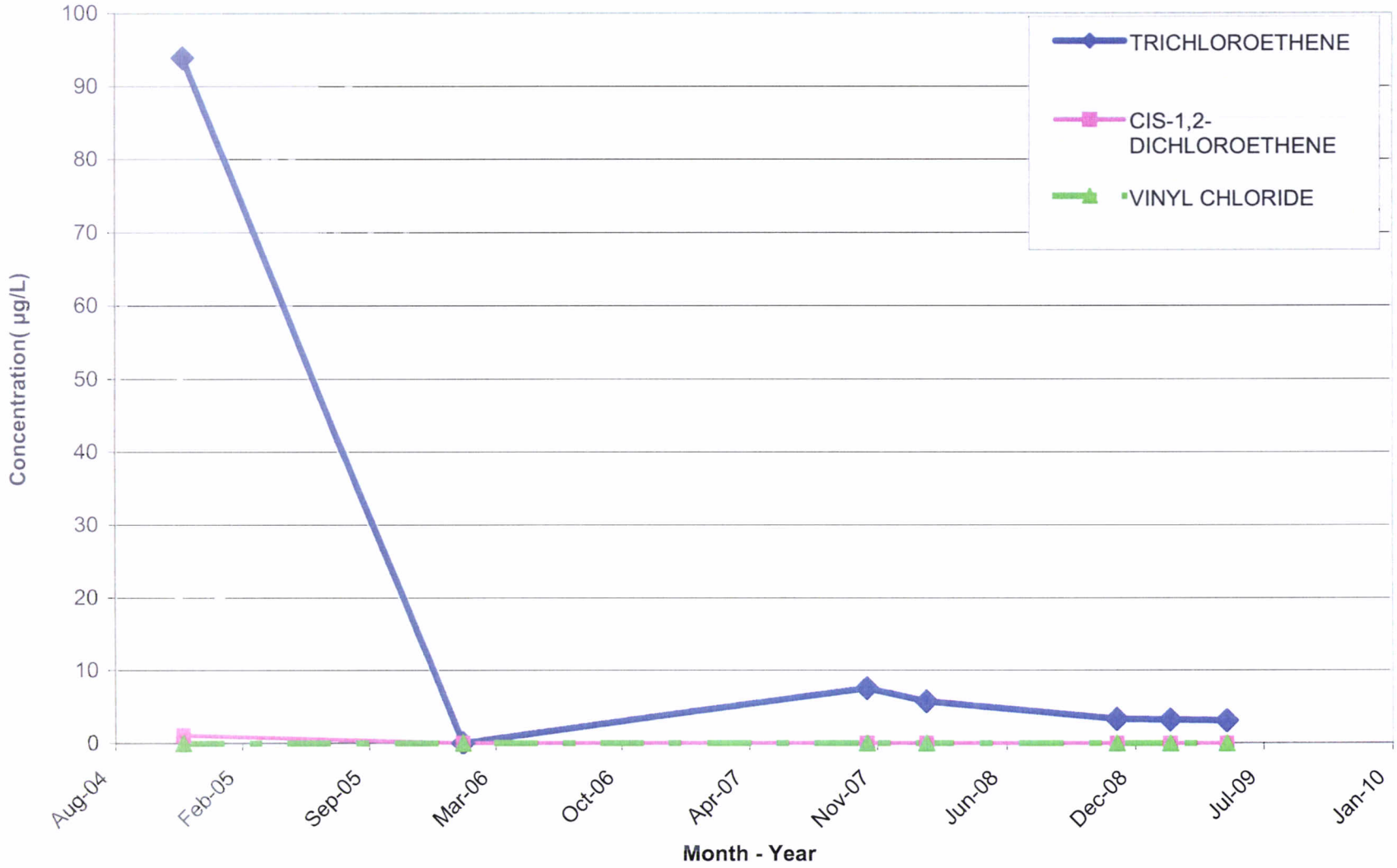
VOCs CONCENTRATION TRENDS

WELLS WITHIN VOC PLUMES- Clusters 003, 005, 009, 011, 016, 017, and 027

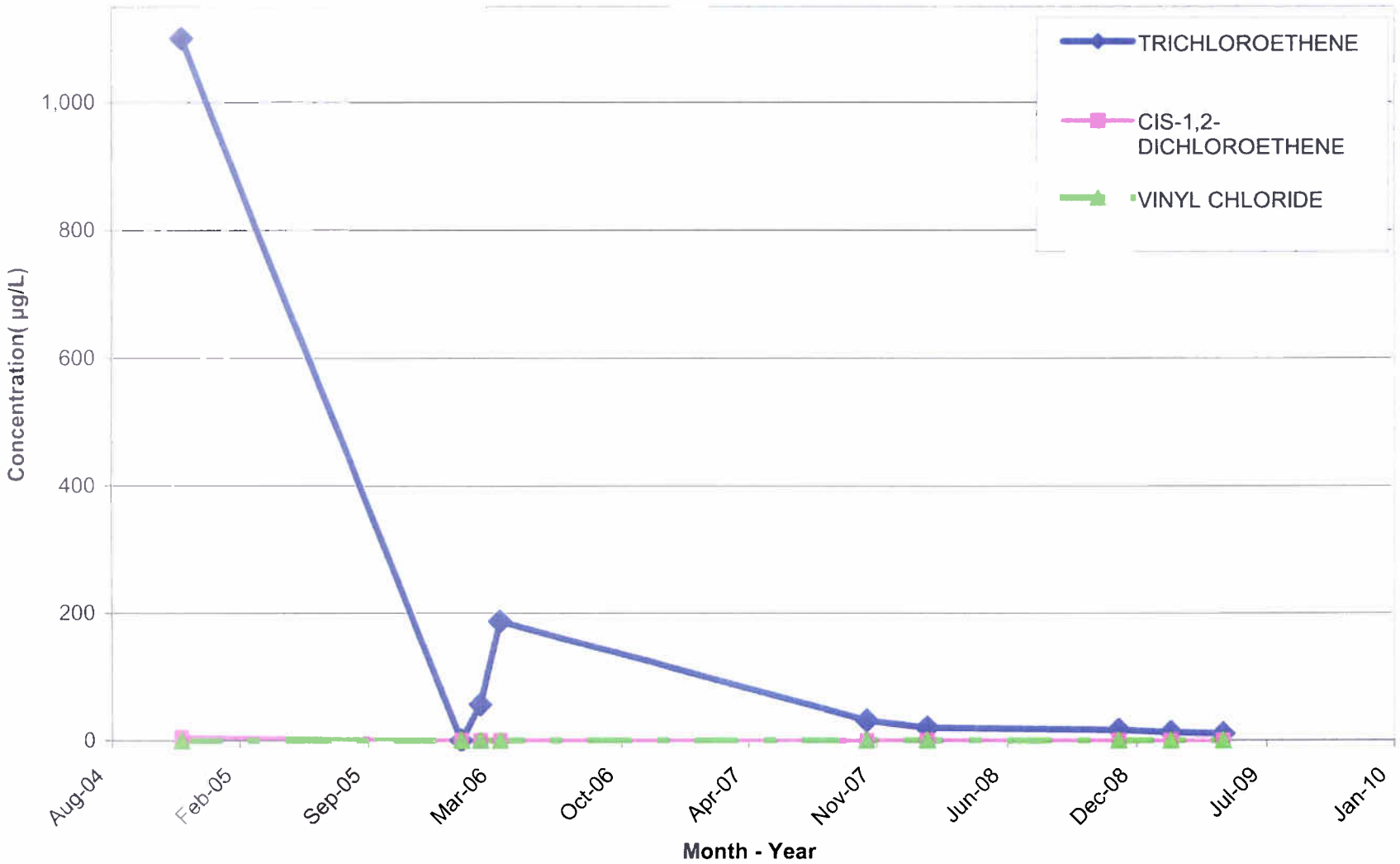
CEF-059-003-035



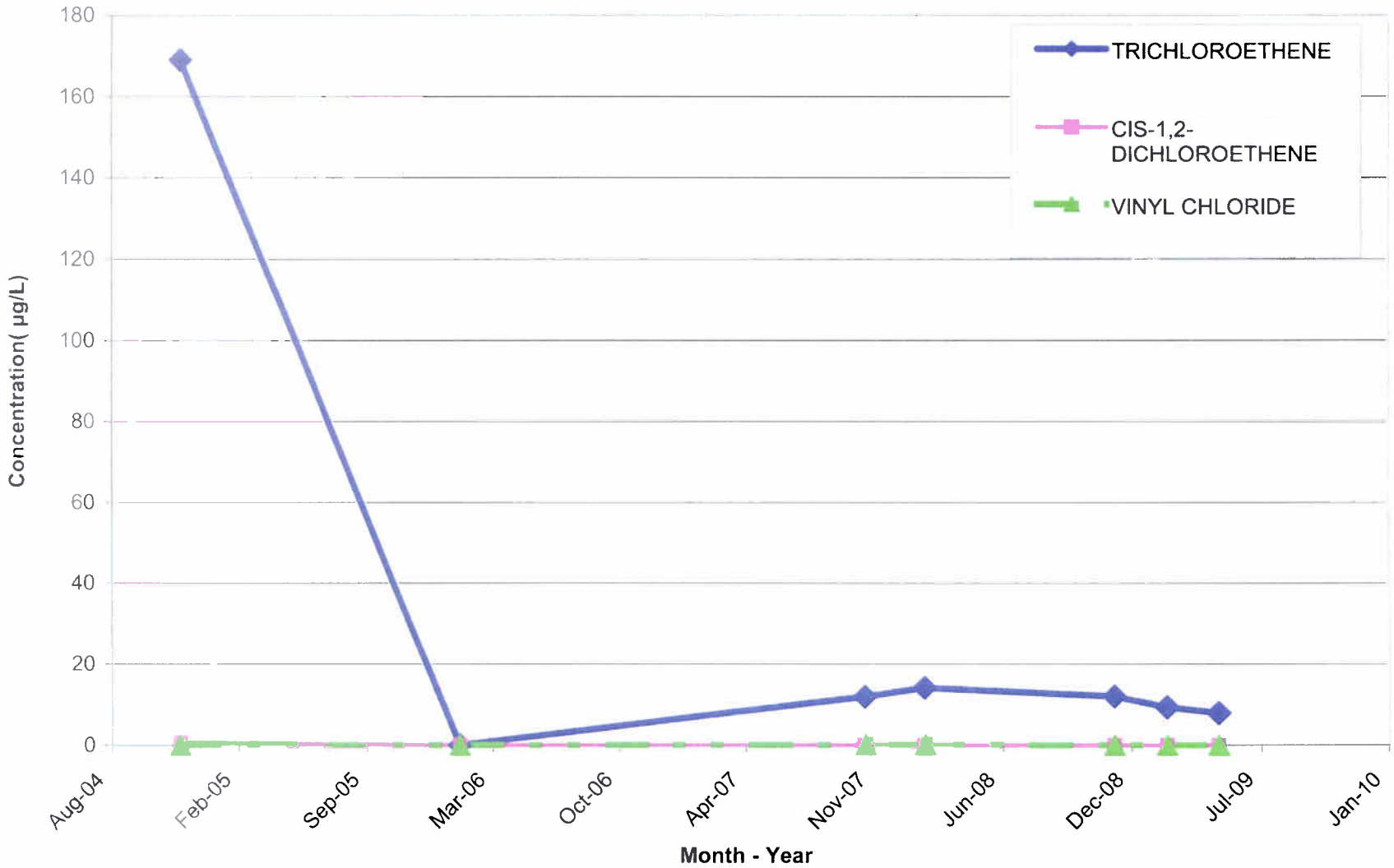
CEF-059-003-053

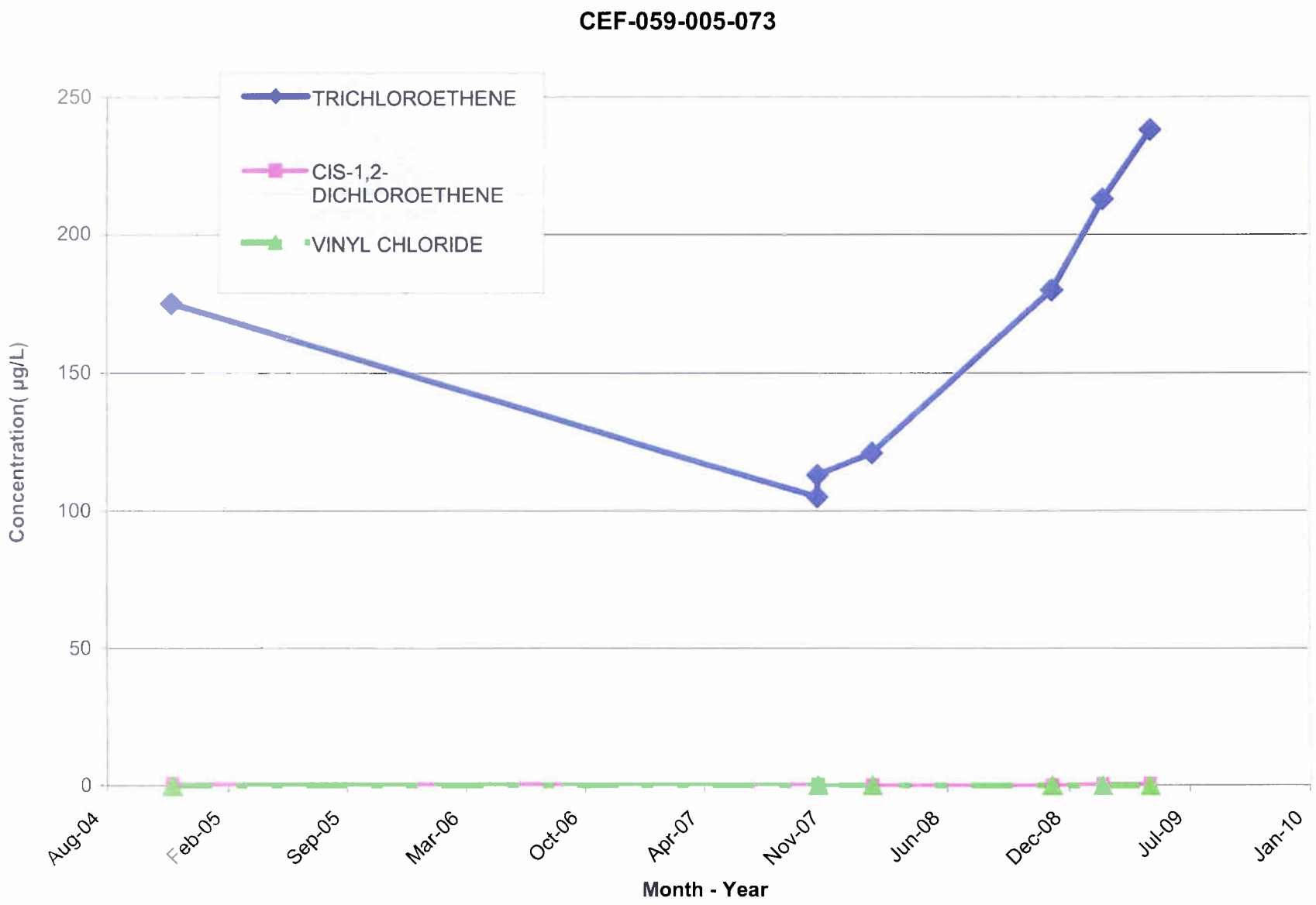


CEF-059-003-073

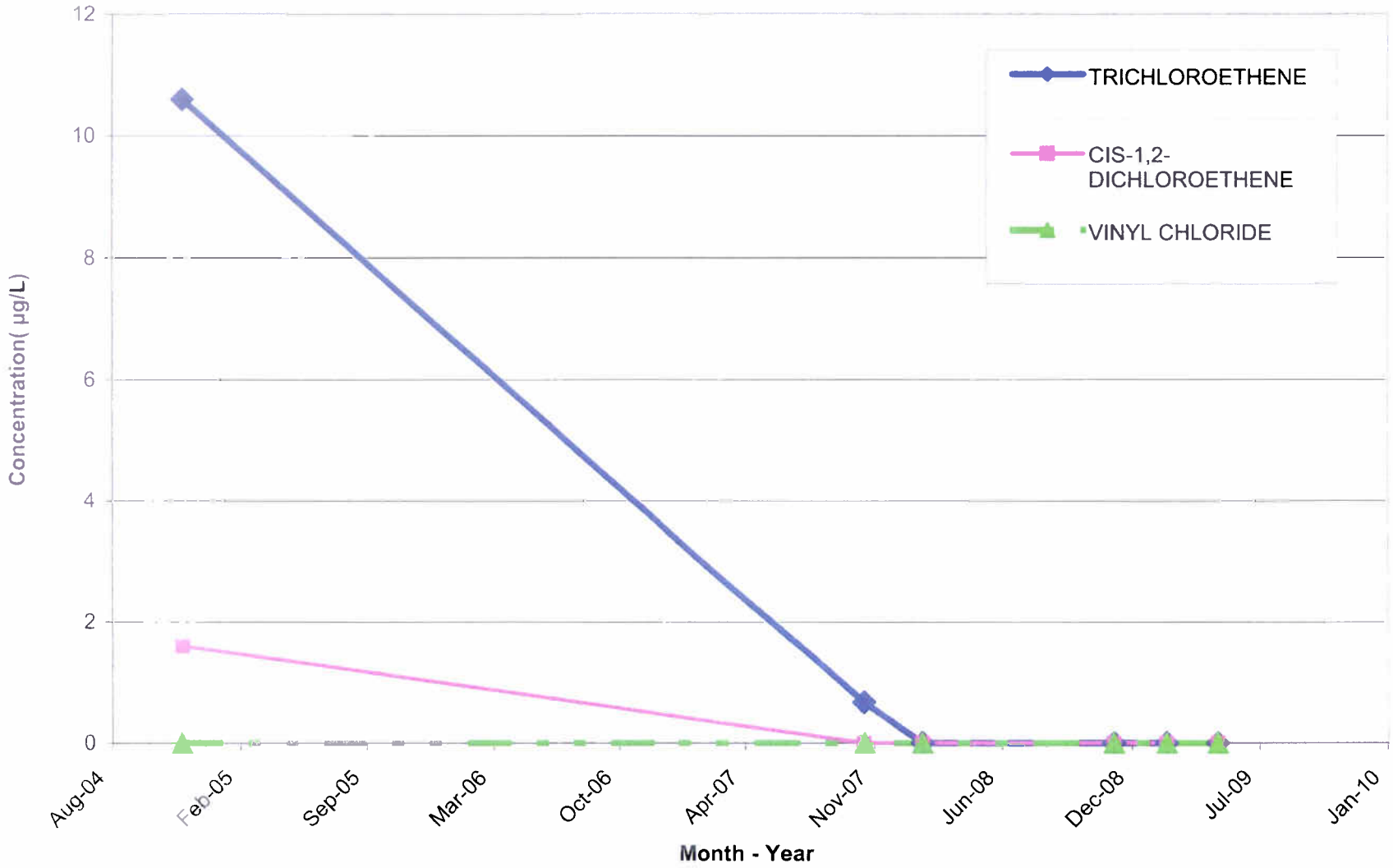


CEF-059-005-053

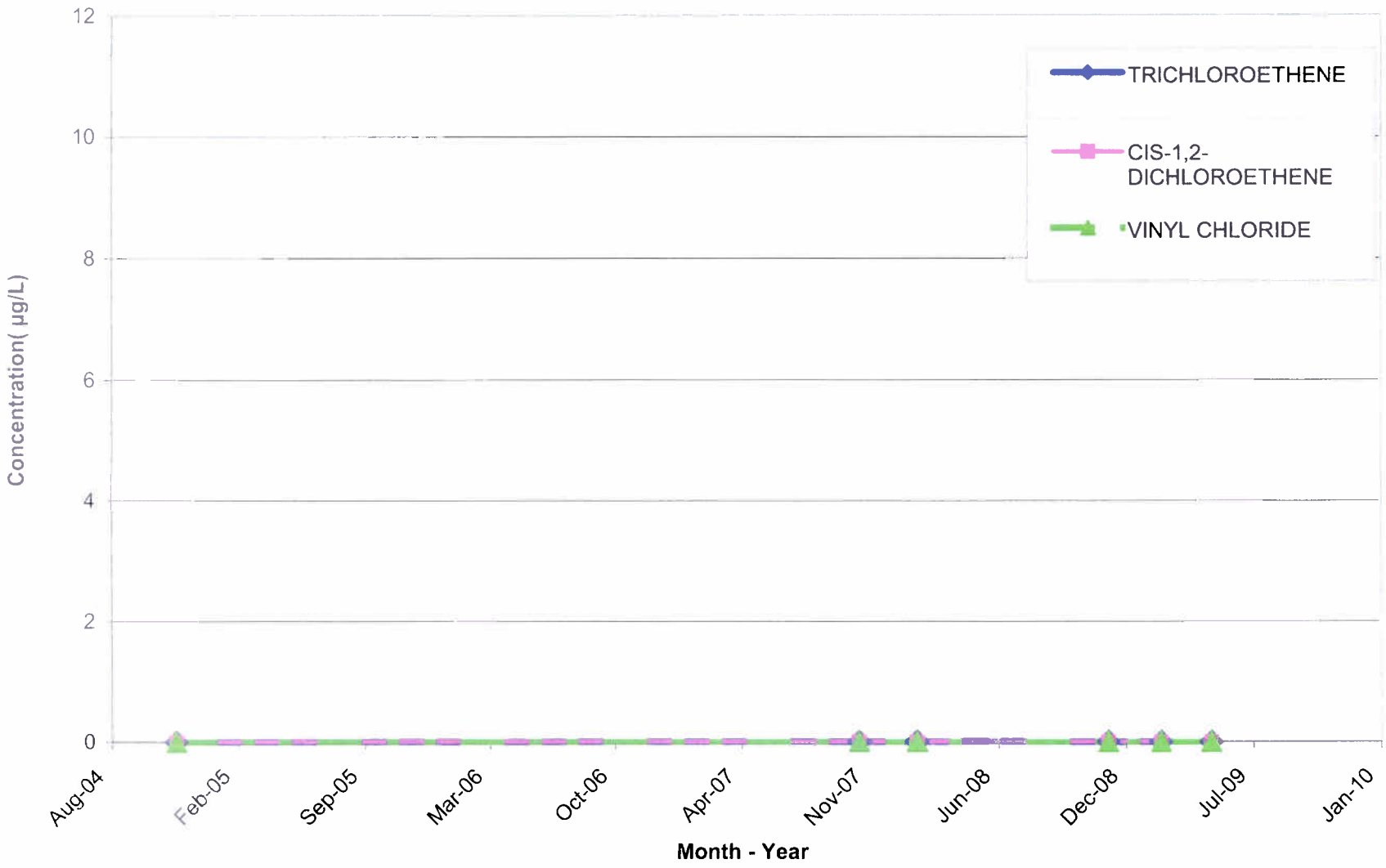



CEF-059-005-073
TRICHLOROETHENE
CIS-1,2-DICHLOROETHENE
VINYL CHLORIDE
Concentration(µg/L)
250
200
150
100
50
0
Aug-04
Feb-05
Sep-05
Mar-06
Oct-06
Apr-07
Nov-07
Jun-08
Dec-08
Jul-09
Jan-10
Month - Year

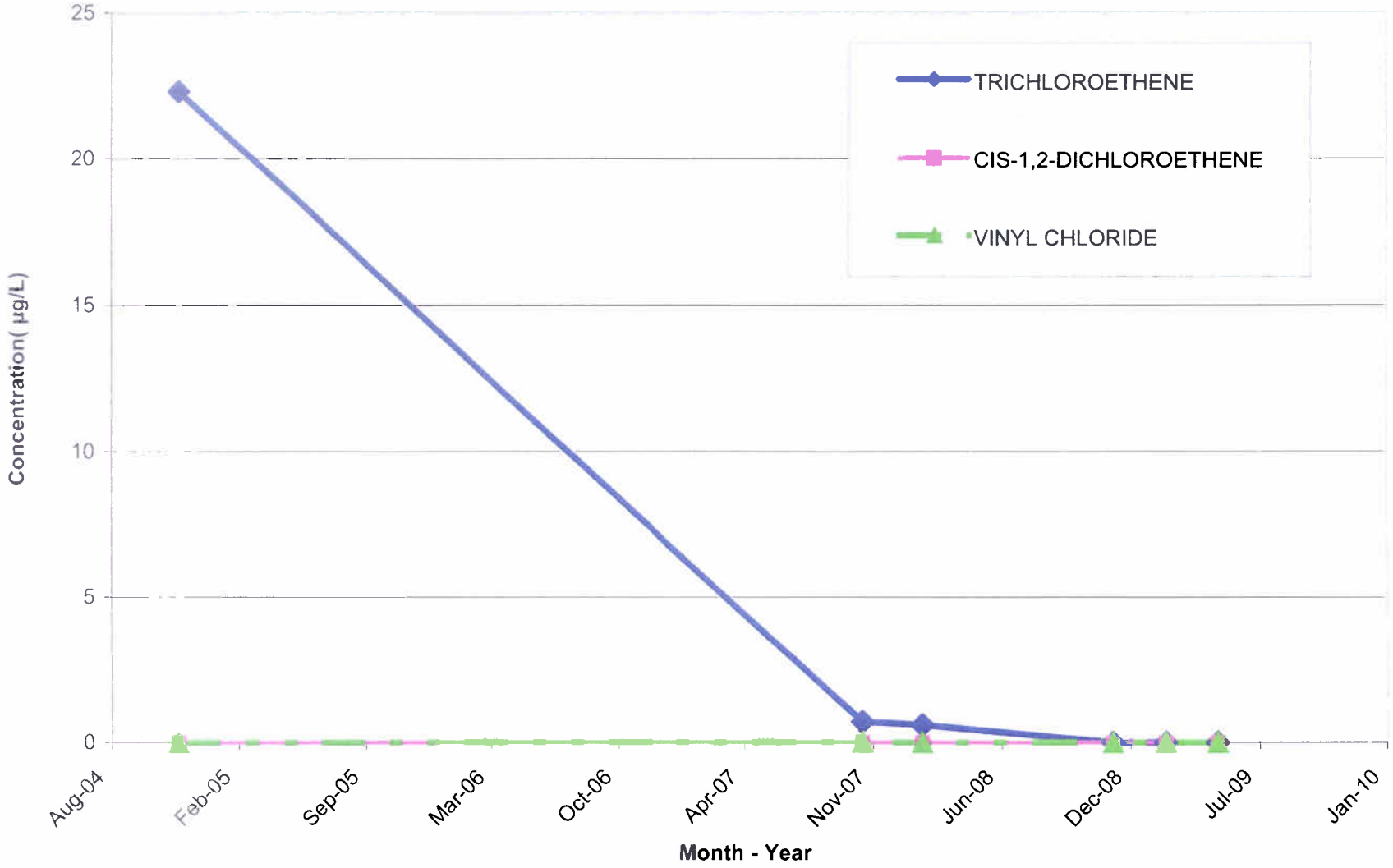
CEF-059-009-053



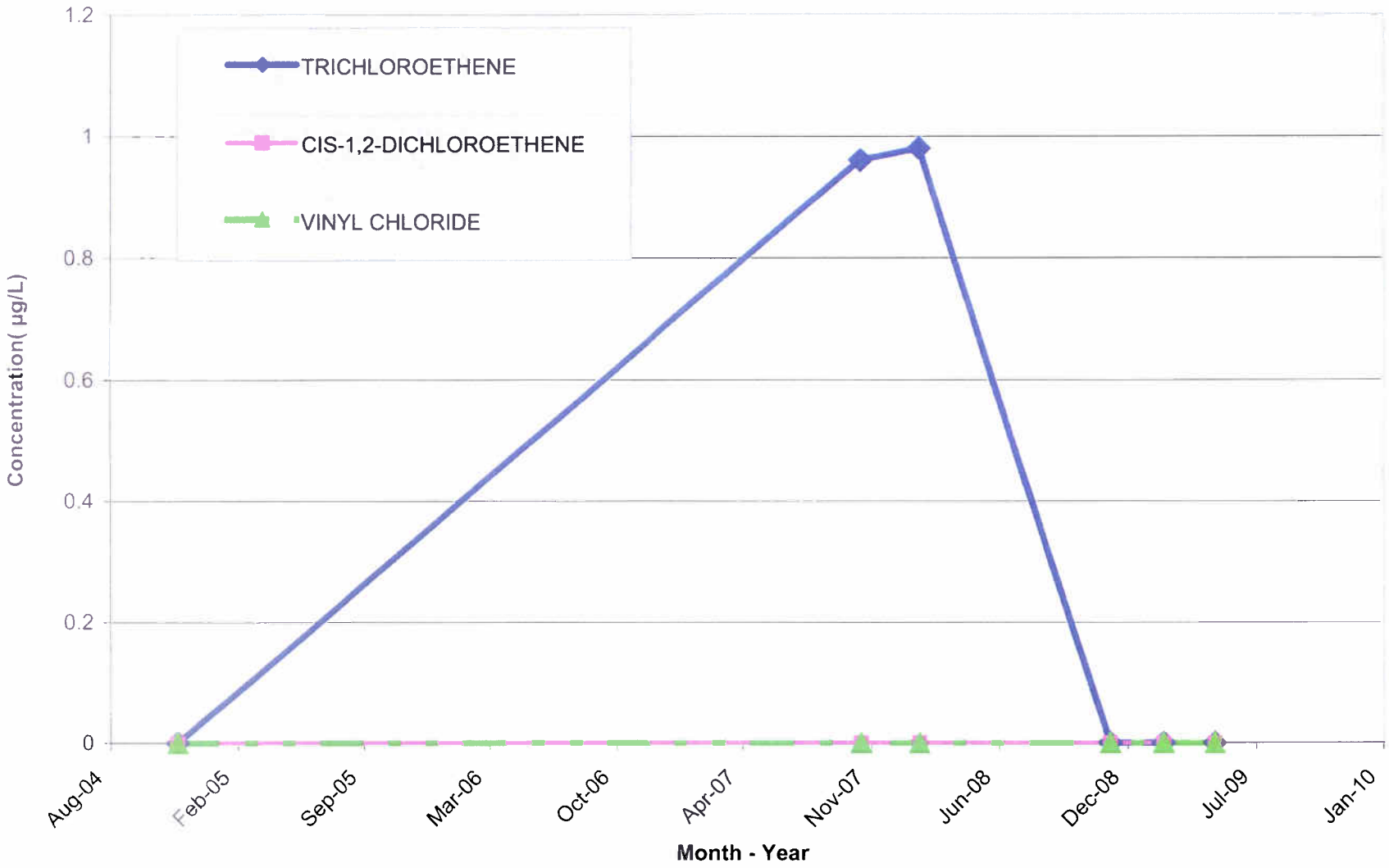
CEF-059-009-083



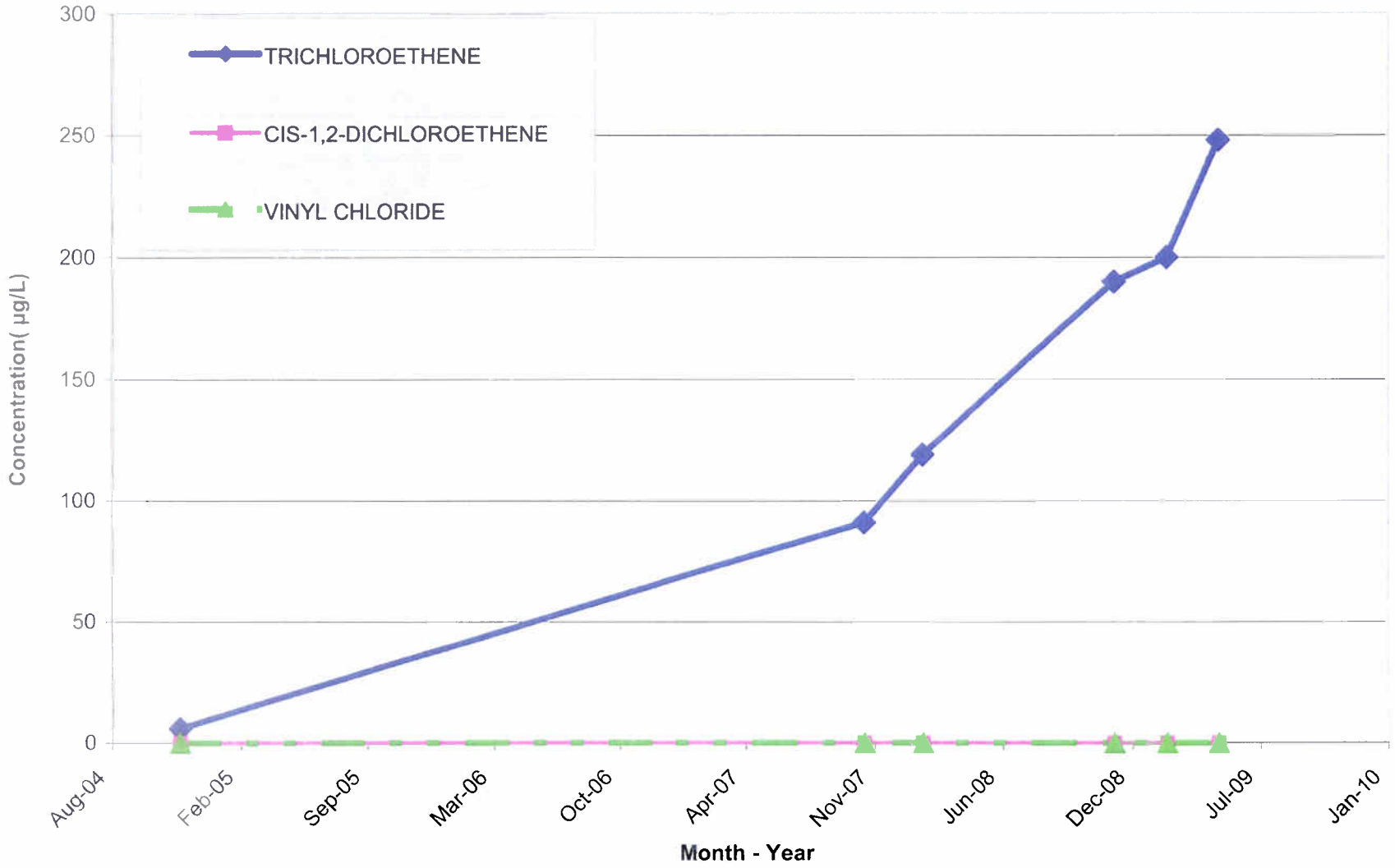
CEF-059-011-033

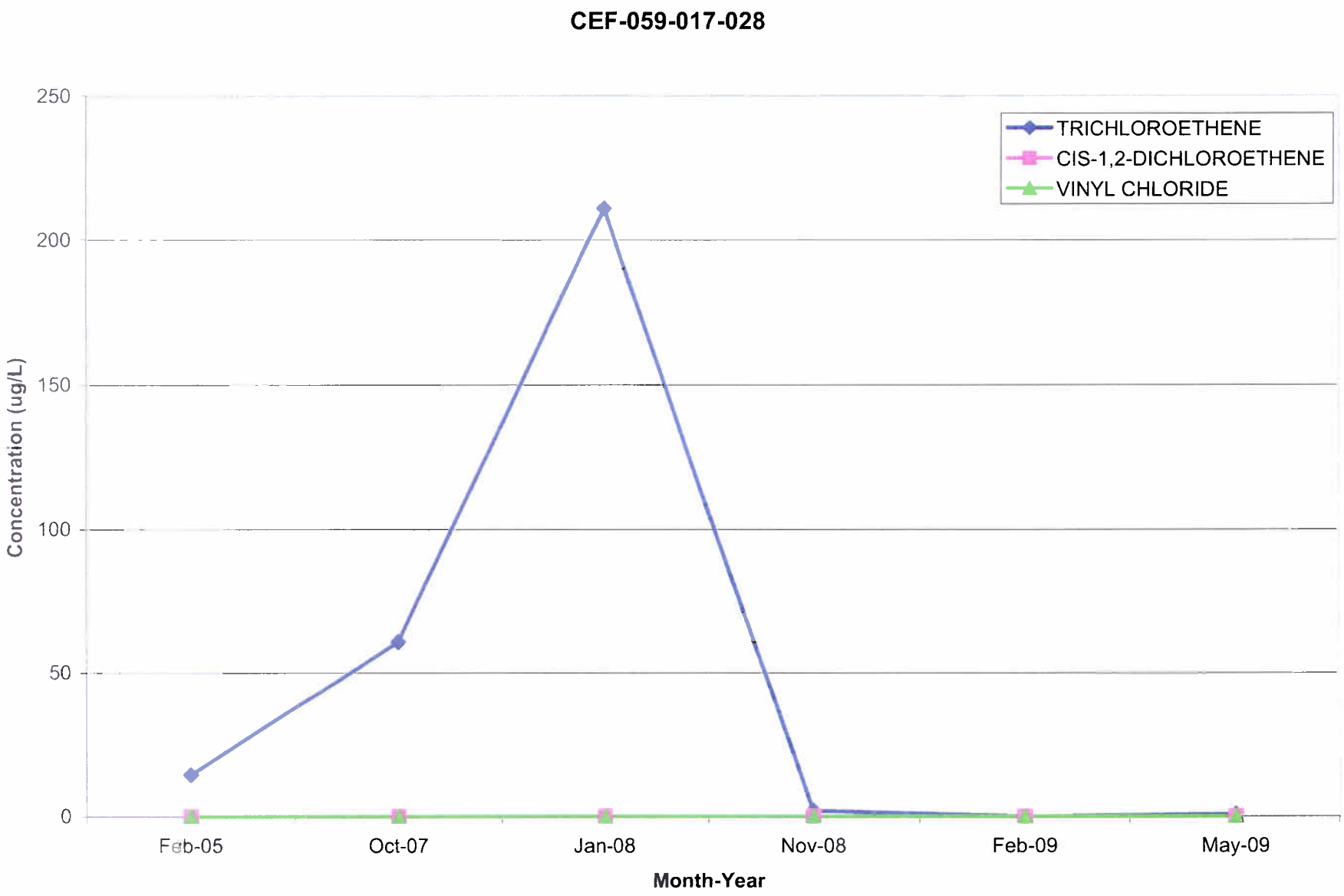


CEF-059-011-053

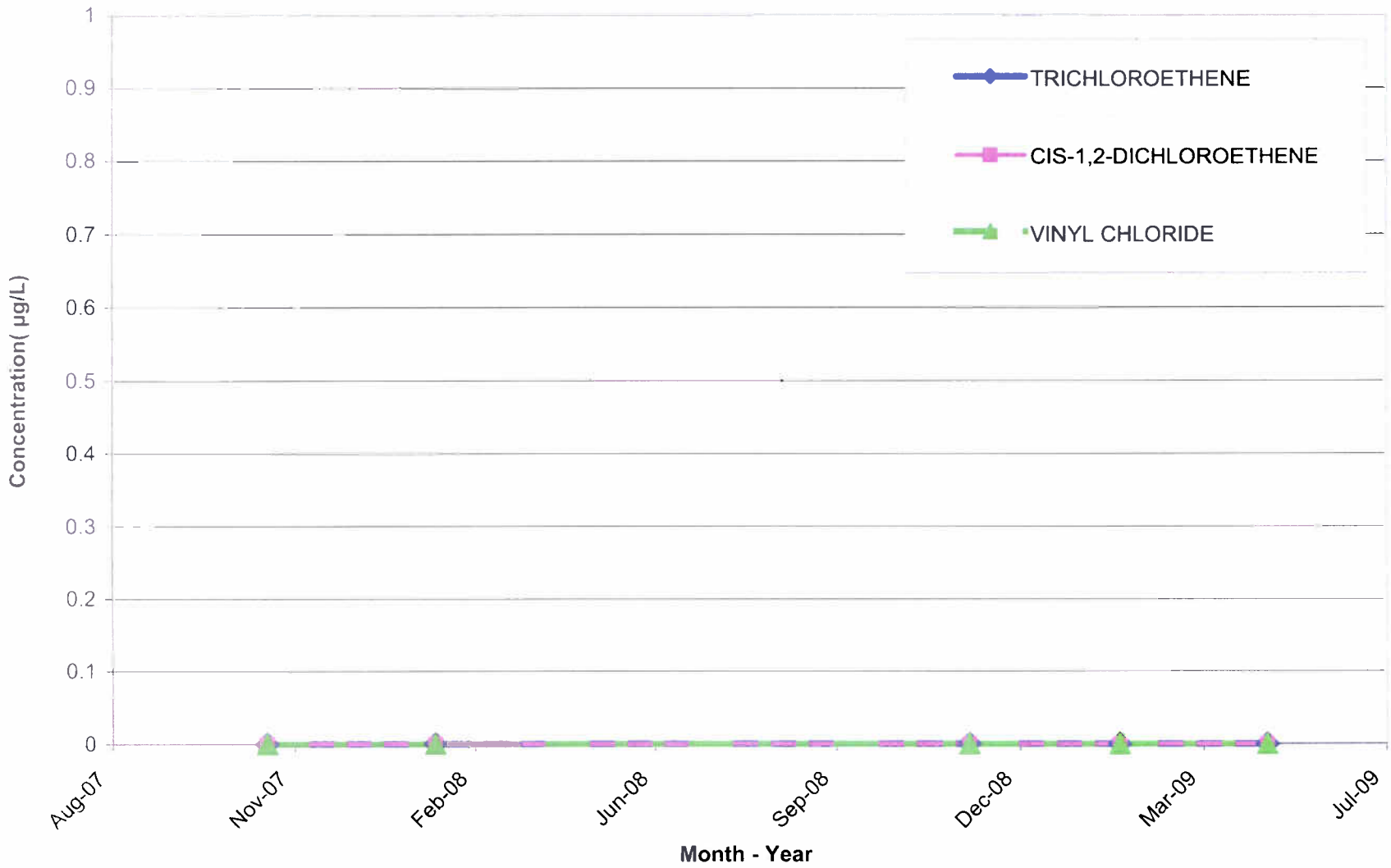


CEF-059-016-053




CEF-059-017-028
250
200
150
100
50
0
Concentration (ug/L)
TRICHLOROETHENE
CIS-1,2-DICHLOROETHENE
VINYL CHLORIDE
Feb-05
Oct-07
Jan-08
Nov-08
Feb-09
May-09
Month-Year

CEF-059-027-035

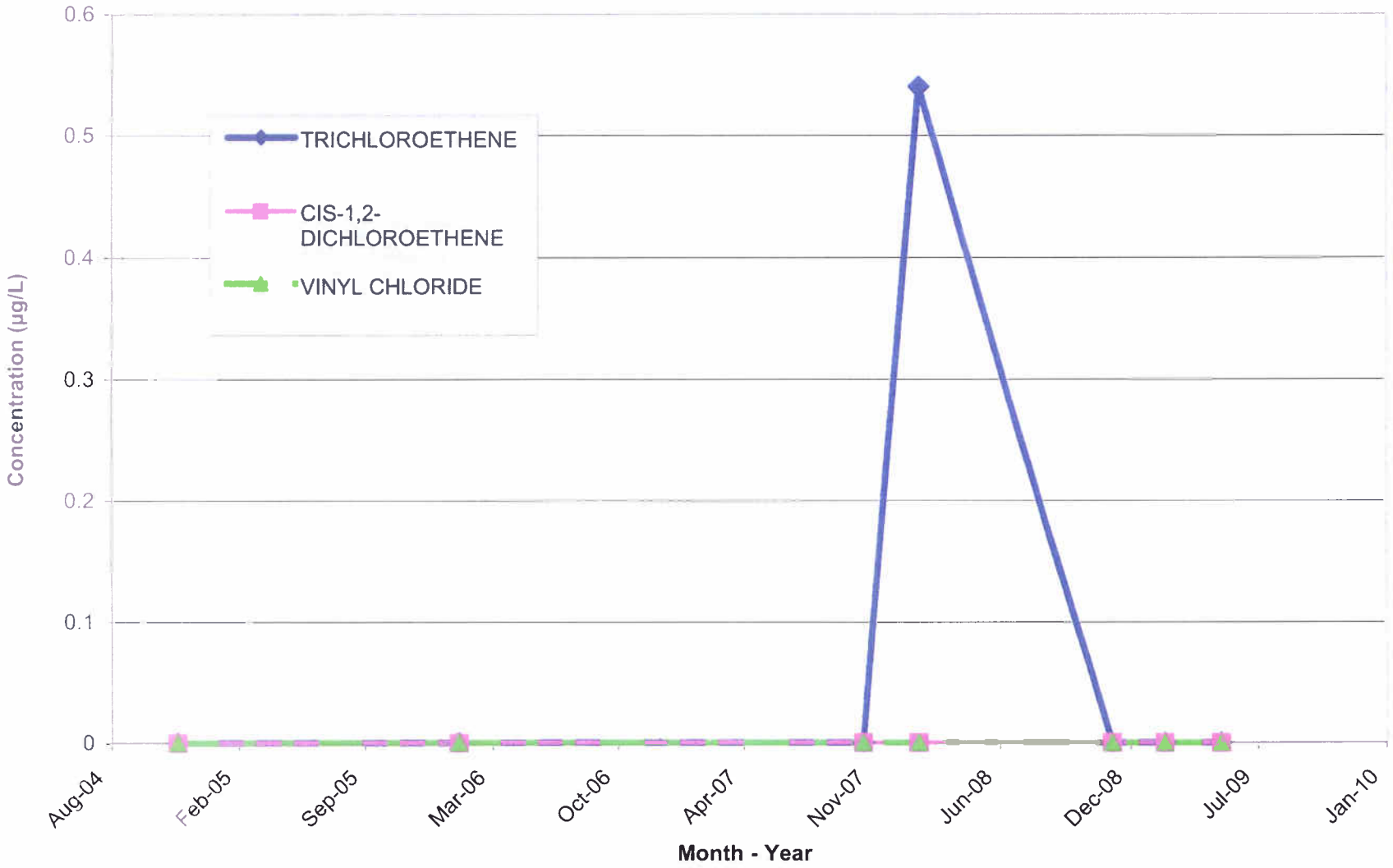


SITE 59

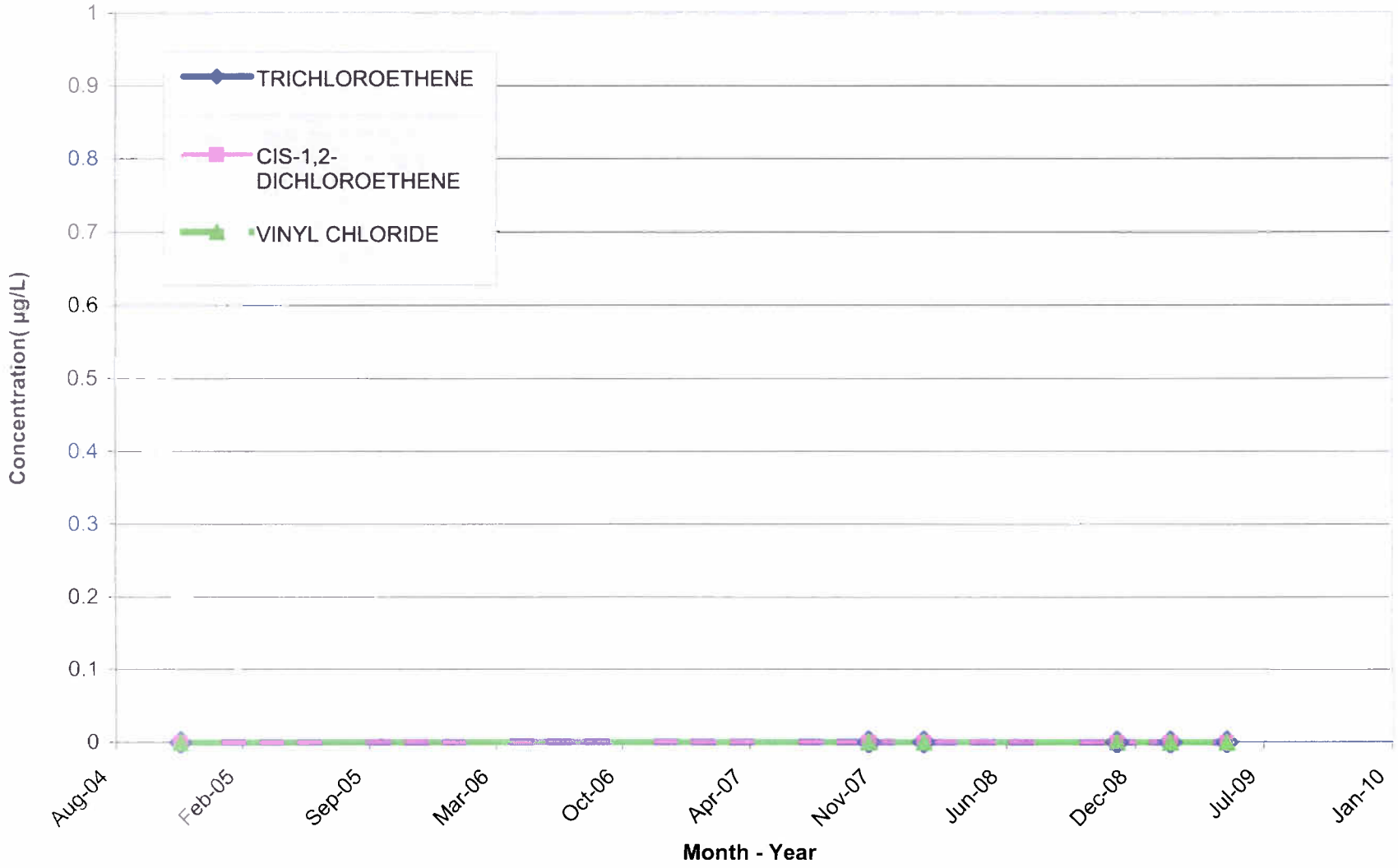
VOCs CONCENTRATION TRENDS

FRINGE WELLS- Clusters 001, 012, 013, 014, and 026

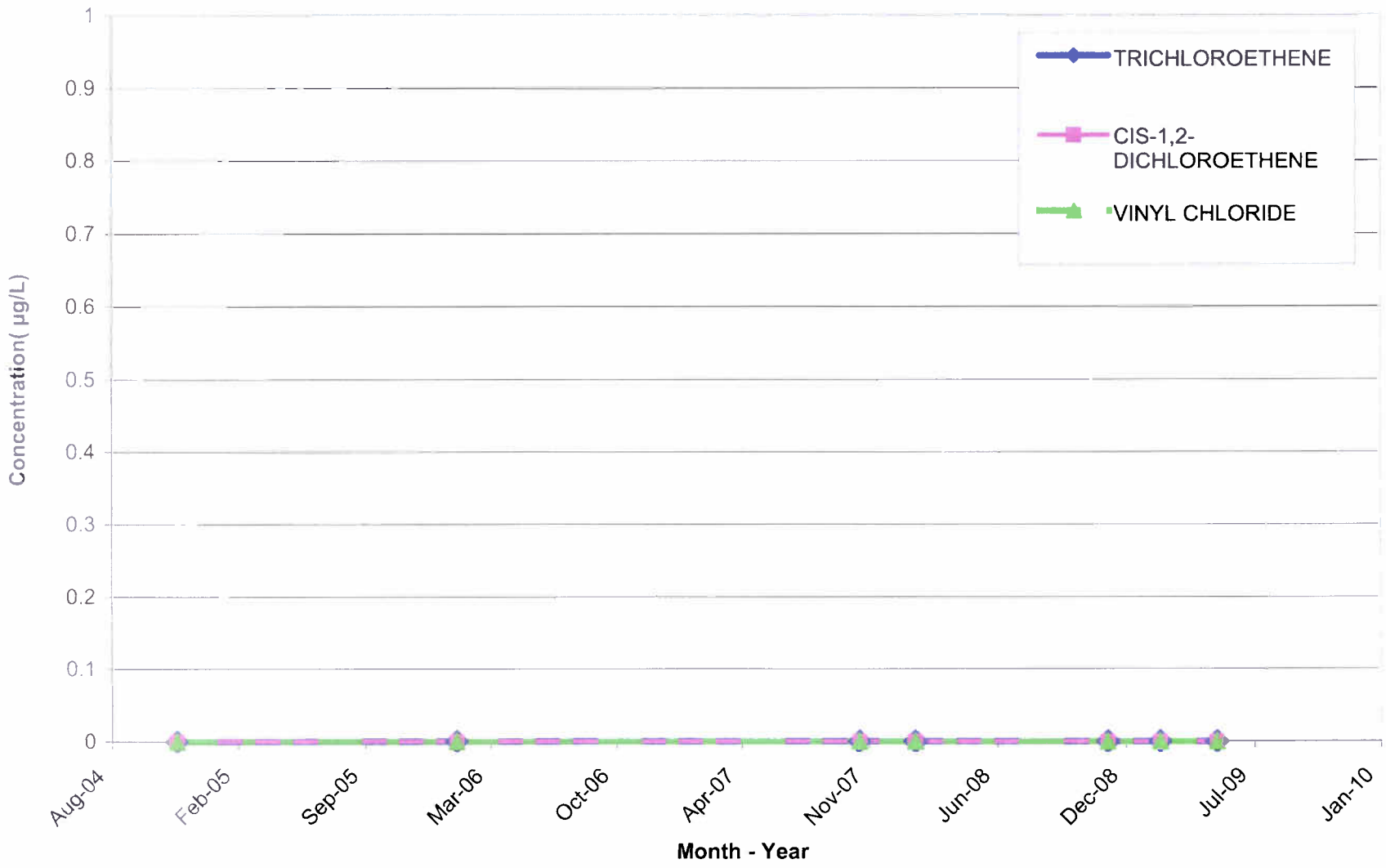
CEF-059-001-028



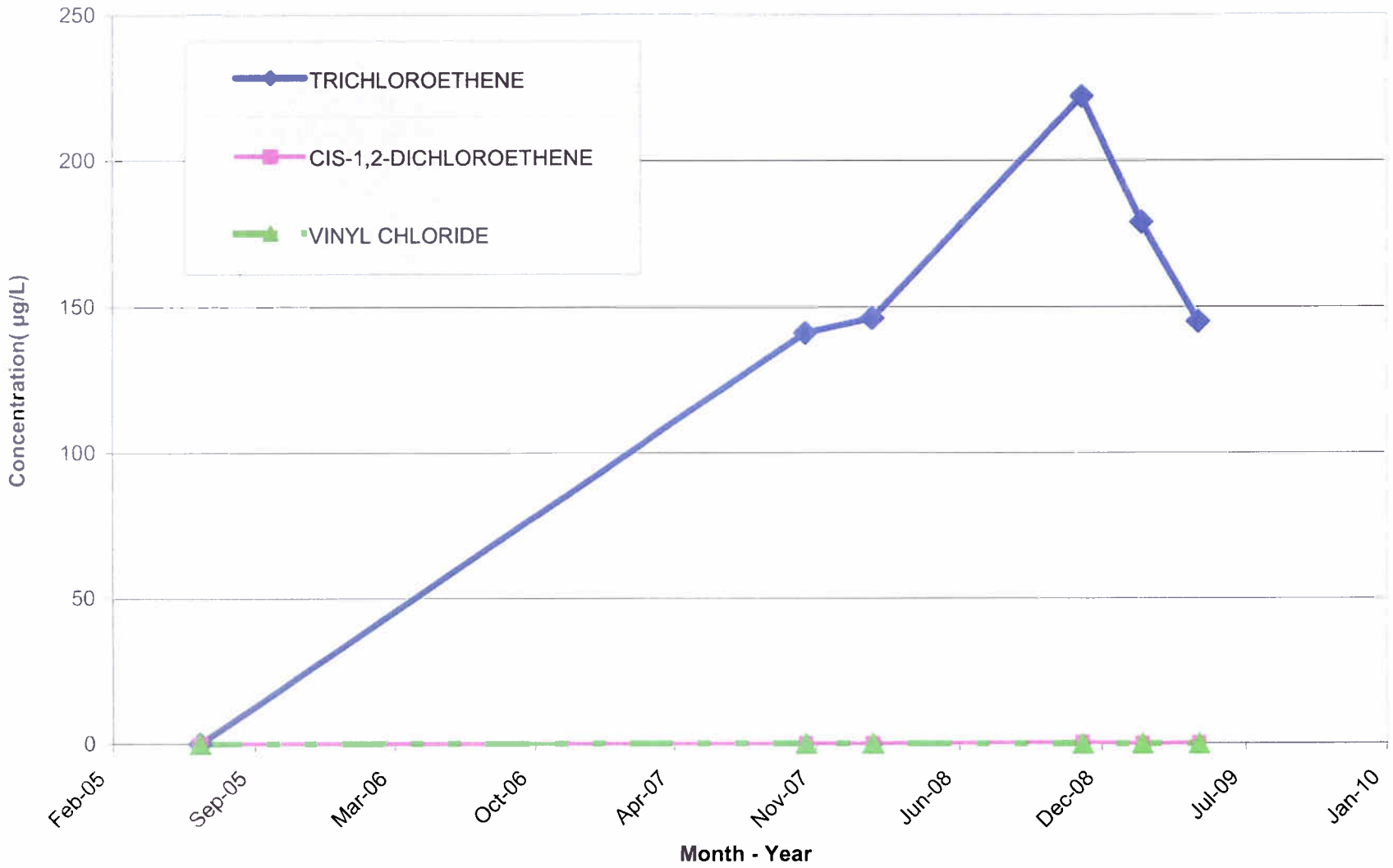
CEF-059-001-053



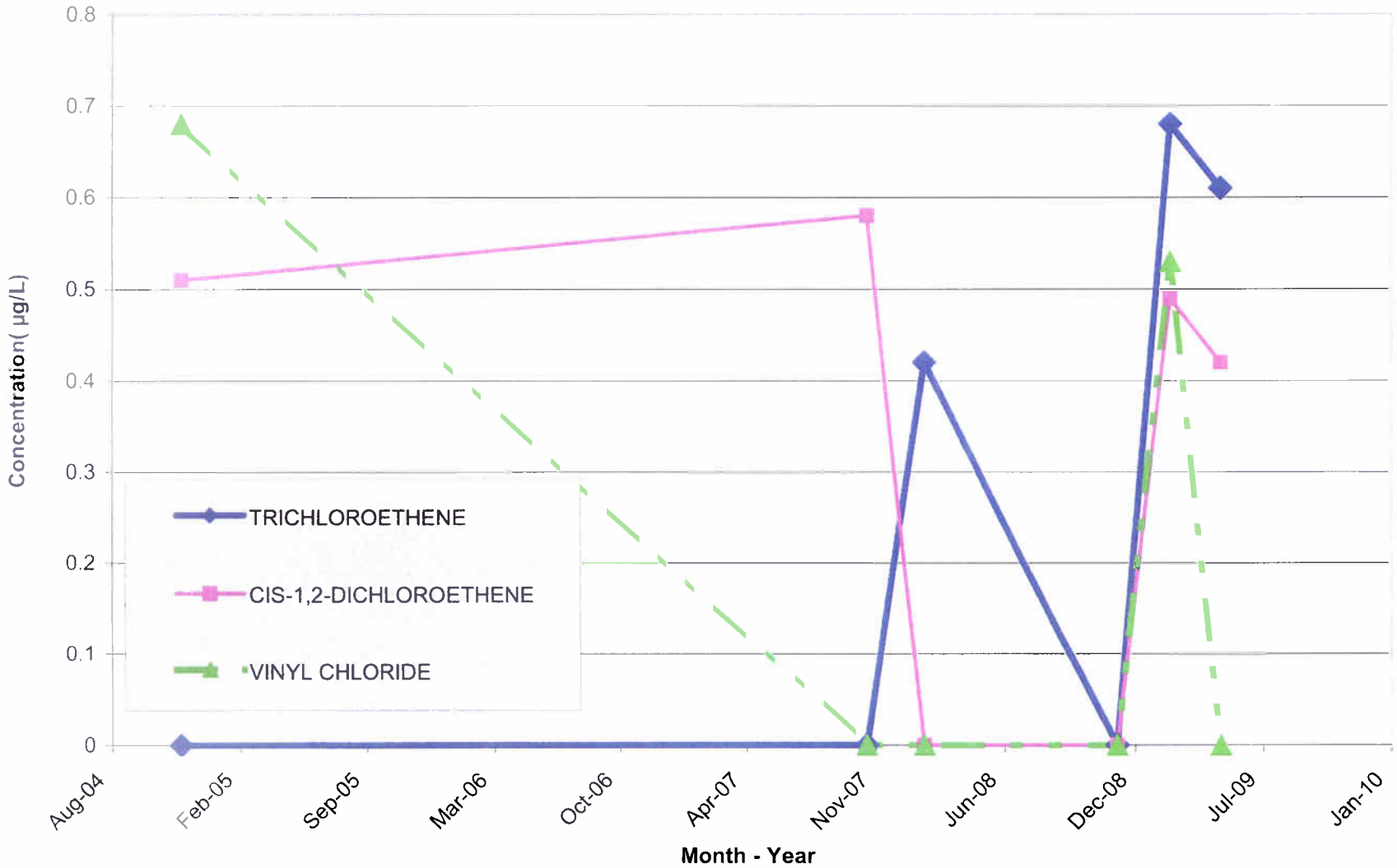
CEF-059-001-083



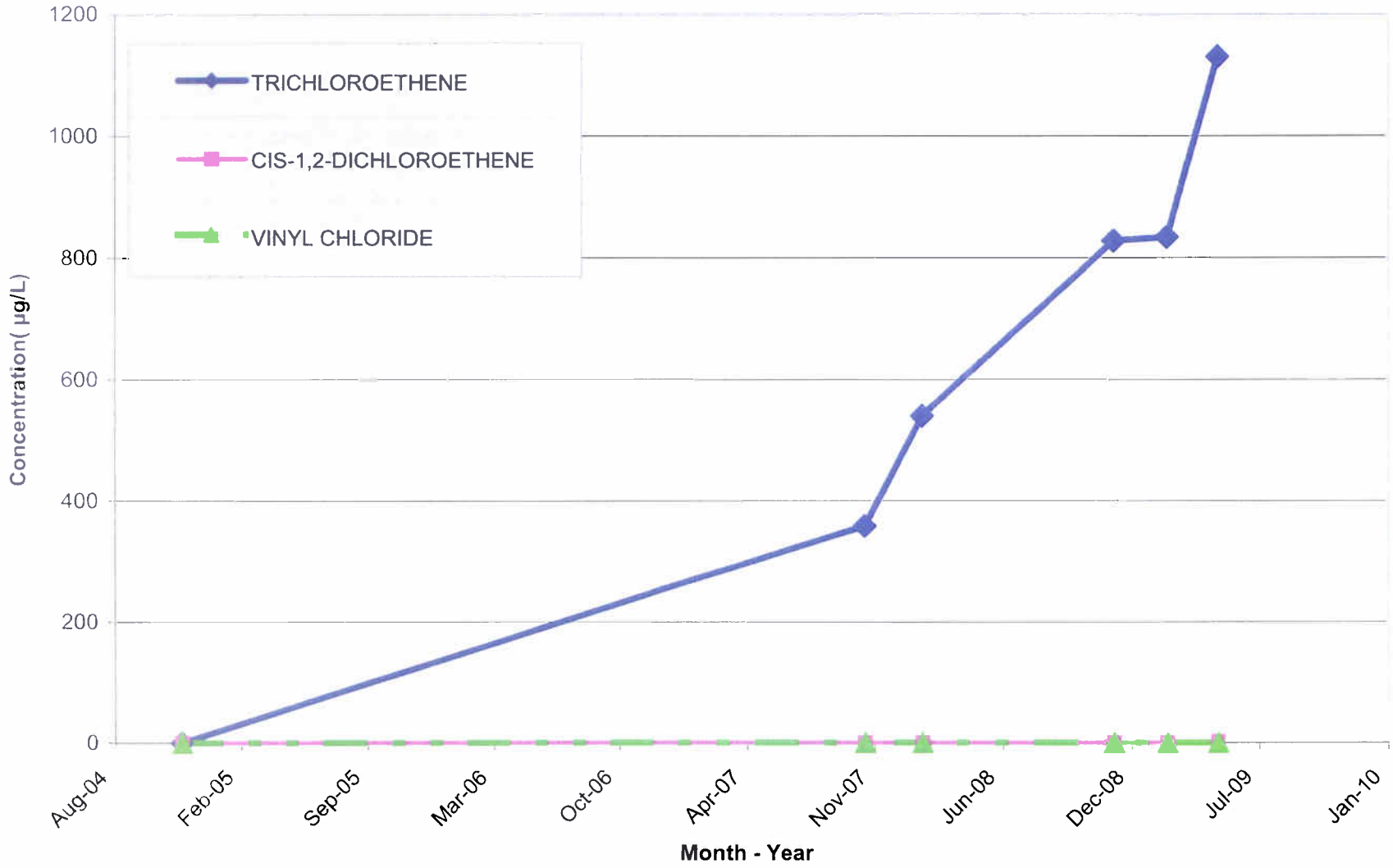
CEF-059-012-053



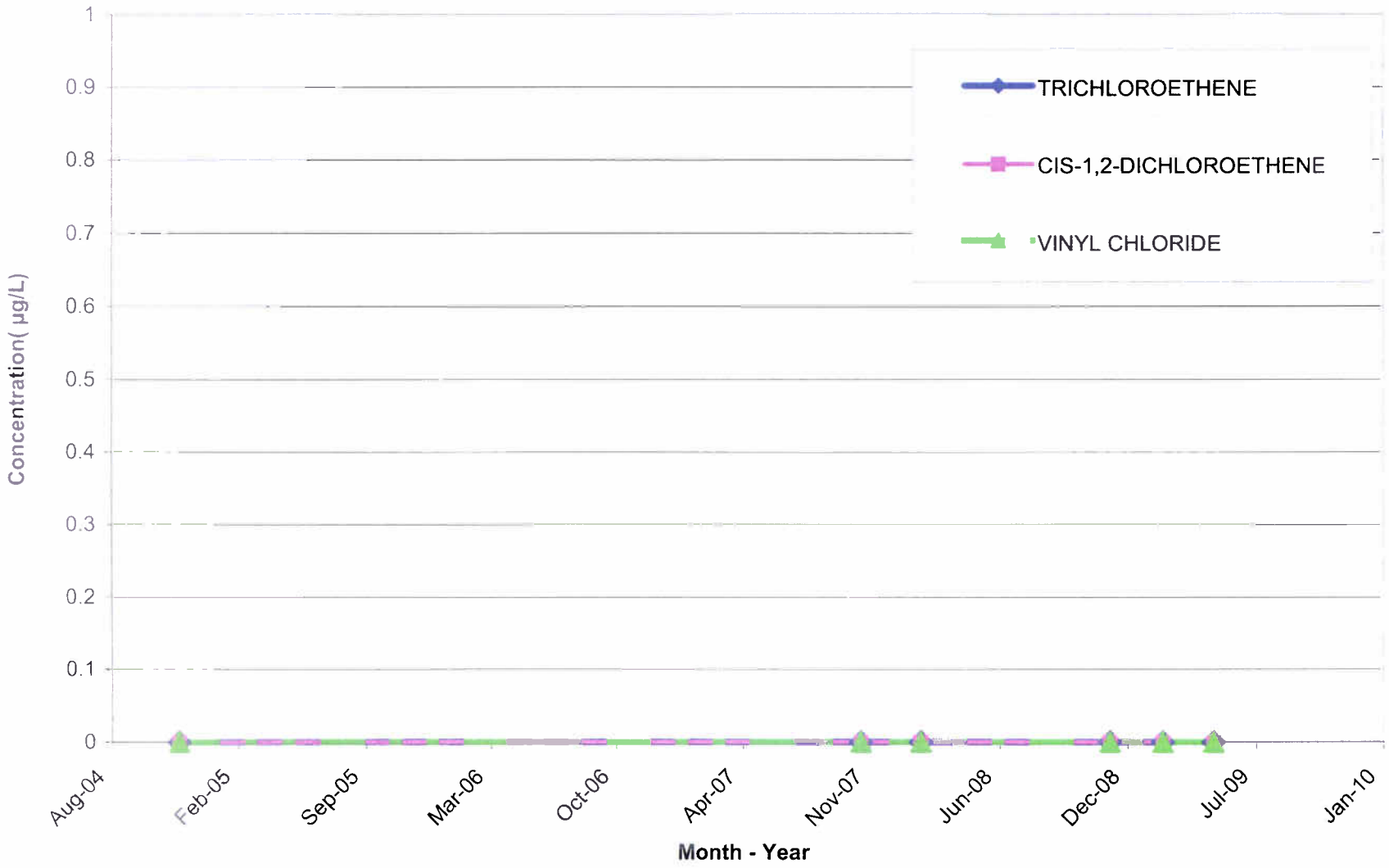
CEF-059-013-032



CEF-059-013-053



CEF-059-014-083



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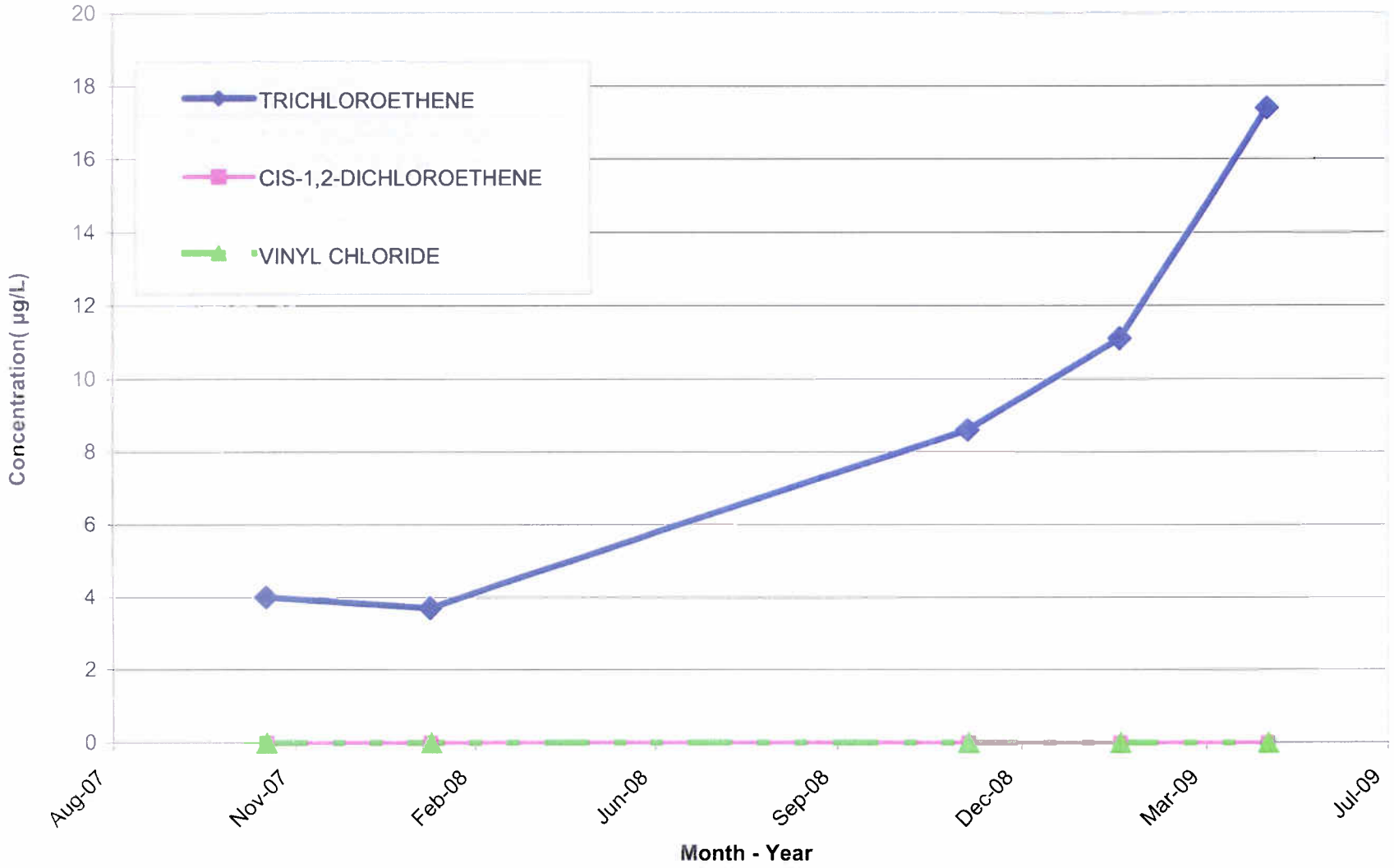
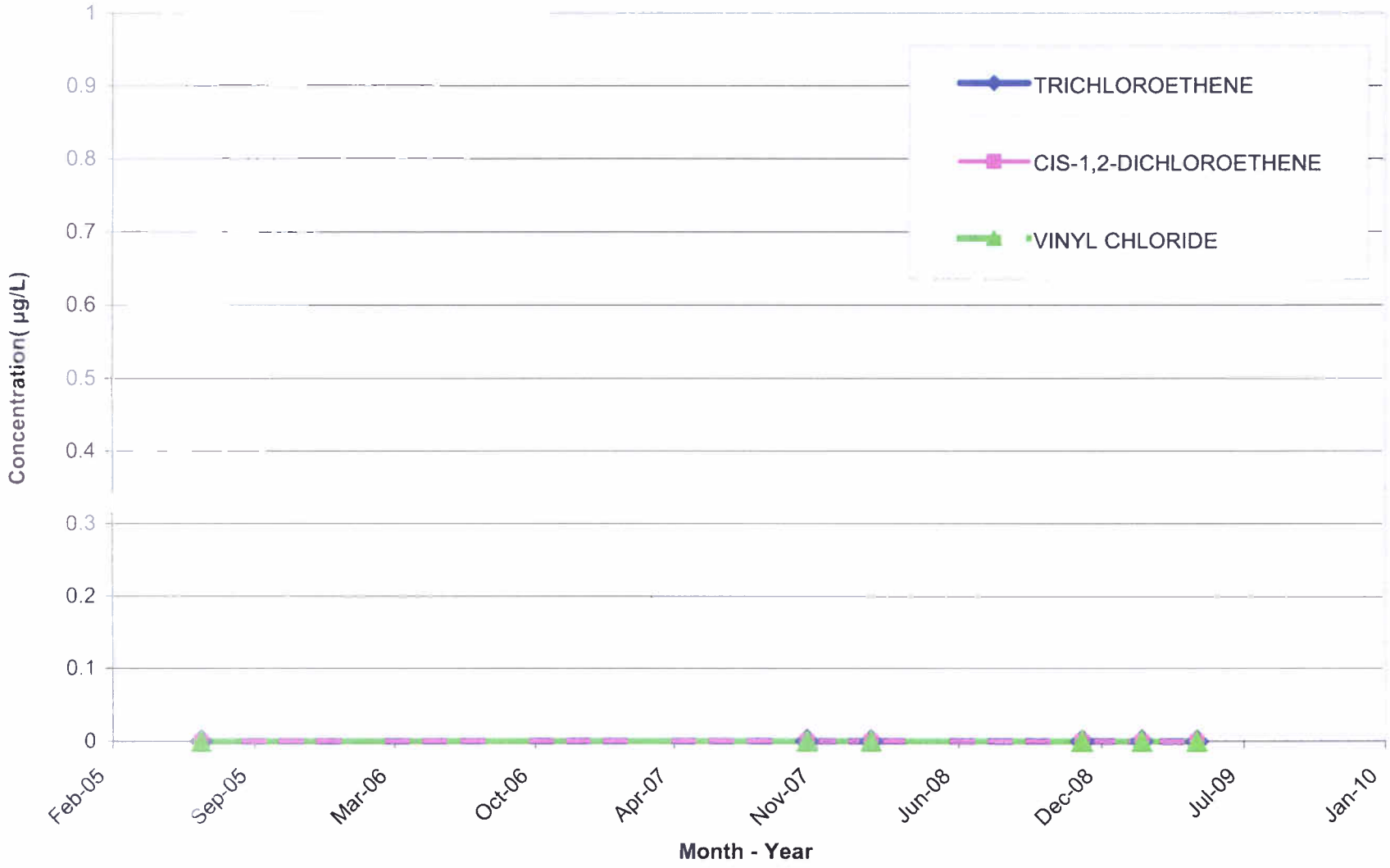
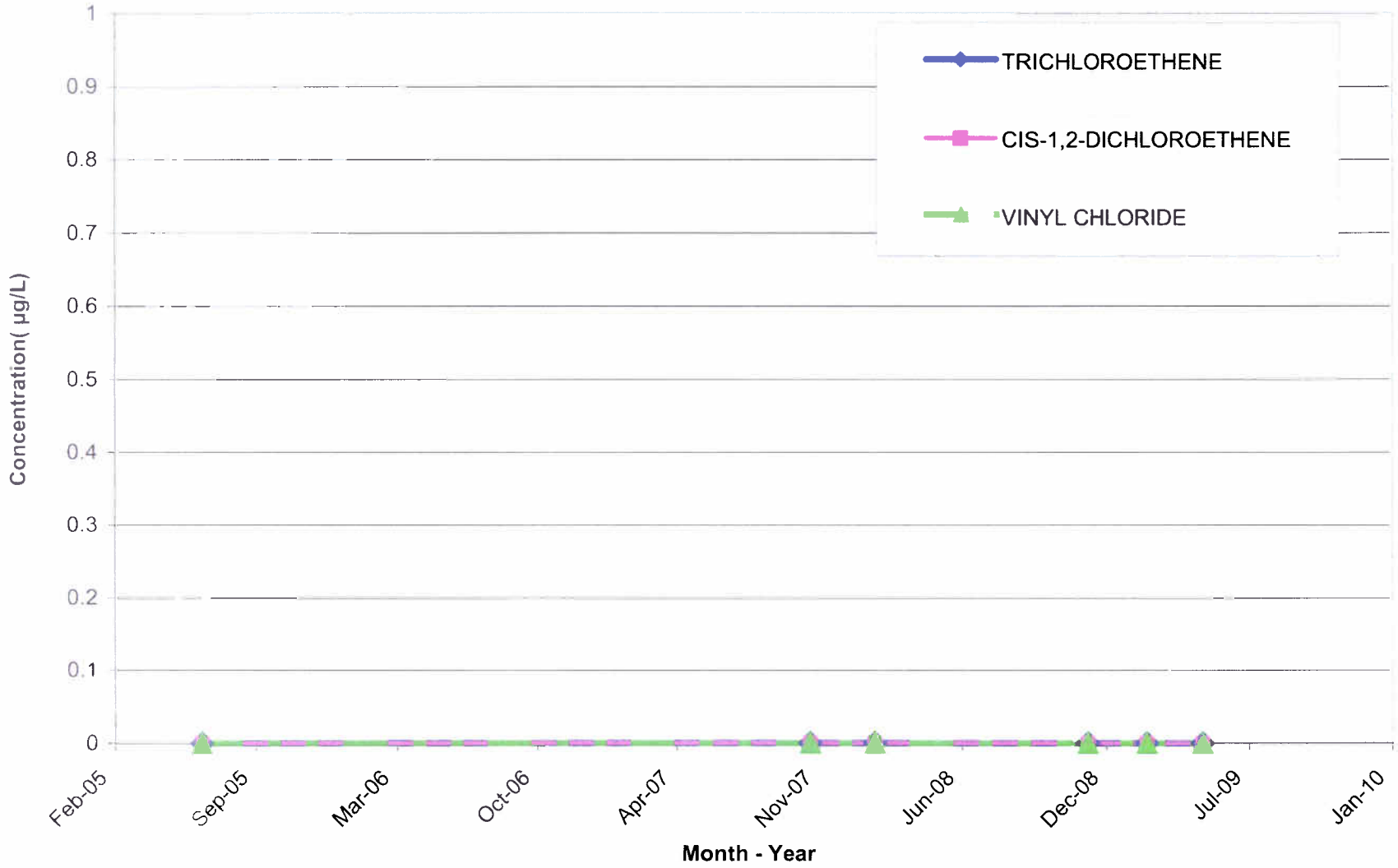


SITE 59

VOCs CONCENTRATION TRENDS
DOWNGRADIENT SENTINEL WELLS- Cluster 019

CEF-059-019-051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