FIVE-YEAR REVIEW
OPERABLE UNITS 1, 2, 3, 4, 5, 6, 7, AND 8

NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Revision: 0

Prepared for:

Department of the Navy
Naval Facilities Engineering Command Southeast
Building 903, Naval Air Station Jacksonville
Jacksonville, Florida 32212-0030

March 2016

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Prepared by:

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March 2016

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Contract Task Order Manager

Table of Contents

Figures

Tables

Appendices

List of Acronyms

µg/L	microgram(s) per liter
µg/m^3	microgram(s) per cubic meter
ABB-ES	ABB Environmental Services, Inc.
AFFF	Aqueous Film-Forming Foam
AG&M	ARCADIS Geraghty & Miller, Inc.
AGVIQ	AGVIQ Environmental Services, Inc.
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
AS	air sparge
AST	aboveground storage tank
BEHP	bis-(2-ethylhexyl)phthalate
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BHC	hexachlorocyclohexane
BRA	Baseline Risk Assessment
BTEX	benzene, toluene, ethylbenzene, and xylenes
CCI	CH2MHILL Constructors, Inc.
CCR	Construction Completion Report
CDC	Control Detonation Chamber
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
COC	contaminant of concern
COPC	contaminant of potential concern
CPT	cone penetrometer test
CSM	Conceptual Site Model
CTL	cleanup target level
DCA	dichloroethane
DCE	dichloroethene
DDD	4,4'-dichlorodiphenyldichloroethane
DDE	4,4'-dichlorodiphenyldichloroethene
DDT	4,4'-dichlorodiphenyltrichloroethane
DNAPL	Dense Non-Aqueous Phase Liquid
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct-push technology
DRMO	Defense Reutilization and Marketing Office
DSDB	Domestic Waste Sludge Drying Bed
DVECC	Disease Vector Ecology and Control Center
ELCR	Excess Lifetime Cancer Risk
EOD	Explosive Ordnance Disposal
ERA	Ecological Risk Assessment
ESD	Explanation of Significant Difference
ESS	Explosives Safety Submission
ESTCP	Environmental Security Technology Certification Program

List of Acronyms (continued)

FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
FFTA	Fire Fighter Training Area
FRCSE	Fleet Readiness Center Southeast
FS	Feasibility Study
FSWS	Florida Surface Water Standards
GCTL	Groundwater Cleanup Target Level
gpd	gallon(s) per day
gpw	gallon(s) per week
GWPS	Groundwater Protection Standards
GWT	groundwater extraction and treatment
HHPRE	Human Health Preliminary Risk Evaluation
HHRA	Human Health Risk Assessment
HI	Hazard Index
HLA	Harding Lawson Associates Group, Inc.
HQ	Hazard Quotient
HRC	Hydrogen Release Compound
HSWA	Hazardous and Solid Waste Amendments of 1984
HVAC	heating, ventilating, and air conditioning
ILCR	Incremental Lifetime Cancer Risk
IRA	Interim Remedial Action
IROD	Interim Record of Decision
IRP	Installation Restoration Program
ISCO	in-situ chemical oxidation
ISDB	Industrial Waste Sludge Drying Bed
J&E	Johnson & Ettinger
LNAPL	Light Non-Aqueous Phase Liquid
LTM	long-term monitoring
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
LUC RD	Land Use Control Remedial Design
MCL	Maximum Contaminant Level
MCW	multi-chamber well
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
MEE	methane, ethane, and ethene
mg/L	milligram(s) per liter
MNA	monitored natural attenuation
MOA	Memorandum of Agreement
MPPEH	Material Potentially Presenting an Explosive Hazard
msl	mean sea level
MSWC	Marine Surface Water Criteria

List of Acronyms (continued)

NADC	Natural Attenuation Default Concentration
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NAVFAC SE	Naval Facilities Engineering Command Southeast
NECE	Naval Entomology Center of Excellence
NFA	No Further Action
NIRIS	Naval Installation Restoration Information Solution
NP	nanoscale particle
O&M	operations and maintenance
ODA	Oil Disposal Area
ORP	oxygen reduction potential
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
OWS	oil-water separator
PAH	polynuclear aromatic hydrocarbon
PCA	Petroleum Contaminated Area
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PCR	Project Completion Report
PFC	perfluorocarbon
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of compliance
PQL	practical quantitation limit
PSC	Potential Source of Contamination
RACR	Remedial Action Completion Report
RAD	radiological
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SCTL	Soil Cleanup Target Level
SIES	Solutions-IES, Inc.
SJRWMD	St. Johns River Water Management District
SLERA	Screening Level Ecological Risk Assessment
SSFP	Scoping Study Field Program

List of Acronyms (continued)

SSSL	site-specific soil leachability
SVE	soil-vapor extraction
SVOC	semi-volatile organic compound
SWCTL	Surface Water Cleanup Target Level
SWPPP	Storm Water Pollution Prevention Plan
TBC	To Be Considered
TCA	trichloroethane
TCDD	tetrachlorodibenzodioxin
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TGC	Target Groundwater Concentration
TLCA	Trigger Level for Contingent Action
TOC	total organic carbon
TRPH	Total Recoverable Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
UXO	unexploded ordnance
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level
VOC	volatile organic compound
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY
Five-Year Review Summary Form

This five-year review has been prepared by the Naval Facilities Engineering Command Southeast for eight Operable Units (OUs) at Naval Air Station (NAS) Jacksonville in Jacksonville, Florida. The purpose of the five-year review is to evaluate implementation and performance of remedies to determine if they are protective of human health and the environment. The Department of the Navy (Navy) is the lead agency responsible for this five-year review at NAS Jacksonville, working with the United States Environmental Protection Agency (U.S. EPA) and the Florida Department of Environmental Protection (FDEP) under a Federal Facilities Agreement (FFA) signed by all parties in 1990. This five-year review was conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices remain at each OU above levels that allow for unlimited use and unrestricted exposure. The next five-year review, which will be conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and pertinent U.S. EPA and Navy five-year review guidance, is scheduled to be completed in 2021.

NAS Jacksonville is a 3,400-acre facility in south-central Duval County, approximately 9 miles south of downtown Jacksonville, Florida. The facility is situated along the banks of the St. Johns River, approximately 24 miles upstream from its confluence with the Atlantic Ocean. NAS Jacksonville has been an active facility since 1940 with emphasis on joint air operations and pilot training. Today, NAS Jacksonville is an important regional hub for both fixed wing and rotary wing aircraft, consisting of operational and industrial areas occupied by various tenants. The site hosts one of three Navy aviation maintenance depots in the country which maintains, repairs, and overhauls Navy aircraft.

The Navy initiated environmental investigation of NAS Jacksonville in 1979 and the site was placed on the National Priorities List in November 1989. The cleanup program at NAS Jacksonville conducted under the aforementioned FFA and the Navy's Installation Restoration Program (IRP) identified 58 Potential Sources of Contamination (PSCs) that required some level of additional investigation before determining what, if any, further action under CERCLA was necessary. Records of Decision (RODs) have been signed and remedies implemented at each OU. In addition to CERCLA and the IRP, the facility operates under a Resource Conservation and Recovery Act (RCRA) operating permit issued by FDEP and has Petroleum Contaminated Areas subject to remediation under FDEP's Petroleum Restoration Program. This is the fourth five-year review for NAS Jacksonville. The following summarizes the OUs included in this five-year review and includes brief descriptions of remedial actions and protectiveness statements.

Operable Unit 1 — PSCs 26 and 27

PSC 26 (Old Main Registered Disposal Area) was used for various disposal purposes between 1940 and 1979. PSC 27 (Former Transformer Storage Area), which south-adjoins PSC 26, was used to store transformers with dielectric fluid that contained polychlorinated biphenyls. PSCs 26 and 27 were investigated as one OU because of their proximate locations and shared fate and transport mechanisms for contaminants.

The major components of the selected remedy are free product collection; soil and sediment excavation, consolidation, and capping; natural attenuation; groundwater and surface water monitoring, and Land Use Controls (LUCs). The results of groundwater and surface water monitoring indicate the landfill cap is controlling contaminant leaching into groundwater. Groundwater monitoring has defined the horizontal and vertical extent of groundwater contamination. In general, contaminant of concern (COC) concentrations in groundwater have been decreasing, indicating natural attenuation remains an effective remedy. Surface water monitoring indicates that COCs in groundwater are not reaching the unnamed tributary to the south at concentrations above established levels requiring contingent actions.

The remedy at OU 1 is considered protective in the short term. The soil removal and capping components of the remedy implemented at OU 1 protect human health and the environment. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The Navy is implementing LUCs to prevent unacceptable soil and groundwater exposures. Vapor intrusion (VI) screening suggests that current groundwater concentrations/plume conditions do not affect protectiveness at this time. To ensure long-term protectiveness, additional work may be required to assess dioxins at OU 1.

Operable Unit 2 — PSCs 3, 4, 41, 42, and 43

OU 2 is comprised of PSCs formerly associated with the NAS Jacksonville wastewater treatment plant (WWTP): PSC 3 (Former Sludge Disposal Area), PSC 4 (Pine Tree Planting Area), PSC 41 (Domestic Waste Sludge Drying Beds), PSC 42 (Effluent Polishing Pond), and PSC 43 (Industrial Waste Sludge Drying Beds). The WWTP and associated PSCs treated industrial and domestic wastes from approximately 1970 to the mid-1980s. No Further Action was the selected remedy under CERCLA, with RCRA post-closure groundwater monitoring and LUCs at PSC 42. LUCs limit human exposure by restricting access and land and groundwater use.

The remedy at OU 2 is protective of human health and the environment because soil removal, RCRA closure, and LUCs have eliminated risk from direct exposure to soil and groundwater in excess of industrial criteria. LUCs continue to protect human health and the environment by prohibiting residential land use and groundwater uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The emerging contaminant 1,4-dioxane has been identified at the site, but protectiveness of the remedy is not affected while LUCs prevent groundwater use.

Operable Unit 3 — Fleet Readiness Center Southeast

OU 3 encompasses much of the Fleet Readiness Center Southeast (FRSCE), which is a major industrial complex with a primary mission to perform in-depth repair and modification of aircraft, engines, and aeronautical components. OU 3 is comprised of the following areas: PSC 11 (Building 101, Hangar 101S), PSC 12 (Old Test Cell Building), PSC 13 (Radium Paint Disposal Pit), PSC 14 (Battery Shop Area), PSC 15 (Solvent and Paint Sludge Disposal Area), PSC 16 (Black Point Storm Sewer Discharge), PSC 48 (Station's Drycleaners), Building 780, Multiple Storm Sewers, and Groundwater Contamination Areas A through G. There are two RODs for OU 3: the Primary ROD which includes seven PSCs, two buildings, storm sewer, and five groundwater plumes (Areas B, C, D, F, and G) contaminated with chlorinated volatile organic compounds (VOCs) and the Secondary ROD for Area A. A ROD was not completed for Area E. Based on continuing investigations, the Navy is completing Remedial Investigation (RI) and Feasibility Study (FS) addendums with the intention of preparing a holistic, OU-wide remedy in a ROD Amendment. In the interim, LUCs are used to prevent unacceptable groundwater exposures.

Conditions at OU 3 are protective in the short term. The Navy is implementing LUCs, which prevent unacceptable groundwater exposures. The current remedy, if determined to be necessary, will be modified after the RI and FS addendums, proposed plan addendum, and ROD amendment. The RI and FS addendums will be completed by 31 March 2018.

Operable Unit 4 — PSC 21

PSC 21 is an 11-acre manmade Casa Linda Lake at the NAS Jacksonville Casa Linda Oaks Golf Course. The lake is a storm and surface water collection and discharge basin within the NAS Jacksonville Storm Water Management Basin 17, which is densely developed with industrial operations and is extensively paved. Storm water runoff is drained by storm sewers and an open drainage ditch system. Surface water and sediment samples collected in 1983 indicated that there were impacts to the sediment and surface water that were attributed to storm water runoff. The selected remedy components are (1) institutional and passive habitat controls to prevent unauthorized access and limit exposure and (2) monitoring of Casa Linda Lake in compliance with the NAS Jacksonville Storm Water Management Program.

The remedy at OU 4 is protective of human health and the environment as exposures to contaminated sediment are mitigated as outlined in the ROD, and signage and passive habitat controls mitigate human health and ecological direct contact exposure at this site.

Operable Unit 5 — PSC 51

PSC 51 is comprised of a Former Oil Disposal Area (ODA) and Former Firefighter Training Area (FFTA). The Former ODA included a circular area used to drain hydraulic fluid, fuel, and oil from aircraft before transfer offsite. The Former FFTA included a nearly circular area historically used by the

NAS Jacksonville fire department. The areas were investigated as one PSC because of their proximity and similar operation dates. The remedy selected in the ROD consisted of institutional controls, natural attenuation, and groundwater and surface water monitoring. Long-term monitoring (LTM) has defined the horizontal and vertical extent of groundwater contamination and has revealed decreasing COC concentrations over time in source area wells. Surface water monitoring indicates that COCs in groundwater are not reaching the unnamed creek to the south at concentrations above FDEP Storm Water Cleanup Target Levels (SWCTLs). To date, LUCs and groundwater/surface water monitoring have met the intent of the decision documents, natural attenuation remains an effective remedy for groundwater, and a contingency remedy has not been required.

The remedy at OU 5 is protective of human health and the environment because LTM data indicate contaminants are naturally attenuating. Groundwater and surface water monitoring ensure contamination is not migrating offsite or to the unnamed creek, and that the natural attenuation portion of the remedy is effective. LUCs eliminate risk from exposure to soil and groundwater.

Operable Unit 6 — PSC 52

OU 6 includes PSC 52 (Hangar 1000) and is the location of two former underground storage tanks installed in the late 1960s and removed in 1994. Hangar 1000 is now part of FRCSE, which performs various support functions for Navy aircraft, designated weapons systems, accessories, and equipment.

The selected remedy included the following components: in-situ treatment, natural attenuation, surface water and groundwater monitoring, and LUCs. To date, the remedial action components have met the intent of the ROD, and a contingency remedy has not been required. Groundwater monitoring has defined the horizontal and vertical extent of groundwater contamination. In general, parent VOC concentrations have been decreasing over time in source area wells. Degradation product VOC concentrations have increased, indicating ongoing biotic/abiotic degradation within the aquifer. Surface water monitoring indicates that COCs in groundwater are not reaching the drainage ditch to the southeast at concentrations above FDEP SWCTLs. Natural attenuation remains an effective remedy for groundwater at OU 6.

The remedy at OU 6 is protective of human health and the environment because nanoscale particle injections have reduced source mass by more than 50 percent, and LTM data indicate COCs are naturally attenuating and not migrating to surface water. LUCs eliminate risk from exposure to groundwater. VI screening suggests that, given current building conditions, groundwater concentrations do not affect protectiveness at this time.

Operable Unit 7 — PSC 46

PSC 46 is the Former Defense Reutilization and Marketing Office (DRMO), an 11.5-acre noncontiguous parcel southwest of NAS Jacksonville. The DRMO's mission is to provide means for disposal of surplus DoD equipment, supplies, and scrap materials stored within a fenced yard prior to transfer to other government agencies or sale to the public. The selected remedy included excavation and disposal of contaminated soil, natural attenuation, and LUCs. Excavations completed in 2011 removed soil above FDEP Commercial/Industrial Soil Cleanup Target Levels (SCTLs), and concrete caps and paving prevent direct contact with residual soil contamination onsite and minimize leaching. Data review suggests natural attenuation is ongoing.

The remedy at OU 7 is protective of human health and the environment because soil removal and LUCs have eliminated risk from direct exposure to soil contaminant concentrations exceeding industrial criteria, and LUCs prevent exposure to groundwater from potable or other uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. Additional investigation may be warranted for the emerging contaminant 1,4-dioxane, which was detected in groundwater at OU 7, but protectiveness is not affected while LUCs prevent groundwater use. VI screening suggests that current groundwater concentrations do not affect protectiveness at this time.

Operable Unit 8 — PSC 47

PSC 47 includes the Pesticide Shop/Building 536 and Former Disease Vector Ecology and Control Center/Building 937. Building 536 was used for development of pesticide management programs, training, and pesticide mixing and storage from the 1960s until 1978, when Building 937 was dedicated for that purpose. Building 536 is now used to store and maintain grounds landscaping and lawn care equipment, and pesticides for nearby Casa Linda Oaks Golf Course. Now the Naval Entomology Center of Excellence, Building 937 is used for pesticide development programs, training, and research and development.

The selected remedy for soil was excavation and offsite disposal, capping to prevent leaching, groundwater monitoring, and LUCs. The selected remedy for groundwater was natural attenuation and LUCs. Excavations removed soil above FDEP Commercial/Industrial SCTLs. Concrete caps emplaced onsite have prevented direct contact with residual soil contamination and minimized leaching. LTM data suggest natural attenuation is performing as expected by various biotic and abiotic mechanisms. In general, VOC, semi-volatile organic compound, and pesticide plumes are stable or decreasing, based on data review.

The remedy at OU 8 is protective of human health and the environment because soil removal, capping, and LUCs have eliminated risk from direct exposure to soil in excess of industrial criteria, contaminated soil leaching to groundwater, and use of groundwater. Groundwater monitoring ensures contamination is not migrating offsite and the natural attenuation portion of the remedy is effective. VI screening suggests that current groundwater concentrations do not affect protectiveness at this time.

SITE IDENTIFICATION		
Site Name: Naval Air Station Jacksonville		
EPA ID: FL6170024412		
Region: 4	**State:** FL	**City/County:** Jacksonville/Duval

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE)
Author name (Federal or State Project Manager): Adrienne Wilson
Author affiliation: NAVFAC SE Remedial Project Manager
Review period: June 2014 — January 2015
Date of site inspection: 1 and 2 October 2014
Type of review: Statutory
Review number: 4
Triggering action date: 6 March 2011
Due date *(five years after triggering action date)*: 6 March 2016

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">This five-year review did not identify issues or recommendations/follow-up actions that affect protectiveness at Operable Units (OUs) 2, 4, 5, 6, 7, or 8.</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td rowspan="3">OU: 1-1</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: Emerging contaminants (dioxins/furans) were detected in soil above Florida Department of Environmental Protection residential and industrial toxicity equivalent thresholds at Operable Unit 1. Access controls prevent exposure.</td></tr>
<tr><td colspan="4">Recommendation: Evaluate whether further assessment of dioxins/furans in soil is necessary. Document decision in a Technical Memorandum and modify remedy documents, as appropriate.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>Navy</td><td>EPA/State</td><td>31 March 2017</td></tr>
<tr><td rowspan="3">OU: 1-2</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: At the time the 2005 Five-Year Review was generated, there were no Florida Surface Water Standards or Trigger Levels for Contingent Action for groundwater/surface water contaminants of concern 1,2-dichloroethane, trans-1,2-dichloroethene, or vinyl chloride. The 2011 Five-Year Review recommended the Naval Air Station Jacksonville Partnering Team evaluate promulgated Surface Water Cleanup Target Levels and determine if they are applicable as Trigger Levels for Contingent Action.</td></tr>
<tr><td colspan="4">Recommendation: The Naval Air Station Jacksonville Partnering Team evaluated the Florida Surface Water Cleanup Target Levels and determined they are applicable as Trigger Levels for Contingent Action, and will prepare appropriate Record of Decision modification documentation (e.g., Explanation of Significant Difference).</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2017</td></tr>
<tr><td rowspan="3">OU: 2</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The emerging contaminant 1,4-dioxane was an early contaminant detected at Potential Sources of Contamination 41 and 42. However, 1,4-dioxane was not an analytical parameter included in the Remedial Investigation/Feasibility Study or subsequent sampling events. Protectiveness is not affected while Land Use Controls prevent groundwater use.</td></tr>
<tr><td colspan="4">Recommendation: Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions, as appropriate.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2018</td></tr>
</table>

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td rowspan="3">OU: 3-1</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: The Remedial Investigation and Feasibility Study addendums for Operable Unit 3 are still underway. However, given Land Use Controls are in place, there is no protectiveness issue at this time.</td></tr>
<tr><td colspan="4">Recommendation: Complete the RI and FS addendums so that OU 3 remedy documents can be modified.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>Navy</td><td>EPA/State</td><td>31 March 2018</td></tr>
<tr><td rowspan="3">OU: 3-2</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The emerging contaminant 1,4-dioxane is associated with 1,1,1-trichloroethane, which has historically been detected at Operable Unit 3. However, 1,4-dioxane was not an analytical parameter included in the original Remedial Investigation/Feasibility Study; ensure that this is incorporated into the Remedial Investigation/Feasibility Study Addendum process. Protectiveness is not affected while Land Use Controls prevent groundwater use.</td></tr>
<tr><td colspan="4">Recommendation: Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions as appropriate.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2018</td></tr>
<tr><td rowspan="3">OU: 4-1</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: Storm water monitoring through the Naval Air Station Jacksonville Storm Water Program was a component of the selected remedial alternative to meet Remedial Action Objectives in the Record of Decision. The Naval Air Station Jacksonville Storm Water Management Team discontinued monitoring in approximately 2002 and subsequently removed Casa Linda Lake from the Naval Air Station Jacksonville Storm Water Pollution Prevention Plan.</td></tr>
<tr><td colspan="4">Recommendation: Obtain documentation justifying the removal of Casa Linda Lake from the Naval Air Station Jacksonville Storm Water Management Program and determine if decision modification documents are necessary.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2018</td></tr>
</table>

<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td rowspan="3">OU: 4-2</td><td colspan="4">Issue Category: Institutional Controls</td></tr>
<tr><td colspan="4">Issue: Florida Department of Environmental Protection has indicated that the language in the 30 December 2011 Land Use Control Remedial Design document is outdated.</td></tr>
<tr><td colspan="4">Recommendation: Revise and resubmit the Operable Unit 4 Land Use Control Remedial Design document.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Implementing Party</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2017</td></tr>
<tr><td rowspan="3">OU: 6-1</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The parameter 1,1-dichloroethane exceeded the Florida Department of Environmental Protection Groundwater Cleanup Target Level, Natural Attenuation Default Concentrations, and milestone objectives but was excluded from reporting after 2012 because it is a natural attenuation parameter, not a contaminant of concern.</td></tr>
<tr><td colspan="4">Recommendation: Determine whether 1,1-dichloroethane should be retained as a natural attenuation parameter or contaminant of concern, establish appropriate screening/evaluation criteria, and document decisions as necessary.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Implementing Party</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2017</td></tr>
<tr><td rowspan="3">OU: 6-2</td><td colspan="4">Issue Category: Monitoring</td></tr>
<tr><td colspan="4">Issue: The emerging contaminant 1,4-dioxane is associated with 1,1,1-trichloroethane, which is an Operable Unit 6 contaminant of concern, but was not an analytical parameter included in the Remedial Investigation/Focused Feasibility Study or subsequent sampling events. Protectiveness is not affected while Land Use Controls prevent groundwater use.</td></tr>
<tr><td colspan="4">Recommendation: Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions as appropriate.</td></tr>
<tr><th>Affect Current Protectiveness</th><th>Affect Future Protectiveness</th><th>Implementing Party</th><th>Oversight Party</th><th>Milestone Date</th></tr>
<tr><td>No</td><td>No</td><td>Navy</td><td>EPA/State</td><td>31 March 2017</td></tr>
</table>

Issues/Recommendations				
OU: 7-1	**Issue Category: Monitoring**			
	Issue: The 2007 Remedial Action Work Plan recommended the remedial goals (1999 Florida Department of Environmental Protection Commercial/Industrial Soil Cleanup Target Levels) be updated to the 2005 Soil Cleanup Target Levels. The areas where soil was excavated were based on 2005 criteria. Record of Decision remedial goals have not been revised.			
	Recommendation: Revise remedial goals to reflect 2005 Soil Cleanup Target Levels as implemented during the 2007 (and subsequent) remedial actions.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Navy	EPA/State	31 March 2018
OU: 7-2	**Issue Category: Monitoring**			
	Issue: The emerging contaminant 1,4-dioxane was detected at 70.7 micrograms per liter in MW-8 during the November 2012 monitoring event. The remaining analytical results could not be evaluated for 1,4-dioxane because the detection limits (20 and 100 micrograms per liter) exceeded the 3.2 micrograms per liter Groundwater Cleanup Target Level. Protectiveness is not affected while Land Use Controls prevent groundwater use.			
	Recommendation: Develop a Sampling and Analysis Plan to assess the current extent of 1,4-dioxane at Operable Unit 7.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Navy	EPA/State	31 March 2018
OU: 8	**Issue Category: Monitoring**			
	Issue: Emerging contaminants (dioxins/furans) were detected above Florida Department of Environmental Protection Groundwater Cleanup Target Levels and United States Environmental Protection Agency Toxicity Equivalency thresholds at Operable Unit 8. Background concentrations in groundwater were not available for comparison. Protectiveness is not affected while Land Use Controls prevent groundwater use.			
	Recommendation: Evaluate whether further assessment of dioxins/furans in groundwater (e.g., background or spatial evaluations) is necessary, and document recommendations as appropriate.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Navy	EPA/State	31 March 2018

Protectiveness Statement(s)		
Operable Unit: 00001	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Sources of Contamination 26 (Old Main Registered Disposal Area) and 27 (Former Transformer Storage Area)		
Protectiveness Statement: The remedy at Operable Unit 1 is considered protective in the short term. The soil removal and capping components of the remedy implemented at Operable Unit 1 protect human health and the environment. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The Navy is implementing Land Use Controls to prevent unacceptable soil and groundwater exposures. Vapor intrusion screening suggests that current groundwater concentrations/plume conditions do not affect protectiveness at this time. To ensure long-term protectiveness, additional work may be required to assess dioxins at Operable Unit 1.		
Operable Unit: 00002	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Sources of Contamination 3 (Wastewater Treatment Plant Former Sludge Disposal Area), 4 (Pine Tree Planting Area), 41 (Domestic Waste Sludge Drying Beds), 42 (Effluent Polishing Pond), and 43 (Industrial Waste Sludge Drying Beds)		
Protectiveness Statement: The remedy at Operable Unit 2 is protective of human health and the environment because soil removal, Resource Conservation and Recovery Act closure, and Land Use Controls have eliminated risk from direct exposure to soil and groundwater in excess of industrial criteria. Land Use Controls continue to protect human health and the environment by prohibiting residential land use and groundwater uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The emerging contaminant 1,4-dioxane has been identified at the site, but protectiveness of the remedy is not affected while Land Use Controls prevent groundwater use.		
Operable Unit: 00003	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Sources of Contamination 11 (Building 101, Hangar 101S), 12 (Old Test Cell Building), 13 (Radium Paint Disposal Pit), 14 (Battery Shop Area), 15 (Solvent and Paint Sludge Disposal Area), 16 (Black Point Storm Sewer Discharge), 48 (Station's Drycleaners), and Building 780, Multiple Storm Sewers, and Groundwater Contamination Areas A through G		
Protectiveness Statement: Conditions at Operable Unit 3 are protective in the short term. The Navy is implementing Land Use Controls, which prevent unacceptable groundwater exposures. The current remedy, if determined to be necessary, will be modified after the Remedial Investigation and Feasibility Study addendums, proposed plan addendum, and Record of Decision amendment. The Remedial Investigation and Feasibility Study addendums will be completed by 31 March 2018		
Operable Unit: 00004	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Source of Contamination 21 (Casa Linda Lake)		
Protectiveness Statement: The remedy at Operable Unit 4 is protective of human health and the environment as exposures to contaminated sediment are mitigated as outlined in the Record of Decision, and signage and passive habitat controls mitigate human health and ecological direct contact exposure at this site.		

Protectiveness Statement(s)		
Operable Unit: 00005	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Source of Contamination 51 (Former Oil Disposal Area and Former Firefighter Training Area)		
Protectiveness Statement: The remedy at Operable Unit 5 is protective of human health and the environment because long-term monitoring data indicate contaminants are naturally attenuating. Groundwater and surface water monitoring ensure contamination is not migrating offsite or to the unnamed creek, and that the natural attenuation portion of the remedy is effective. Land Use Controls eliminate risk from exposure to soil and groundwater.		
Operable Unit: 00006	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Source of Contamination 52 (Hangar 1000)		
Protectiveness Statement: The remedy at Operable Unit 6 is protective of human health and the environment because nanoscale particle injections have reduced source mass by more than 50 percent, and long-term monitoring data indicate contaminants of concern are naturally attenuating and not migrating to surface water. Land Use Controls eliminate risk from exposure to groundwater. Vapor intrusion screening suggests that, given current building conditions, groundwater concentrations do not affect protectiveness at this time.		
Operable Unit: 00007	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Source of Contamination 46 (Former Defense Reutilization and Marketing Office)		
Protectiveness Statement: The remedy at Operable Unit 7 is protective of human health and the environment because soil removal and Land Use Controls have eliminated risk from direct exposure to soil contaminant concentrations exceeding industrial criteria, and Land Use Controls prevent exposure to groundwater from potable or other uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. Additional investigation may be warranted for the emerging contaminant 1,4-dioxane, which was detected in groundwater at Operable Unit 7, but protectiveness is not affected while Land Use Controls prevent groundwater use. Vapor intrusion screening suggests that current groundwater concentrations do not affect protectiveness at this time.		
Operable Unit: 00008	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Not Applicable
Potential Source of Contamination 47 (Pesticide Shop/Building 536 and Former Disease Vector Ecology and Control Center/Building 937)		
Protectiveness Statement: The remedy at Operable Unit 8 is protective of human health and the environment because soil removal, capping, and Land Use Controls have eliminated risk from direct exposure to soil in excess of industrial criteria, contaminated soil leaching to groundwater, and use of groundwater. Groundwater monitoring ensures contamination is not migrating offsite and the natural attenuation portion of the remedy is effective. Vapor intrusion screening suggests that current groundwater concentrations do not affect protectiveness at this time.		

AUTHORIZING SIGNATURE

By my signature below, I approve the issuance of this Five-Year Review for the Naval Air Station Jacksonville in Jacksonville, Florida.

____

CAPT Howard Wanamaker, USN — Date

Commanding Officer, Naval Air Station Jacksonville

U.S. Department of the Navy

1.0 INTRODUCTION

Resolution Consultants was contracted by the Department of the Navy (Navy), Naval Facilities Engineering Command Southeast (NAVFAC SE), under Comprehensive Long-term Environmental Action Navy contract number N62470-11-D-8013, task order JM74, to perform this (the fourth) five-year review at Naval Air Station (NAS) Jacksonville, in Jacksonville, Duval County, Florida.

The five-year review was conducted using the following United States Environmental Protection Agency (U.S. EPA) and Navy guidance.

- Chief of Naval Operations Letter 5090 N453 Ser/11U158119 (7 June 2011)
- Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P *Comprehensive Five-Year Review Guidance* (U.S. EPA, June 2001)
- OSWER Directive 9355.7-18 *Recommended Evaluation of Institutional Controls: Supplement to the Comprehensive Five-Year Review Guidance* (U.S. EPA 2011)
- OSWER Directive 9200.2-111 *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews* (U.S. EPA, September 2012)
- OSWER Directive 9200.2-84 *Assessing Protectiveness at Sites for Vapor Intrusion: Supplement to the Comprehensive Five-Year Review Guidance* (U.S. EPA, November 2012)
- Naval Facilities Engineering Command (NAVFAC) *Toolkit for Preparing Five-Year Reviews* (NAVFAC, April 2013)

1.1 Purpose

The purpose of this five-year review is to evaluate implementation and performance of remedies at eight operable units (OUs) to determine if they are protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this five-year review report. In addition, this report documents deficiencies identified during the review and recommends specific follow-up actions to address them.

This five-year review was prepared pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section §121(c), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan in Title 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii).

Consistent with Executive Order 12580, the Secretary of Defense is responsible for ensuring that five-year reviews are conducted at federal facility sites under jurisdiction, custody, or control of the Department of Defense (DoD). The Navy is the lead agency responsible for this five-year review at NAS Jacksonville, working with the U.S. EPA and the Florida Department of Environmental Protection (FDEP) under the Federal Facilities Agreement (FFA) signed by all parties in 1990.

This is the fourth five-year review for NAS Jacksonville. The triggering action event for the first five-year review was the 6 March 1995 start date for construction of the OU 1 Light Non-Aqueous Phase Liquid (LNAPL) System. The first five-year review (September 2001) included OUs 1 and 2, the second five-year review (September 2005) included OUs 1 through 4, and the third five-year review included OUs 1 through 8. The third five-year Review was issued May 2011 and approved by the U.S. EPA in September 2011. This five-year review was conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices remain at each OU above levels that allow for unlimited use and unrestricted exposure (UU/UE).

1.2 Report Organization

This report is organized with the intent of meeting the general format requirements specified in U.S. EPA's *Comprehensive Five-Year Review Guidance*, summarizing the results of the five-year review of each OU in a cohesive and comprehensive manner. The remainder of Section 1 provides an overview of NAS Jacksonville and five-year review elements common to OUs 1 through 8.

Sections 2 through 9 are the five-year reviews for OU 1 through OU 8, respectively. Each individual OU five-year review section includes site chronology and background, a summary of remedial action progress since the last five-year review, and the findings, technical assessment, deficiency list, recommendations, and protectiveness statements associated with this five-year review. Section 10 lists the references upon which this five-year review was based.

1.3 Facility Overview

NAS Jacksonville is a 3,400-acre facility in south-central Duval County, approximately 9 miles south of downtown Jacksonville, Florida (Figure 1-1). The facility is situated along the banks of the St. Johns River, approximately 24 miles upstream from its confluence with the Atlantic Ocean. The main portion of NAS Jacksonville is bordered on the north by the Timuquana Country Club, on the east and northeast by St. Johns River, on the south by a residential area, and on the west by U.S. Highway 17 (Roosevelt Boulevard) beyond which are Westside Regional Park and commercial developments. The individual OUs are listed in Table 1-1 and shown on Figure 1-2.

Table 1-1
Naval Air Station Jacksonville Operable Units

Operable Unit	Potential Sources of Contamination (PSCs)
1	Closed Landfill (PSC 26) and Former Transformer Storage Area (PSC 27)
2	Wastewater Treatment Plant (PSCs 3, 4, 41, 42, and 43)
3	Fleet Readiness Center Southeast (PSCs 11 through 16 and 48, Building 780, Storm Sewer, and Groundwater Contamination Areas A through G)
4	Casa Linda Lake (PSC 21)
5	Former Oil Disposal Area and Firefighter Training Area (PSC 51)
6	Hangar 1000 (PSC 52)
7	Former Defense Reutilization and Marketing Office (PSC 46)
8	Pesticide Shop and Former Disease Vector Ecology and Control Center (PSC 47)

1.3.1 History and Site Chronology

NAS Jacksonville was officially commissioned on 15 October 1940 as an air defense strategic base to provide facilities for pilot training and a Naval Aviation Trades School for ground crewmen. The physical size of NAS Jacksonville more than doubled during World War II with construction of over 700 buildings, many of which remain in use today. In 1942, the station became the headquarters for the Chief of Naval Operational Training. By 1946, the facility reached a peak of 42,000 naval personnel and 11,000 civilians. Operational objectives have been adjusted to meet the Navy's priorities over time, but the emphasis has remained joint operations and training. Today, NAS Jacksonville is an important regional hub for both fixed wing and rotary wing aircraft. The station also hosts one of the three Navy aviation maintenance depots in the country.

The Navy initiated an environmental investigation of NAS Jacksonville in 1979. The U.S. EPA issued a Hazardous and Solid Waste Amendments of 1984 (HSWA) permit to the installation in June 1987 and a Resource Conservation and Recovery Act (RCRA) Facility Assessment was included in the permit. The site was placed on the National Priorities List in November 1989. The cleanup program at NAS Jacksonville conducted under the aforementioned FFA and the Navy's Installation Restoration Program (IRP) identified 58 Potential Sources of Contamination (PSCs) that required some level of additional investigation before determining what, if any, further action under CERCLA was necessary.

Figure 1-1
NAS Jacksonville Location Map
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Legend

NAS Jacksonville Boundary

0 2,000 4,000 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/11/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road, city, and state line data are from the United States Census Bureau.

Figure 1-2
Operable Units Location Map
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Operable Unit Boundary

NAS Jacksonville Boundary

0 1,250 2,500 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

In addition to CERCLA and the IRP, the facility operates under a joint RCRA operating/HSWA permit renewed by FDEP on 22 July 2014 and has Petroleum Contaminated Areas (PCAs) subject to remediation under FDEP's Petroleum Restoration Program as provided for by Florida Administrative Code (FAC) Chapter 62-770.

1.3.2 Land Use

NAS Jacksonville's mission is to enable naval aviation warfighting readiness by supporting the Fleet, Fighter, and Family. NAS Jacksonville maintains and operates facilities and provides services and materials to support aviation operations and units of the operating forces of the Navy. Currently, NAS Jacksonville supports over 110 tenant commands and over 20,000 people during its daily operations. The station consists of operational and industrial areas occupied by various tenants including Fleet Readiness Center Southeast (FRCSE), Fleet Logistic Center Jacksonville, Patrol and Helicopter squadrons, and two Fleet Logistics Support Squadrons. The largest industrial employer in northeast Florida, the FRCSE maintains, repairs, and overhauls Navy aircraft. Support facilities include an airfield for air operations and pilot training, a maintenance depot, a Naval Hospital, and a Fleet Industrial Supply Center.

1.3.3 Physiography and Topography

NAS Jacksonville is located in the Coastal Plain physiographic province. The Coastal Plain is composed of marine/coastal sediments in the vicinity of the facility. The sediments were deposited in terraces related to prehistoric fluctuations in sea level. The terrace deposits are in the form of ridges that tend to parallel the current coastline. The topography of the terrace deposits is characterized by very low relief with gentle slopes to the east-southeast. NAS Jacksonville is 10 to 25 feet above mean sea level (msl) (United States Geological Survey [USGS] 1993). According to the NAS Jacksonville Master Plan, the 100-year flood stage for the station is 5 feet above msl (EDAW, Inc. 2009).

1.3.4 Climate

Climate is summarized in detail in the various Remedial Investigation (RI) reports prepared for the OUs at NAS Jacksonville. The climate in northeast Florida approaches semi-tropical, with an annual mean temperature of 68 to 70 degrees Fahrenheit, an average summer temperature of 82 to 83 degrees Fahrenheit, and an average winter temperature of 56 to 57 degrees Fahrenheit. The region experiences an average of 53 to 54 inches of rainfall per year, most of which accumulates during frequent summer thunderstorms. Extended dry periods may occur throughout the year but are most common in spring and fall. Winds of hurricane force can be expected once in five years; tropical storm activity mostly occurs between August and October, although the six-month period between 1 June and 30 November is officially considered the Atlantic hurricane season.

1.3.5 Geology

The surficial aquifer forms the uppermost permeable unit at NAS Jacksonville. The aquifer is composed of sedimentary deposits of Pliocene to Holocene age and consists of 30 to 100 feet of tan to yellow, medium to fine-grained unconsolidated silty sands interbedded with lenses of clay, silty clay, and sandy clay. NAS Jacksonville is underlain by sediments of the Pamlico Terrace below which are deposits of the Miocene-age Hawthorn Group. The Hawthorn Group consists mainly of dark-grey and olive-green sandy to silty clay, clayey sand, clay and sandy limestone encountered at a depth of approximately 50 to 70 feet below ground surface (bgs). Black phosphatic sand, granules, and pebbles are common throughout the Hawthorn Group (Fairchild 1972).

The Hawthorn Group is significant at NAS Jacksonville because it contains as much as 200 feet of low permeability, silty, sand-clay layers (Scott 1988). This low permeability deposit acts as an aquiclude for the underlying Floridan aquifer system. A marine carbonate sequence makes up the Floridan aquifer system, which is Eocene in age and consists of, in descending order, the Ocala Group, Avon Park Limestone, Lake City Limestone, and Oldsmar Limestone. The Floridan aquifer system is the major source of potable water in the Jacksonville area and throughout much of northeast and central Florida.

1.3.6 Hydrogeology

Hydrogeology of NAS Jacksonville has been evaluated through a series of studies conducted by the USGS. Three aquifer systems — surficial, intermediate, and Floridan — have been identified in the Jacksonville area.

While the surficial aquifer may be considered a single unit on a regional or base-wide scale, localized clay layers or discontinuous lenses may divide the aquifer into distinct permeable units in some areas. The contact between the surficial aquifer deposits and the underlying Hawthorn Group, containing the intermediate aquifer, is an unconformity generally identified by a coarse phosphatic sand and gravel bed (Leve 1966). Average well yields in Jacksonville for the surficial aquifer were estimated by the City of Jacksonville Planning Department to be between 200 and 500 gallons per day (gpd) (Toth 1990). This groundwater is primarily used for lawn irrigation, domestic purposes, and heat exchange in heating, ventilating, and air conditioning (HVAC) units.

The combination of numerous thick clay layers within the Hawthorn Group serves as a confining layer that separates the surficial aquifer from the underlying Floridan aquifer system. The Floridan aquifer water-bearing zones consist of soft, porous limestone and porous dolomite beds. The top of the Floridan aquifer in the vicinity of NAS Jacksonville is approximately 400 feet bgs. Published transmissivities of the Floridan aquifer in east Duval County range from 85,000 to 160,000 gpd per foot (Leve 1966). Groundwater in the Floridan aquifer in the vicinity of NAS Jacksonville is moving eastward toward areas of heavy pumping. Recent data indicates that groundwater in the Floridan aquifer in the vicinity of NAS Jacksonville has a flat gradient with a possible slight east-southeast flow trend (Sepulveda and Spechler 2004). Floridan aquifer wells in the vicinity of NAS Jacksonville are under sufficient artesian pressure to flow at the surface.

1.3.7 Surface Water

Two principal waterways — the St. Johns River and the Ortega River — are located near NAS Jacksonville. The St. Johns River, which forms the east boundary of NAS Jacksonville, is a Class III water body, which is popularly referred to as fishable/swimmable (Hand 1996). The St. Johns River at NAS Jacksonville is approximately 2.5 miles wide. The salinity in this portion of the river fluctuates somewhat dependent on rainfall and tidal conditions (Tetra Tech, Inc. 2014). Based on a Scoping Study Field Program (SSFP) at OU 3, which measured salinity between 7 and 8.8 parts per thousand, the water would be classified as marine (Harding Lawson Associates Group, Inc. [HLA] 2000).

1.4 Land Use Control Implementation Plan Program

The Navy has implemented institutional controls to prevent human health and ecological exposure to contaminants that remain above concentrations that allow for UU/UE. Under the Land Use Control Implementation Plan (LUCIP) Program, land use controls (LUCs) are incorporated into the overall NAS Jacksonville Master Plan, and the Navy maintains responsibility for implementing, monitoring, maintaining, enforcing, and reporting.

LUCs at OU 2 are conducted under a Memorandum of Agreement (MOA). LUCs at OUs 5, 6, 7, and 8 are conducted under FDEP- and U.S. EPA-approved Land Use Control Remedial Design (LUC RD) documents. LUC RD documents that contain implementation and maintenance actions based on specific Record of Decision (ROD) requirements have been submitted for OUs 1, 3, and 4. While the LUC RDs are pending regulatory review, the Navy has proactively implemented LUCs and associated inspection protocols to prevent exposure. Navy IRP personnel conduct quarterly LUC inspections at each OU, and submit inspection certification sheets to the FDEP and U.S. EPA annually.[1]

[1] Significant infractions of the LUC RD, which occur infrequently, are reported to U.S. EPA and FDEP at the time they are discovered.

1.5 Five-Year Review Process

This five-year review includes document reviews, site inspections, and interviews and discussions with personnel associated/familiar with the OUs. Section 11 is a comprehensive reference list for this five-year review.

1.5.1 Telephone Interviews

Telephone interviews were conducted with the following NAS Jacksonville Partnering Team members the week of 22 to 26 September 2014.

- Adrienne Wilson, NAVFAC SE Remedial Project Manager (RPM)
- Mike Singletary, NAVFAC SE Technical Manager
- Tim Curtin, NAS Jacksonville IRP Manager
- Peter Dao, U.S. EPA Region 4 RPM
- Jennifer Conklin, FDEP RPM
- Mark Peterson, Tetra Tech Task Order Manager
- Eric Davis, CH2MHILL Constructors, Inc. (CCI)
- Jody Overmyer, Solutions IES, Inc. (SIES), Project Manager

Interview findings have been incorporated into each OU section discussion, and documents and data provided as a result of the interviews are included as noted.

1.5.2 Site Inspections

Site inspections were performed on 1 and 2 October 2014 with the following personnel in attendance:

- Holly Brauer, Resolution Consultants
- Adrienne Wilson, NAVFAC SE RPM
- Tim Curtin, NAS Jacksonville IRP Manager

Inspection findings have been incorporated into each OU section discussion. Photographs taken during the site inspections are in Appendix A.

1.5.3 Community Involvement

A public notice announcing the initiation of this five-year review was published in the Florida Times-Union on 24 August 2014; an affidavit of publication is in Appendix B. After the this five-year review report is finalized, a fact sheet will be produced and distributed to the Restoration Advisory Board and any other interested persons or organizations.

The estimated completion date for the final five-year report is 6 March 2016. This five-year review report will be placed in the Naval Installation Restoration Information Solution (NIRIS) database and in the Information Repositories and Administrative Record File for NAS Jacksonville. Most project documentation can be found at the following Information Repository location:

Webb Wesconnett Branch Library
6887 103rd Street
Jacksonville, Florida 32210

In addition, the Administrative Record can be accessed on-line through the following Navy website: http://www.navfac.navy.mil/products_and_services/ev/products_and_services/env_restoration/administrative_records.html.

1.6 Naval Air Station Jacksonville Operations and Maintenance Costs

All long-term operations and maintenance (O&M) costs are managed by NAVFAC SE for the NAS Jacksonville IRP as a whole. Annual costs for O&M were approximately $280,000 for FY2014. Those costs included:

- Long-term monitoring (LTM) of groundwater and surface water
- OU 1 (Section 2) and OU 5 (Section 6) soil cover maintenance
- OU 4 (Section 5) passive habitat control maintenance
- Five-year review costs (annualized)

LUC inspections conducted by IRP personnel are not included in the approximated annual costs. Costs are variable, based on the O&M required annually, but are within the range deemed customary for sites like NAS Jacksonville.

1.7 Applicable or Relevant and Appropriate Requirements, To Be Considered Criteria, and Site-Specific Action Levels

The Applicable or Relevant and Appropriate Requirements (ARARs) identified in each ROD were reviewed to determine if there have been any changes that affect the protectiveness of the remedy at each OU. ARARs were evaluated for changes during the 2011 through 2014 review period for this five-year review. Guidance documents that may be relevant to changes since remedy decisions (e.g., risk assessment guidance) are discussed throughout each section.

The Federal Endangered Species Act was cited as a location-specific ARAR for OU 1 and OU 2 and State Endangered and Threatened Species as To Be Considered (TBC) Criteria. Additions to the Florida Endangered and Threatened Species List have occurred since the last five-year review. Review of the most recently updated (January 2013) Florida Endangered and Threatened Species List indicated addition of the Miami Blue Butterfly, which is not indigenous to Duval County and not applicable to NAS Jacksonville (Florida Fish and Wildlife Conservation Commission 2013). If additional remedial actions are considered, then evaluations should reconsider location-specific ARARs. Other location-specific TBC criteria, which may include floodplain management requirements, should also be evaluated if contingent actions are considered.

Several action-specific ARARs changed during this five-year review period but few changes are applicable to the remedies implemented at NAS Jacksonville. General observations include the following.

- Overall, federal ARAR changes were not deemed to be significant relative to remedy protectiveness, as most OUs have demonstrated construction completion or No Further Action (NFA) for soil/sediment actions, and are currently in an LTM program for groundwater.[2]

- State ARARs have changed since the last five-year review, largely due to consolidation of Florida rules (e.g., consolidation of risk management options under FAC 62-780). State ARAR references identified in the original remedy documents (i.e., Feasibility Study [FS] and ROD) may be inaccurate; however, the substantive requirements of the Florida ARARs have not changed.

Should additional remedial actions be required at sites where construction has been deemed complete or NFA has been issued for soil or sediment, the NAS Jacksonville Partnering Team may consider an ARAR review as part of any Focused FS, remedy modification documents (ROD amendment or Explanation of Significant Difference [ESD]), and supplemental remedial design activity.

Chemical-specific ARARs are discussed for each OU relative to Technical Assessment Question B. Most of the applicable changes in chemical-specific ARARs since the last five-year review or ROD was issued have included changes to existing standards or addition of new constituents, based on changes to toxicological factors.

[2] ARARs for OU 3 will be reviewed following completion of RI and FS Addendums, and development of remedial alternatives, as noted in Section 4.

The NAS Jacksonville Partnering Team has been proactive in identifying changes in state and federal ARARs at each OU, as documented in meeting minutes, LTM reports, and Sampling and Analysis Plan (SAP) documents. In the letter approving the 2011 Five-Year Review, the U.S. EPA noted that several ARARs identified as the basis for numeric cleanup levels of contaminants of concern (COCs) had changed for which a post-ROD change document (e.g., an ESD) had not been prepared. Per U.S. EPA comments, an ESD is required to document any significant changes to a remedy, including changes to remedial goals (e.g., ARARs), and how they may impact the protectiveness of the remedy. Individual OUs at which U.S. EPA comments are applicable are discussed in the corresponding section.

1.8 Risk Assessment Review Process

In support of this five-year review for NAS Jacksonville OUs 1 through 8, remedial action objectives (RAOs) and remedial goals used at the time of each remedy were evaluated to determine their validity with regard to current risk assessment methods (Technical Assessment Question B). In general, FDEP Soil Cleanup Target Levels (SCTLs), Groundwater Cleanup Target Levels (GCTLs), and Surface Water Cleanup Target Levels (SWCTLs) were used as ARARs or TBC Criteria at NAS Jacksonville; FDEP originally developed many of the cleanup target levels (CTLs) as risk-based concentrations.

During the risk assessment review, the Conceptual Site Model (CSM), exposure pathways, changes in land use, new contaminants or sources, toxicity, other contaminant characteristics, risk assessment methods, COCs, and remedial goals were reviewed using U.S. EPA's *Five-Year Review Guidance*.

As part of the risk assessment review, the following were included, where applicable:

- A review of emerging contaminants, including 1,4-dioxane and perfluorocarbons (PFCs).[3]
- A qualitative vapor intrusion screening level (VISL) evaluation where volatile organic compounds (VOCs) or naphthalene were present in shallow groundwater near structures. The vapor intrusion (VI) screening is documented in Appendix C and discussed where applicable to individual OUs (1, 3, 6, 7, and 8).
- A dioxin, furan, and dioxin-like compound re-assessment, as required by the U.S. EPA in its comments on the last five-year review. The dioxin/furan re-evaluation process is summarized in Appendix D, and the results discussed where applicable at OUs 1 and 8.

[3] The emerging contaminant 1,4-dioxane was assessed at sites where 1,1,1-trichlorethane was a historical site contaminant and PFCs were assessed at former firefighter training areas where use of aqueous firefighting foam was documented.

Each section discusses specific elements in the risk assessment process as it applies to the individual OU; risk assessment changes common to each OU are summarized below.

- Risk assessment models, toxicity values, and screening values have changed over time, as recently as May 2014, when exposure models were updated by the U.S. EPA. However, most RAOs defined in each ROD, including all groundwater RAOs, are ARAR-based (e.g., FDEP CTLs) as opposed to site-specific risk-based remedial goals generated using risk assessment findings. Therefore, the protectiveness of remedies based on ARARs are not sensitive to risk assessment changes. Exceptions are noted in individual OU sections.

- Risk Assessment Guidance for Superfund (RAGS) Parts E and F were published after most RI/FS documents were completed. Re-evaluation of risk is not warranted for this five-year review because most remedies use ARARs, and remedial goals would not be affected by changes in RAGS unless the overall site strategy or applicable ARARs change in the future.

- Exposure model calculations and other inputs to risk calculations have changed since the risk assessments were performed. However, re-evaluation of risk is not warranted for this five-year review because LTM data are compared to ARARs as a measure of potential risk. If it were necessary to re-evaluate risk, current guidance would likely include exposure pathways not previously evaluated, such as VI, and would also include the following considerations.

  — Risk would be evaluated using a cumulative approach.

  — Updated toxicity values (e.g., slope factors) for contaminants common to NAS Jacksonville COCs, including naphthalene, dichloroethene (DCE), trichloroethene (TCE), arsenic, chromium, dioxins and dioxin-like compounds, and various polynuclear aromatic hydrocarbons (PAHs); for example, the cancer slope factor for naphthalene changed as of May 2014.

  — Current U.S. EPA guidance recommends screening to identify contaminants of potential concern (COPCs) using U.S. EPA Regional Screening Level (RSL) tables, which are based on a target risk of 1.0E-06 and an adjusted target Hazard Index (HI) of 0.1 (U.S. EPA 2013). FDEP's approach to identify COPCs is ARAR-based.

- Some ARARs calculated by FDEP are based on risk assessment methods that are infrequently updated. Additionally, some FDEP risk assessment methods differ from U.S. EPA methods, or they are implemented and interpreted differently (e.g., FDEP uses a risk threshold of 1.0E-06 for remedial decisions whereas U.S. EPA uses an upper bound acceptable risk of 1.0E-04). As noted above, the updated toxicity factors for several compounds have not been incorporated in FDEP ARARs. For example, the protective remedial goal for naphthalene is anticipated to decrease, potentially affecting decisions made using historical FDEP CTLs.

Ecological risk assessments (ERAs) were completed at several OUs; Sections 2 and 5 address changes to ERAs specific to OU 1 and OU 4, respectively.

1.9 Next Five-Year Review

The next five-year review, which will be conducted pursuant to CERCLA and pertinent U.S. EPA and Navy five-year review guidance, is scheduled to be completed in 2021.

2.0 OPERABLE UNIT 1

OU 1 is located within the south-central portion of NAS Jacksonville and is bordered by a forested area and golf course to the north, River Oaks Neighborhood Navy family housing to the east, a wooded area to the south, and a restricted weapons storage area to the west (Figure 2-1). The air station hospital on Child Street is approximately 600 feet east of OU 1.

OU 1 is comprised of PSC 26 (Old Main Registered Disposal Area) and PSC 27 (Former Transformer Storage Area). PSC 26 was used for various disposal purposes between 1940 and 1979. PSC 27, which south-adjoins PSC 26, was used to store transformers with dielectric fluid that contained polychlorinated biphenyls (PCBs). PSCs 26 and 27 comprise OU 1 because of their proximate locations and shared fate and transport mechanisms for contaminants.

2.1 Site Chronology

Historical events and relevant dates in the OU 1 chronology are listed in Table 2-1.

Table 2-1
Chronology of Site Events at Operable Unit 1

Event		Date
Initial discovery of problem or contamination		February 1973
Interim Remedial Actions		
	Trench system constructed and operated temporarily to recover Light Non-Aqueous Phase Liquid (LNAPL)	1983 to 1984
	Excavated LNAPL trench ditch material was blended with fill and spread over landfill	1983
Site placed on the National Priorities List		November 1989
Focused Remedial Investigation (RI)/Feasibility Study (FS) (LNAPL only)		1990 to 1993
Remedial Design (LNAPL only)		May 1994
Interim Record of Decision Signed for LNAPL Removal		August 1994
RI/FS Complete for OU 1		March 1996
Remedial Design (excavation with landfill cap and cover only)		1994 to June 1997
Record of Decision signed		23 September 1997
Construction dates:		
	Excavation and disposal of contaminated surface soil and sediment from Potential Source of Contamination (PSC) 27 to PSC 26	July 1998
	Installation of cap and cover system at PSC 26	August 1998
Institutional controls for Operable Unit (OU) 1 developed through Land Use Control Implementation Plan		October 1998
Long-term groundwater and surface water monitoring		1999 to Present
Air Intrusion Study at River Oaks Neighborhood (air station housing)		October 2005
Investigations of suspected contaminants outside OU 1 landfill and Land Use Control boundary		2005 and 2007
Five-Year Reviews		2001, 2005, 2011
Revised Land Use Control Remedial Design		January 2012
LNAPL System Decommissioning		2013

Figure 2-1
Operable Unit 1 - Location
Potential Sources of Contamination 26 and 27
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

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REQUESTED BY: H. Brauer	DATE: 4/17/2015
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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2.2 Background

2.2.1 Physical Characteristics

PSC 26 is approximately 30 to 40 acres in two contiguous parcels (north Parcel 1 and south Parcel 2) separated by Child Street; PSC 27 is south of Parcel 2 (Figure 2-2). The former landfill portion of PSC 26 is approximately 17 acres and PSC 27 is less than 1 acre. Unnamed drainage ditches within a portion of the wooded area south of the main landfill (PSC 26) that is included in OU 1 drain south through additional woods into an unnamed tributary of the St. Johns River estuary and adjoining wetlands (hydrophytic forest habitat) east of OU 1. The stream flows approximately 2,200 feet south before it reaches the St. Johns River. OU 1 is above the 10-foot msl contour interval, which places it above the 5-foot msl 100-year station flood stage (EDAW 2009).

During investigation-related field assessments, diverse and productive upland and wetland ecological communities were observed at OU 1 and some macro-invertebrate communities in the OU 1 wetlands appeared to be moderately degraded (ABB Environmental Services, Inc. [ABB-ES] 1997).

2.2.2 Land and Resource Use

Land use at OU 1 is industrial. The landfill is fenced with warning signs to prevent unauthorized access, and LUCs restrict unauthorized disturbance (e.g., construction, drilling, and excavation). Future receptors will be limited to air station personnel assigned to activities associated with the landfill. LUCs in place prevent agricultural, recreational, and residential uses (including any form of housing, childcare facilities, schools, playgrounds, or convalescent or nursing care facilities). LUCs will be required at OU 1 until concentrations of hazardous substances in soil and groundwater allow for unrestricted use and unlimited exposure.

The surficial aquifer at OU 1 is not used for domestic, industrial, or potable purposes. The LUC remedy prohibits use of surficial groundwater for any purpose including human consumption, dewatering, irrigation, heating/cooling purposes, and other industrial processes (Tetra Tech 2012).

2.2.3 History of Contamination

PSC 26

From approximately 1940 to 1979, the landfill at PSC 26 received discarded vehicles, household and sanitary garbage, liquid industrial wastes (including oil and solvents), and demolition and construction debris. During that time, material was burned in open pits and trenches which were subsequently covered with soil. Between 1940 and 1950, low-level radioactive wastes (radium-226 and radium-228 paint waste and luminescent dials) were also disposed of at PSC 26.

Figure 2-2
Operable Unit 1 - Layout
Potential Sources of Contamination 26 and 27
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Ditch
Fence
PSC Boundary
Surface Water

0 150 300 Feet

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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Estimated volumes of liquid industrial wastes disposed of over approximately 40 years included 1,000 gallons per week (gpw) of volatile organic waste, 200 gpw of cold carbon remover residue, 300 gpw of vapor degreaser solution, and 600 gpw of paint shop waste. The liquid wastes contained methylene chloride, methyl ethyl ketone, ethyl acetate, TCE, methyl isobutyl ketone, n-butyl acetate, xylenes, and heavy metal salts. Approximately 200 drums of hazardous material were reportedly buried in the south portion of the landfill on an unknown date before 1979. NAS Jacksonville continued to use the PSC 26 area for disposal purposes until 1978 when oil was observed seeping into a ditch; the landfill was officially closed on 15 January 1979.

PSC 27

PSC 27 was used to store transformers for an unknown period of time before 1978, when vandalism reportedly caused spill(s) of unknown quantities of PCB-containing transformer oil (dielectric fluid) to the ground surface. The Navy subsequently removed the transformers and PCB-contaminated soil for offsite disposal.

OU 1

Soil, groundwater, and surface water investigations conducted between 1979 and 1992 identified PCBs in soil; VOCs, semi-volatile organic compounds (SVOCs), PCBs, and LNAPL in surficial groundwater; and dissolved oil and VOCs in surface water. Combinations of VOCs, SVOCs, metals, PCBs, pesticides, dioxins, furans, and radionuclides were detected in ambient air, surface water, sediment, soil, and surficial aquifer groundwater; no contaminants were detected in Hawthorn Formation wells or in soil-gas samples.

2.2.4 Initial Response

Pre-ROD Removal Actions

Soil contaminated with low-level radioactive paint waste and 501 drums of glass vials were removed after a February 1973 radiological (RAD) survey. A final assessment completed in November 1973 determined no RAD hazards remained.

In 1983, three primary disposal pits were excavated to 8 feet bgs to address the presence of LNAPL and, with excavated ditch material and sand, spread across the PSC 26 landfill surface. A passive (trench) groundwater recovery system was constructed with underflow weirs and the land graded to increase flow to perimeter drainage ditches. Although the temporary remediation system demonstrated some effectiveness in removing LNAPL, the system failed to meet National Pollutant Discharge Elimination System surface water discharge permit effluent limitations, so the Navy suspended its operation in 1984. Earthen dams were constructed across the ditches to prevent offsite drainage from OU 1.

LNAPL Source Area

A Focused RI/Focused FS confirmed PCB contamination in PSC 27 soil and sediment in an adjacent tributary, characterized the nature and extent of free-phase LNAPL at OU 1, and developed and screened potential remedial alternatives for free-phase LNAPL removal (ABB-ES 1993). Approximately 5,900 to 10,200 gallons of LNAPL — defined as a viscous weathered petroleum product containing at least 50 milligrams per kilogram PCBs — were present north of Child Street. To meet the RAO of removing free product LNAPL from the surficial aquifer, the 1994 Interim Record of Decision (IROD) recommended construction and operation of a trench recovery system for LNAPL, offsite treatment and disposal of LNAPL, and temporary onsite stockpiling of soil excavated during construction. That Interim Remedial Action (IRA) was initiated in February 1995.

2.2.5 Basis for Taking Action

The OU 1 RI/FS, completed in 1996, identified VOCs, SVOCs, PCBs, metals, pesticides, dioxins, furans, and radionuclides in various environmental media. OU 1 was evaluated to identify the populations that might come into contact with site-related chemicals and the pathways through which exposure might occur. Since OU 1 was remediated consistent with the presumptive remedy for landfills, which included containment and control of migration of chemicals and prevention of exposure to surface soil and groundwater within the landfill, the Baseline Risk Assessment (BRA) evaluated risks associated with potential exposures to compounds that have already migrated from the landfill into the surrounding environment.

Human Health Risk Assessment

The RI/FS Human Health Risk Assessment (HHRA) evaluated potential risks for the following receptors: current trespassers (exposure to air, soil, surface water, and sediment), future residents (exposure to air, soil, surface water, sediment, and groundwater), and future excavation workers (exposure to air and soil). Media evaluated were those that may have been contaminated by landfill chemicals migrating from the landfill source area. Per the ROD, the following human health concerns were identified (ABB-ES 1997).

- For current land-use scenarios, site-related cancer and non-cancer risks were within U.S. EPA acceptable risk thresholds (i.e., non-cancer risk HI less than 1 and Excess Lifetime Cancer Risk [ELCR] within or less than acceptable risk range of 1.0E-06 to 1.0E-04). There were several parameters with associated cancer risks greater than FDEP's acceptable risk threshold of 1.0E-06.

- For future residential land-use scenarios, site-related cancer and non-cancer risks in surface soil north of Child Street, surface water, and sediment were within U.S. EPA-acceptable risk limits. Cancer risks associated with chlorinated solvents and future use of groundwater as drinking water were sufficiently high to indicate the need to prevent drinking water use in the area of the plume. Cancer and non-cancer risks associated with future residential use of areas not addressed by the presumptive remedy were slightly above the generally acceptable range. Those risks were predominantly due to PAHs and PCBs in soil north and south of Child Street. There was at least one chemical in each medium with an associated cancer risk greater than 1.0E-06 (ABB-ES 1996).

- Calculated risks associated with potential exposure to radionuclides in surface water, sediment, and groundwater were consistent with risks at background sampling locations, and not considered site-related.

Ecological Risk Assessment

The RI/FS ERA assessed potential adverse effects to ecological receptors resulting from contamination of surface soil, surface water, and sediment by past disposal practices.[1] The receptors evaluated included terrestrial plants and invertebrates, terrestrial wildlife, semi-terrestrial wildlife, and aquatic life.

Potential risk to wildlife species were evaluated by habitat as follows:

- Terrestrial wildlife receptors north and south of Child Street: cotton mouse, short-tailed shrew, meadowlark, red fox, and great-horned owl

- Semi-terrestrial receptors in grassy drainage ditches: cotton mouse, short-tailed shrew, meadowlark, and great-horned owl

- Semi-terrestrial receptors in forested streams: short-tailed shrew, American woodcock, raccoon, great-horned owl, and great blue heron

- Semi-terrestrial receptors in St. John's River: muskrat, spotted sandpiper, raccoon, great blue heron, and osprey

[1] The full text of the ERA (Section 7 of the 1996 RI/FS) was not available for review. As such, the review of ecological risk and the appropriateness/protectiveness of response actions is based on the executive summary of the RI/FS, Appendix S of the RI/FS (Baseline ERA; calculations for food chain evaluations), and the ROD text.

The following ecological concerns were identified:

- Risks were posed to upper trophic level terrestrial receptors due to cadmium, selenium, lead, and PCBs (Aroclor-1260). Those risks were not indicated or addressed in the ROD remedial goals.

- Risks were posed to upper trophic level semi-terrestrial receptors in the forested stream habitat due to food-chain exposure to 4,4'-dichlorodiphenyldichloroethane (DDD) and mercury, with Hazard Quotients (HQs) of 1.0 and 1.5, respectively. Those risks were not addressed in ROD remedial goals.

- Aquatic exposures to PCBs that exceeded benchmark values may result in direct toxicological effects to aquatic receptors. The ROD did not identify specific sediment COCs, but PCB removal actions were performed in the unnamed tributary to human-health based criteria.

Contaminants of Concern

The following summarizes COCs for each medium.

- COCs in soil and debris within the PSC 26 landfill were PCBs, metals, and radionuclides. The highest contamination detected within the landfill was in the vicinity of the former solvent and oil disposal pits. COCs in soil samples collected outside the landfill were SVOCs, PCBs, and metals.

- Pesticides, PCBs, and metals were COCs in sediment in the unnamed tributary. PCBs appeared to have been transported from the landfill via suspended particles.

- Two groundwater plumes of VOCs were identified: the north plume (that included LNAPL) and the south plume (that included chlorinated VOCs and SVOC-fuel constituents). Groundwater COCs identified in the ROD were: 1,1-DCE, 1,2-dichloroethane (DCA), cis- and trans-1,2-DCE, benzene, TCE, vinyl chloride, bis-(2-ethylhexyl)phthalate (BEHP), and naphthalene.

- Surface water did not contain COCs above an unacceptable human health risk but was considered to be a transport medium for contaminants found in groundwater and sediment. Both VOC groundwater plumes had migrated away from their respective source areas approximately halfway to their primary discharge point, the unnamed tributary, which entirely captured both groundwater plumes migrating from OU 1 (EBB-ES 1997).

2.3 Remedial Actions

The ROD for OU 1 was signed on 23 September 1997.

2.3.1 Remedial Action Objectives

Table 2-2 lists 10 RAOs identified for six mediums: landfill soil and debris, LNAPL in the vadose zone, soil outside the landfill, groundwater, sediment, and surface water in the unnamed tributary. The purpose of the remedial action for OU 1 is to contain and control the contamination at OU 1 and to reduce the risks posed by COCs to acceptable levels within 30 years (ABB-ES 1997). The groundwater criteria specified in the ROD were Federal Safe Drinking Water Act Maximum Contaminants Levels (MCLs), Florida MCLs (Primary and Secondary Drinking Water Standards in FAC 62-550.310 and 62-550.320, respectively), and Florida Groundwater Guidance Concentrations.[2]

2.3.2 Remedy Selection

Table 2-2 also lists preferred remedial actions developed and evaluated during the RI/FS and documented in the ROD. After implementation of remedial actions, continued protection would be provided through natural attenuation, LTM of groundwater and surface water, and LUCs.

2.3.3 Remedy Implementation

The remedial design, which included RCRA closure and post-closure plans, was initiated in 1996 and completed in 1997. Remedial activities (excavation, capping, and covering) were conducted in 1998.

Excavation, Capping, and Covering

As specified in the ROD, contaminated soil and sediment exceeding 1.0E-04 risk action levels were excavated from areas outside the landfill and placed on the existing soil and debris within the landfill. Approximately 4,000 and 5,000 cubic yards of soil and debris were excavated from the areas north and south of Child Street, respectively. Approximately 900 cubic yards of "hot spot" PCB-contaminated sediment were excavated from the unnamed tributary in the south wooded portion of OU 1.

The contaminated soil and debris at PSC 26 were capped with a 30-millimeter geomembrane layer to prevent water migration through the area that contained radionuclides, metals, and PCBs. To reduce human and ecological receptor exposure by promoting vegetation, absorbing rainwater, and reducing surface runoff, 18 inches of compacted soil and 6 inches of topsoil were placed (1) on top of the geomembrane layer, (2) on contaminated soil at PSC 27, and (3) on soil, sediment, and debris within the remainder of the landfill.

[2] Florida Groundwater Guidance Concentrations are taken from Chapter 6 (Guidance Concentration Index) of the FDEP Groundwater Guidance Concentrations (June 1994).

Table 2-2
Remedial Action Objectives and Remedy Selection at Operable Unit 1

Medium	Contaminants	Remedial Action Objective(s)	Remedy	Date Completed
Landfill soil and debris	Polychlorinated biphenyls (PCBs), metals, radionuclides	Reduce exposure to contaminants	Installed a cap/cover system	1998
Landfill surface	PCBs, metals, radionuclides	Prevent runoff from landfill surface contaminants	Installed a cap/cover system	1998
Landfill leachate	PCBs, metals, radionuclides	Control leachate generation from additional material placed on landfill	Installed a cap/cover system	1998
Light Non-Aqueous Phase Liquid (LNAPL)	PCB and polynuclear aromatic hydrocarbons	Remove if greater than 0.1 inch from the water table	Continued operation of the LNAPL Interim Remedial Action as described in the Interim Record of Decision	1998-2005
Soil outside landfill	Semi-Volatile Organic Compounds, PCBs, metals	Reduce human and ecological exposure, and potential for human and ecological receptor ingestion	Excavate soil outside the landfill and consolidate with landfill soil and debris	1998
Sediment in the unnamed tributary	PCBs	Reduce human and ecological exposure, and reduce potential for human and ecological receptor ingestion and contact	Excavated sediment within the unnamed tributary and consolidate with landfill soil and debris	1998
Groundwater	Volatile Organic Compounds	Reduce potential for humans to ingest or breathe contaminants, and for human and ecological receptor contact	Monitor groundwater and surface water for natural attenuation with contingent actions for enhanced bioremediation and tributary water collection	Ongoing

Landfill Cap Maintenance

A requirement of the selected remedial action chosen for OU 1 is monitoring and maintenance of the landfill cap to ensure that cap integrity is not compromised. Bechtel Environmental, Inc. (BEI), installed the landfill cap and provided a maintenance and monitoring plan with semi-annual inspections for various criteria including vegetation cover, fencing and signage, damage by vandals and pests, and surface erosion, settlement, and drainage.

LNAPL

LNAPL collection and offsite disposal were continued as described in the IROD. Initially, the LNAPL recovery system was installed across the groundwater-soil interface to remove the light-phase layer from the top of the water table. The collected LNAPL was pumped into recovery drums, which were staged in former PCB transformer storage lockers near the recovery system prior to transportation for offsite disposal. The LNAPL recovery system was operated from July 1995 to January 2005. A decreasing trend in free product recovery was noted in 2003 and only minimal amounts of free product were available to be recovered (NAVFAC 2011). A 19 March 2010 letter requesting formal approval to decommission the OU 1 LNAPL system closure was sent to the U.S. EPA and FDEP, both of which approved the decision in October 2010. Because the LUCs, groundwater monitoring, and storm water compliance monitoring remedies that remain in place are expected to be protective of human health and the environment as it relates to groundwater contamination, a CERCLA alternate remedy or other post-ROD change document was not prepared.

The LNAPL remediation system (comprised of three removal trenches, pea gravel, drain pipe, vertical wells, hoses, cable pull vaults, and geotextile fabric) and associated system control, storage buildings, and metal sheds anchored on concrete foundations were decommissioned in 2013 under an approved work plan. Decommissioning and removal activities are detailed in the 23 June 2014 Draft Construction Completion Report (CCR), approved by FDEP on 10 September 2014; the document is pending review by the U.S. EPA.

Groundwater

The groundwater treatment component of the selected remedy consists of biodegradation, monitored natural attenuation (MNA), and access restrictions to prevent consumption of groundwater at OU 1 from the surficial aquifer in the affected area. Groundwater and surface water monitoring was implemented upon completion of the excavation, capping, and covering components. The LTM program, which includes sampling and analysis of groundwater for COCs and natural attenuation parameters and of surface water for groundwater COCs, was designed to determine:

- Whether aquifer conditions at PSCs 26 and 27 could support MNA based on analysis of selected natural attenuation parameters.

- If COC concentrations in groundwater decrease and trend towards FDEP GCTLs.

- If groundwater COCs migrate to the unnamed tributary of the St. Johns River and exceed Trigger Levels for Contingent Action (TLCAs).

The groundwater criteria specified in the ROD are State and Federal MCLs for COCs 1,1-DCE, 1,2-DCA, cis- and trans-1,2-DCE, benzene, TCE, vinyl chloride, BEHP, and naphthalene.[3] TLCAs listed in the ROD were Class III Florida Surface Water Standards (FSWS): 3.2 micrograms per liter (µg/L) 1,1-DCE, 1,580 µg/L 1,2-DCA, and 80.7 µg/L TCE (ABB-ES 1997).[4]

Contingent Actions

The following contingent actions were included in the selected remedy; to date, neither contingent action has been implemented at OU 1.

- If, after a review of data accumulated during the first five years of natural attenuation, predicted concentrations of COCs in groundwater would not achieve Federal and State MCLs within 30 years, then enhanced bioremediation — injection of a carbon source and applicable nutrients into the impacted groundwater beneath OU 1 through a series of trenches — will be implemented.

- If COC concentrations in surface water or groundwater from wells adjacent to the tributary exceed TLCAs established in the ROD, one or more seepage meters will be installed to collect water samples at the direct interface of groundwater discharge to surface water. The samples are to be analyzed and, if COCs exceed FSWS, then tributary water will be collected using a surface water pump-and-treat system until the contaminants are reduced below MCLs.

[3] FDEP and U.S. EPA approved eliminating BEHP and naphthalene as COCs after the first year (1999) of quarterly monitoring because neither was detected.

[4] The 2005 Five-Year Review documented the NAS Jacksonville Partnering Team's decision to remove the TLCA for 1,2-DCA erroneously established in the ROD and add benzene to the surface water monitoring program with the established SWCTL of 71.28 µg/L (NAVFAC 2005).

Institutional Controls/Access Restrictions

Institutional controls for OU 1 were developed through the Navy LUCIP Program in October 1998 in accordance with the MOA, discussed in Section 1.4. LUCs at OU 1 included constructing a fence around the landfill, posting signs along the fence, and restricting groundwater consumption. The groundwater restrictions are to remain in effect until concentrations of COCs meet U.S. EPA MCLs, with concurrence from FDEP and U.S. EPA. Quarterly LUCIP inspections are conducted by Navy IRP personnel and submitted to FDEP and U.S. EPA annually.

2.4 Progress Since the Last Five-Year Review

2.4.1 Protectiveness Statement from the 2011 Five-Year Review

The following protectiveness statement is from the 2011 Five-Year Review.

> *The remedy at OU 1 currently protects human health and the environment for the short term because LUCs are in place to prevent any ecological or human health exposure to contaminated media. The MNA effectiveness determination after collection of five years of data has been completed at this site and MNA for the groundwater component of the remedy was found to be meeting the RAOs, therefore the remedy for the short and long terms are protective for the groundwater component of the remedy. However, in order for the surface water component of the remedy to be protective in the long term, the following actions need to be taken. Evaluate if FAC 62-777 freshwater CTLs for 1,2-DCA, trans-1,2-DCE, and vinyl chloride should be used as target concentration action levels for OU 1.*

2.4.2 Issues, Recommendations, and Follow-Up Actions

The following are issues and recommended follow-up actions identified during the 2011 Five-Year Review.

OU 1 Landfill Boundary

During a fence construction project prior to the 2005 Five-Year Review, discolored water and trash were encountered suggesting the landfill boundary had not been fully delineated. Additional investigation to define and delineate soil and groundwater along the northwest boundary was conducted from 2005 to 2007. The resulting report concluded that a small area of soil and groundwater contamination existed outside the landfill and corresponding OU 1 LUC boundary. The 2011 Five-Year Review recommended the boundary of OU 1 landfill be amended to encompass the extent of the newly delineated soil and groundwater contamination and that a newly installed downgradient well (MW-109S) be included in the OU 1 groundwater monitoring program.

Use of Updated SWCTLs as TLCAs

Subsequent to the 2005 Five-Year Review, SWCTLs (FAC 62-777, 2005) were promulgated for 1,2-DCA (37 µg/L), trans-1,2-DCE (11,000 µg/L), and vinyl chloride (2.4 µg/L). The 2011 Five-Year Review recommended the NAS Jacksonville Partnering Team evaluate the SWCTLs to determine if they should be used as TLCAs and, if adopted, to complete an ESD, as appropriate (NAVFAC 2011).

2.4.3 Results of Implemented Actions from 2011 Five-Year Review

OU 1 Landfill Boundary

As shown on Figure 2-3, the OU 1 landfill boundary was expanded and a revised LUC RD was prepared and submitted to the U.S. EPA and FDEP on 19 January 2012. The revised LUC RD is being implemented while it is pending review by regulators.

Use of Updated SWCTLs as TLCAs

Florida SWCTLs have been used as TLCAs for comparison purposes in all LTM groundwater and surface water sampling events since the last five-year review. Per U.S. EPA's comments on the 2011 Five-Year Review, an ESD will be prepared to document changes.

2.5 2015 Five-Year Review Process

2.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the RI/FS, ROD, annual groundwater and surface water monitoring reports, and prior five-year review reports. This five-year review also included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014 and quarterly LUCIP Inspection Checklists for 2010 through 2014.

2.5.2 Data Review

Data evaluated for this five-year review was obtained from three years of annual groundwater and surface water monitoring conducted in accordance with FDEP- and U.S. EPA-approved SAPs (SIES 2012, SIES 2013).[5] Groundwater and surface water have been monitored for COCs identified in the ROD with subsequent optimization/modification (detailed in Section 2.6.1) by the NAS Jacksonville Partnering Team. Tables 2-3 and 2-4 summarize groundwater analytical data for shallow and intermediate interval wells, respectively, obtained since the 2011 Five-Year Review.[6] Figure 2-4 shows monitoring well and surface water sampling locations.

[5] For comparison, results from the last event included in the 2011 Five-Year Review (February 2010) are included in Tables 2-3 and 2-4.
[6] Results from the 2014 (Year 15) monitoring event, completed during preparation of this Five-Year Review, were unavailable.

Figure 2-3
Operable Unit 1 - Land Use Control Boundaries
Potential Sources of Contamination 26 and 27
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

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- Groundwater LUC Control Point
- SOIL LUC Control Point
- Ditch
- Fence
- Groundwater LUC Area
- Soil LUC Areas
- 6111 Building Address Number

0 162.5 325 Feet

REQUESTED BY: H. Brauer	DATE: 2/8/2016
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Figure 2-4
Operable Unit 1 - Groundwater and Surface Water Sampling Locations
Potential Sources of Contamination 26 and 27
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command
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Table 2-3
Groundwater Analytical Results (Shallow Interval) — Operable Unit 1 Contaminants of Concern
(all concentrations presented in micrograms per liter)

Well ID	Contaminant	GCTL(1)	2010-Feb (Year 11)	2010-Nov(2) (Year 12)	2012-Aug (Year 13)	2013-June (Year 14)
OU1-MW-67	1,1-dichloroethene	7	<0.21	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	24	34	44.5	44.6
	trans-1,2-dichloroethene	100	<0.30	<0.47	<0.35	0.38 I
	Trichloroethene	3	<0.24	<0.39	<0.26	<0.31
	Vinyl Chloride	1	**2.1**	**4.6**	**14.8**	**13.2**
OU1-MW-85	1,1-dichloroethene	7	<0.15	<0.50	<0.20	Removed from Annual Sampling Program for LTM
	1,2-dichloroethane	3	<0.082	<0.34	<0.22	
	Benzene	1	<0.050	<0.35	<0.21	
	cis-1,2-dichloroethene	70	<0.075	<0.41	<0.24	
	trans-1,2-dichloroethene	100	<0.11	<0.47	<0.23	
	Trichloroethene	3	<0.13	<0.39	<0.31	
	Vinyl Chloride	1	<0.083	<0.48	<0.44	
OU1-MW-89	1,1-dichloroethene	7	**22**	**13**	<0.23	<0.20
	1,2-dichloroethane	3	**5.6**	<3.4	0.82 I	0.82
	Benzene	1	**32**	**14**	**12.2**	**17.9**
	cis-1,2-dichloroethene	70	55	39	24.5	31.9
	trans-1,2-dichloroethene	100	2.1	<4.7	<0.35	<0.23
	Trichloroethene	3	**840**	**230**	0.56 I	0.75 I
	Vinyl Chloride	1	**99**	**37**	**43.7**	**59.2**
OU1-MW-93	1,1-dichloroethene	7	<0.15	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.002	<0.34	<0.20	<0.22
	Benzene	1	<0.050	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	<0.075	<0.41	<0.26	<0.24
	trans-1,2-dichloroethene	100	<0.11	<0.47	<0.35	<0.23
	Trichloroethene	3	<0.13	<0.39	<0.26	<0.31
	Vinyl Chloride	1	<0.083	<0.48	<0.22	<0.44
OU1-MW-95	1,1-dichloroethene	7	<0.21	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	<0.22	<0.41	<0.26	<0.24
	trans-1,2-dichloroethene	100	<0.30	<0.47	<0.35	<0.23
	Trichloroethene	3	<0.24	<0.39	<0.26	<0.31
	Vinyl Chloride	1	<0.33	<0.48	<0.22	<0.44
OU1-MW-101	1,1-dichloroethene	7	<0.21	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	<0.22	<0.41	<0.26	<0.24
	trans-1,2-dichloroethene	100	<0.30	<0.47	<0.35	<0.23
	Trichloroethene	3	<0.24	<0.39	<0.26	<0.31
	Vinyl Chloride	1	<0.33	<0.48	<0.22	<0.44

Notes:
(1) Florida Department of Environmental Protection Groundwater Cleanup Target Levels (FAC Chapter 62-777, 2005)
(2) Results taken from 2012 Annual Groundwater Monitoring Report; the November 2010 report was unavailable.
I Analyte detected between the laboratory Method Detection Limit and Method Quantification Level

Table 2-4
Groundwater Analytical Results (Intermediate Interval) — Contaminants of Concern at Operable Unit 1
(all results presented in micrograms per liter)

Well ID	Contaminant	GCTL(1)	2010-Feb (Year 11)	2010-Nov(2) (Year 12)	2012-Aug (Year 13)	2013-June (Year 14)
OU1-MW-12	1,1-dichloroethene	7	<0.15	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.003	<0.34	<0.20	<0.22
	Benzene	1	**2.6**	**4.6**	**6.1**	**6.7**
	cis-1,2-dichloroethene	70	1.3	0.66 I	0.42 I	0.26 I
	trans-1,2-dichloroethene	100	<0.11	<0.47	<0.35	<0.23
	Trichloroethene	3	<0.13	<0.39	<0.26	<0.31
	Vinyl Chloride	1	0.80 I	<0.65 I	0.27 I	<0.44
OU1-MW-18	1,1-dichloroethene	7	<0.21	4.8	3.8	3.9
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	0.33 I	0.33 I
	cis-1,2-dichloroethene	70	30	51	49.3	**81.0**
	trans-1,2-dichloroethene	100	5.8	8.2	3.5	3.4
	Trichloroethene	3	43	**67**	**16.5**	**14.7**
	Vinyl Chloride	1	10	**11**	**23.3**	**36.8**
OU1-MW-19	1,1-dichloroethene	7	2.2	1.1	1.2 I	1.3
	1,2-dichloroethane	3	<0.28	1.2	<0.40	<0.22
	Benzene	1	<0.27	<0.27	<0.40	<0.21
	cis-1,2-dichloroethene	70	**260**	**110**	**147**	**140**
	trans-1,2-dichloroethene	100	61	59	30.6	35.8
	Trichloroethene	3	**170**	**120**	**59.9**	**61.3**
	Vinyl Chloride	1	**12**	**3.8**	**5.5**	**6.8**
OU1-MW-22	1,1-dichloroethene	7	<0.21	0.74 I	2.6	2.7
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	0.44 I	0.46 I
	cis-1,2-dichloroethene	70	11	8	40.5	35.5
	trans-1,2-dichloroethene	100	1.6	1.3	5.8	4.4
	Trichloroethene	3	**9.9**	**4.8**	**16.9**	**15.8**
	Vinyl Chloride	1	**1.9**	**1.6**	**9.2**	**7.3**
OU1-MW-84 (Deep)	1,1-dichloroethene	7	<0.15	<0.50	<0.20	Removed from Annual Sampling Program for LTM
	1,2-dichloroethane	3	<0.003	<0.34	<0.22	
	Benzene	1	<0.050	<0.35	<0.21	
	cis-1,2-dichloroethene	70	<0.075	<0.41	<0.24	
	trans-1,2-dichloroethene	100	<0.11	<0.47	<0.23	
	Trichloroethene	3	<0.13	<0.39	<0.31	
	Vinyl Chloride	1	<0.083	<0.48	<0.44	
OU1-MW-97	1,1-dichloroethene	7	<0.21	<0.21	<0.21	Removed from Annual Sampling Program for LTM
	1,2-dichloroethane	3	<0.28	<0.28	<0.28	
	Benzene	1	<0.27	<0.27	0.56 I	
	cis-1,2-dichloroethene	70	<0.22	<0.22	0.31 I	
	trans-1,2-dichloroethene	100	<0.30	<0.30	<0.30	
	Trichloroethene	3	<0.24	<0.24	<0.24	
	Vinyl Chloride	1	<0.33	<0.33	<0.33	

Table 2-4
Groundwater Analytical Results (Intermediate Interval) — Contaminants of Concern at Operable Unit 1
(all results presented in micrograms per liter)

Well ID	Contaminant	GCTL[(1)]	2010-Feb (Year 11)	2010-Nov[(2)] (Year 12)	2012-Aug (Year 13)	2013-June (Year 14)
OU1-MW-98	1,1-dichloroethene	7	<0.21	<0.21	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.28	<0.20	<0.22
	Benzene	1	<0.27	<0.27	<0.20	<0.21
	cis-1,2-dichloroethene	70	<0.22	0.54 I	<0.26	<0.24
	trans-1,2-dichloroethene	100	<0.30	0.42 I	<0.35	<0.23
	Trichloroethene	3	<0.24	0.42 I	<0.26	<0.31
	Vinyl Chloride	1	<0.33	<0.33	<0.22	<0.44
OU1-MW-100	1,1-dichloroethene	7	<0.21	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	**80**	39	51.2	**83.5**
	trans-1,2-dichloroethene	100	4.6	1.6	2.9	4.4
	Trichloroethene	3	<0.24	0.48 I	0.41 I	<0.31
	Vinyl Chloride	1	**2.6**	**2.6**	**2.6**	**2.1**
OU1-MW-102	1,1-dichloroethene	7	<0.21	<0.50	<0.23	<0.20
	1,2-dichloroethane	3	<0.28	<0.34	<0.20	<0.22
	Benzene	1	<0.27	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	70	0.55 I	0.52 I	0.39 I	0.45 I
	trans-1,2-dichloroethene	100	<0.30	<0.47	<0.35	<0.23
	Trichloroethene	3	<0.24	<0.39	<0.35	<0.31
	Vinyl Chloride	1	**2.8**	**1.5**	**1.9**	**1.8**

Notes:
(1) Florida Department of Environmental Protection Groundwater Cleanup Target Levels (FAC Chapter 62-777, 2005)
(2) Results taken from 2012 Annual Groundwater Monitoring Report; the November 2010 report was unavailable.
I Analyte detected between the laboratory Method Detection Limit and Method Quantification Level

Shallow Wells

In general, COC concentrations detected in shallow wells have decreased since LTM began. COCs have not been detected in OU1-MW-93, OU1-MW-95, and OU1-MW-101 (wells within the adjoining River Oaks Neighborhood) since the last five-year review. Concentrations of cis-1,2-DCE and TCE in OU1-MW-67, at the east edge of the neighborhood, have remained below GCTLs since 2006 and 2007, respectively. Concentrations of 1,1-DCE, 1,2-DCA, cis-1,2-DCE, and TCE in OU1-MW-89, northeast of the PSC 26 Parcel north of Child Street, exceeded GCTLs when LTM began in 2004 subsequently attenuated below GCTLs; TCE was detected below its GCTL for the first time in 2012 and remained below in 2013.

During the 2013 event, only three GCTL exceedances were detected: benzene above 1 µg/L in OU1-MW-89 and vinyl chloride above 1 µg/L in OU1-MW-67 and OU1-MW-89. The benzene and vinyl chloride concentrations in OU1-MW-89 appear to be decreasing and vinyl chloride concentrations in OU1-MW-67 appear stable. Within the shallow aquifer, the north and south plumes appear to be spatially stable.

Intermediate Wells

In general, COC concentrations detected in intermediate wells along the east OU boundary (OU1-MW-12, OU1-MW-18, OU1-MW-19, and OU1-MW-22) and within the River Oaks Neighborhood (OU1-MW-98, OU1-MW-100, and OU1-MW-102) have decreased since 2010. As of the 2013 sampling event, the following COCs had not attenuated below their respective GCTLs: benzene (in one well), cis-1,2-DCE and TCE in three wells, and vinyl chloride in five wells.

Benzene concentrations in OU1-MW-12 have remained above GCTLs, but have not been detected in downgradient intermediate wells above the laboratory practical quantitation limit (PQL) (SIES 2013). Within the intermediate aquifer, the north and south plumes appear to be spatially stable, but VOC concentrations in the most downgradient intermediate well, OU1-MW-22, have risen during the last several LTM events.

While cis-1,2-DCE and vinyl chloride concentrations appear stable over time in OU1-MW-19 and OU1-MW-100 with slight attenuation in OU1-MW-12 and OU1-MW-102, recent increases of those COCs in OU1-MW-18 and OU1-MW-22 are likely the result of reductive processes (of TCE), as discussed below.[7]

Natural Attenuation Data

Monitoring wells were sampled for selected natural attenuation parameters methane, ethane, and ethene (MEE), chloride, sulfate, sulfide, total organic carbon (TOC), total and dissolved iron, and total and dissolved manganese. Review of data suggests that natural attenuation of COCs has been occurring within the shallow and intermediate aquifers at OU 1. Laboratory and field data suggest the presence of acidic to neutral pH and elevated methane concentrations indicative of anaerobic reducing conditions supporting an apparent combination of iron- and sulfate-mediated oxidation of COCs within both aquifers. Elevated ethene and chloride concentrations in OU1-MW-18 and OU1-MW-22 provide further evidence for the effectiveness of natural attenuation and explain the general increase of TCE degradation products cis-1,2-DCE and vinyl chloride in those wells.

Review of Surface Water COC Data in Annual Groundwater Monitoring Reports

Surface water samples collected from SW-20 and SW-55 within the unnamed tributary are compared to FDEP SWCTLs in Table 2-5, which summarizes data collected since the last five-year review. The surface water samples collected from SW-55 contained 0.61 µg/L (2012) to 2.4 µg/L (2013)

[7] It should be noted that no shallow zone wells (screened 3 to 13 feet bgs) are present along the west/southwest perimeter of the air station housing complex, between OU-MW-18 and OU-MW-22, to gauge changes in concentration in the upper 15 feet of the aquifer.

cis-1,2-DCE, a COC for which an FDEP SWCTL has not been established. TCE was also detected at SW-55 in 2013; the detected concentration (0.80 µg/L) was below TCE's SWCTL (80.7 µg/L). COCs were not detected at SW-20. Because the primary groundwater COCs have not been detected in surface water samples, COCs do not appear to be migrating to the unnamed tributary of the St. Johns River and there is no immediate concern between residual groundwater contamination and surface water quality (SIES 2012 and 2013).

Table 2-5
Summary of Surface Water Analytical Results for Contaminants of Concern at Operable Unit 1
(all results presented in micrograms per liter)

Sample Location	Contaminant	TLCA[(1)]	2010-Feb	2010-Nov[(2)]	2012-Aug	2013-June
OU1-SW-20	1,1-dichloroethene	3.2	<0.15	<0.50	<0.23	<0.20
	1,2-dichloroethane	37	<0.082	<0.34	<0.20	<0.22
	Benzene	71.28	<0.050	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	NE	2.7	3.1	<0.26	<0.24
	trans-1,2-dichloroethene	11,000	<0.11	<0.47	<0.35	<0.23
	Trichloroethene	80.7	<0.64 I	0.49 I	<0.26	<0.31
	Vinyl Chloride	2.4	0.48 I	<0.48	<0.22	<0.44
OU1-SW-55	1,1-dichloroethene	3.2	<0.15	<0.50	<0.23	<0.20
	1,2-dichloroethane	37	<0.082	<0.34	<0.20	<0.22
	Benzene	71.28	<0.050	<0.35	<0.20	<0.21
	cis-1,2-dichloroethene	NE	<0.55 I	<0.41	0.61 I	2.4
	trans-1,2-dichloroethene	11,000	<0.11	<0.47	<0.35	<0.23
	Trichloroethene	80.7	0.47 I	<0.39	<0.26	0.80 I
	Vinyl Chloride	2.4	<0.083	<0.48	<0.22	<0.44

Notes:
(1) Trigger Levels for Contingent Action are Surface Water Cleanup Target Levels, Chapter 62-777, FAC (2005)
(2) Results taken from 2012 Annual Groundwater Monitoring Report; the February and November 2010 reports were unavailable.
< = Analyte detected below laboratory Method Detection Limit
NE = A Trigger Level for Contingent Action has not been established for this parameter
I = Analyte detected between the laboratory Method Detection Limit and Method Quantification Level

2.5.3 Site Inspection and Interviews

On 1 October 2014, Resolution Consultants, accompanied by Mr. Curtin and Ms. Wilson, drove throughout and around the perimeter of the main PSC 26 landfill and the portion of PSC 26 north of Child Street. Concrete pads, remnants of the decommissioned LNAPL remediation system, were observed along the southwest side (Child Street) of the north portion of PSC 26. The landfill was secured by fencing and a locked gate.

2.6 Technical Assessment

2.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

The major components of the selected remedy are:

- Collection of LNAPL in accordance with the IROD
- Excavation of select soil outside the landfill and sediment within the unnamed tributary for consolidation within the landfill soil and debris
- Installation, monitoring, and maintenance of a cover (cap) system of landfill soil and debris
- Natural attenuation of groundwater
- Groundwater and surface water monitoring and LUCs

Remedial Action Performance

The twofold purpose of the remedial action for OU 1 was to contain and control contamination and to reduce the risks posed by COCs to acceptable levels within 30 years. The presumptive remedy (cap) for the landfill at OU 1 was intended to shield the radionuclides in the landfill, prevent exposure to other contaminants, and reduce the potential for leachate generation from additional material placed in the landfill.

The results of groundwater and surface water monitoring indicate the landfill cap is controlling contaminant leaching into groundwater. Groundwater monitoring has defined the horizontal and vertical extent of groundwater contamination. In general, COC concentrations in groundwater have been decreasing, indicating natural attenuation remains an effective remedy. Surface water monitoring indicates that COCs in groundwater are not reaching the unnamed tributary to the south at concentrations above established TLCAs. To date, a contingent remedy has not been implemented.

Systems Operation/Operations & Maintenance

There are no active remediation systems requiring O&M at OU 1. Wells are maintained and inspected annually by contractors as part of the LTM program, and are observed during LUCIP inspections conducted by Navy personnel. The monitoring well network at OU 1 has remained in good condition, requiring only routine maintenance (e.g., replacing well caps, casing lids, and locks).

Opportunities for Optimization

Opportunities for optimization of the LTM program are considered annually. Optimization alternatives evaluated have included adding and removing wells, surface water sampling points, individual COCs, and natural attenuation parameters. These changes were managed through OU-specific LTM and base-wide well abandonment programs.

Additional optimization may be possible. A review of the current monitoring well network and 2005 groundwater data collected in support of VI evaluations suggests that the primary screened intervals (3 to 13 feet bgs and 19 to 24 feet bgs) do not isolate the “clean” groundwater lens identified at the top of the aquifer (Section 2.6.2, also Tetra Tech NUS, Inc. [TtNUS], 2008). In addition, wells along the west/southwest perimeter of the air station housing development screened in the 19- to 24-foot zone do not provide current data regarding shallow trends. Further optimization may help resolve fluctuations in concentrations at OU-MW-67. These activities, however, will be implemented as part of routine LTM program optimization; they have no effect on remedy protectiveness determinations.

Implementation of LUCs and Institutional/Engineering Controls

Access LUCs include a perimeter fence around the PSC 26 landfill posted with warning signs indicating that the enclosed area contains contaminated soil, sediment, and groundwater. LUCIP inspections conducted quarterly at OU 1 during this five-year review period noted no problematic observations. NAS Jacksonville prepared a revised LUC RD in 2012, for which review by FDEP is pending. In the interim, NAS Jacksonville has implemented LUCs and conducts inspections to ensure remedy protectiveness.

Semi-annual inspections for the landfill cap remedial action were required by the 1999 Maintenance and Monitoring Plan prepared by BEI. Semi-annual inspections using the designated checklist and providing letter reports to document findings and recommendations were conducted through 2010, at which time they were replaced with LUCIP inspections by the NAS Jacksonville Partnering Team.

The LUC RD includes visual inspections for the following to maintain the integrity of the landfill cap.

- Verifying and estimating the amount of vegetative cover
- Removing trees before their root systems can breach the landfill cap
- Inspecting for surface erosion and ponding
- Examining the condition of surface drainage systems
- Surveying the cap for damage caused by animals or vandals

The LUCIP checklist has been modified to ensure substantive requirements of the Monitoring and Maintenance Plan and LUC RD are included.

Early Indicators of Potential Remedy Problems

The north and south plumes appear to be stable within the current monitoring well network. However, VOC concentrations in the most downgradient intermediate well, OU1-MW-22, have risen during the last several LTM events. Groundwater discharges to the unnamed tributary south of OU 1. Because there are no impacts to this tributary, the short-term increases at OU1-MW-22 do not warrant a modification to the OU 1 remedy, and continued LTM will be used to evaluate VOC trends.

2.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

Location- and action-specific ARARs are discussed in Section 1.7. Chemical-specific ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

ARARs and TBC criteria considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The ROD identified ARAR-based action levels for site COCs: 1,1-DCE, 1,2-DCA, benzene, cis-1,2-DCE, trans-1,2-DCE, TCE, vinyl chloride.[8] The action levels were based on Florida MCLs, which have not changed since ROD issuance. As discussed in Section 2.4.2, SWCTLs for various surface water parameters developed since ROD issuance are used as TLCAs; an ESD will be prepared to document changes to remedy standards.

Expected Progress towards Meeting RAOs

The projected timeframe for COC concentrations in groundwater to achieve remedial goals before implementation of contingency action was 30 years. In general, COC concentrations detected in shallow and intermediate wells have decreased during the past 14 years since LTM began. Surface water data suggests that COCs are not migrating to the unnamed tributary to the St. Johns River.

[8] Two original COCs, BEHP and naphthalene, removed from LTM are not considered as part of this review.

Changes in Exposure Pathways

The exposure pathways at OU 1 have not changed. OU 1 is a closed landfill and, as discussed in Section 2.2.2, land use at OU 1 is industrial and access to the former landfill is restricted.

Changes in Land Use

No changes to land use discussed in Section 2.2.2 is anticipated.

New/Emerging Contaminants and Contaminant Sources

The emerging contaminant 1,4-dioxane is associated with the use or presence of 1,1,1-trichloroethane (TCA) but was not a routinely monitored parameter during the 1990s and early 2000s. The NAS Jacksonville Partnering Team should determine the necessity for including 1,4-dioxane as a parameter during a future sampling event.

The U.S. EPA comments on the 2011 Five-Year Review identified the need for reassessing dioxin toxicity during this five-year review. Dioxin data were compiled and reviewed as described in Appendix D. As indicated on tables included in Appendix D-1, soil dioxin results exceed the 2,4,7,8-tetrachlorodibenzodioxin- (TCDD-) equivalent FDEP Residential and Commercial/Industrial SCTLs in samples collected within OU 1 in 1991 and 1992; note that samples represent pre-cap conditions, and may have been addressed during remedial actions.[9] Based on the initial comparison, the NAS Jacksonville Partnering Team should consider the need for reassessment of dioxins (i.e., evaluate their spatial distribution, review potential sources, and develop a supplemental investigation) to determine if dioxin and dioxin equivalents are COCs that need to be addressed as part of the remedy.

No remedy byproducts or degradation products have been identified which would be considered new or emerging contaminants.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The RI/FS HHRA was developed using U.S. EPA RAGS, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992). The basis for remedial action is summarized in Section 2.2.5. Site-related cancer risks for current land use were greater than 1.0E-06, which exceeds FDEP's acceptable risk threshold. COCs in soil and debris within the PSC 26 landfill were PCBs, metals, and radionuclides, while pesticides, PCBs, and metals were COCs in sediment in the unnamed tributary. Two groundwater plumes of VOCs were identified: the north plume (that included LNAPL) and the south plume (that included chlorinated VOCs and SVOC-fuel constituents). The ERA identified potential threats to terrestrial and aquatic receptors.

[9] As noted in Appendix D, samples collected from background locations (outside OU 1) did not exceed the 2,3,7,8-TCDD-equivalent SCTLs.

The risk assessment changes discussed in Section 1.8 are applicable to OU 1. In September 2014, U.S. EPA changed its approach for evaluation of risk at sites with RAD waste. The new guidance states that exposure rates above 12 millirems per year are presumptively not protective, which is more conservative than prior guidance. RAD wastes were left in place at the OU 1 landfill and covered with a cap to prevent exposure and leaching, and the site is secured against unauthorized access. The change in U.S. EPA-recommended criteria for RAD waste is not expected to affect protectiveness based on a lack of exposure pathways and current LUC enforcement practices, but should be considered if changes to land use or alterations to the cap are considered.

The full text of the ERA (Section 7 of the 1996 RI/FS) was not available for review. As such, the detailed approach used for the risk assessment could not be evaluated. Available summary text indicated that the ERA evaluated surface soil, surface water, and sediment exposures to lower and upper trophic level receptors.

- *Ecological Risk Assessment Guidance for Superfund*, which is the guidance that is currently used for ERAs, was published in 1997. As such, this guidance post-dates the ERA presented in the 1996 RI/FS. *Navy Policy for Conducting Ecological Risk Assessments*, also published in 1999, post-dates the RI. It is likely that the ERA followed the *Framework for Ecological Risk Assessment* (U.S. EPA 1992).

- Guidance documents for evaluating background chemical concentrations in soil have been published by the U.S. EPA (U.S. EPA 2002) and FDEP (FDEP 2012) subsequent to the RI. Current ERA practice would include a comparison of site and background concentrations to determine if inorganic COPCs in site media are site-related. Background levels were considered in development of RAOs.

- Media-specific screening values (e.g., for surface soil, surface water, and sediment) were not available for review. The executive summary of the RI/FS identified multiple chemicals in surface soil with concentrations in excess of toxicological benchmarks for plants or invertebrates, but concluded that magnitudes of exceedences did not indicate likely unacceptable ecological risk. Similarly, multiple chemicals in surface water and sediment exceeded ecological screening values but were not recommended for further action based on the relative magnitude of benchmark exceedences. Although excluding COPCs from further evaluation based solely on a subjectively "low" HQ is generally unacceptable, exclusion of those chemicals from further evaluation is assumed to be sufficiently justified, based on the approval of the RI/FS and ROD by federal and state regulatory agencies.

- The RI/FS executive summary and ROD identified potential risk to one or more terrestrial wildlife receptors as well as to large wading birds (e.g., great blue heron) in the wooded stream habitat to multiple pesticides, Aroclor-1260, and inorganics. The remedy for soil and sediment was excavation (hot spot removal), addition of excavated materials to the landfill, and capping the landfill to limit exposure pathways to human and ecological receptors. Action levels for COCs were identified in the RI/FS. Selected RAOs were protective of ecological receptors. Updates in the risk assessment process and toxicological data subsequent to the publication of the RI/FS do not change the protectiveness of the selected remedy.

Vapor Intrusion

In 2005, TtNUS collected shallow groundwater samples using direct push technology (DPT) within the east-adjoining River Oaks Neighborhood family housing area to evaluate the potential for VI. That sampling event focused on the top 2 feet of the saturated zone to determine whether there was a "clean" groundwater zone (due to infiltration, etc.) located between the chlorinated VOC plume and the vadose zone which would preclude VI migration. The report identified chlorinated VOCs in one out of 22 sampling locations, and concluded that there were no exceedances of FDEP GCTLs (TtNUS 2008).[10] Predictive modeling was subsequently conducted to estimate COC concentrations in indoor air using the U.S. EPA Johnson & Ettinger (J&E) model and data from the 2005 sampling event (TtNUS 2008). The evaluation concluded no unacceptable VI risk.

Significant changes have occurred with respect to TCE, other toxicological assumptions, and use of the J&E model since 2008. Because no indoor air data are available to substantiate the results of the outdated J&E modeling, Resolution Consultants applied the VISL screening process to TCE data used in 2005 to evaluate the potential for VI at OU 1.

Comparison of chlorinated VOC concentrations in OU 1 groundwater with VISL Target Groundwater Concentrations (TGCs) indicates that the 2005 TCE detection would slightly exceed residential risk/hazard thresholds; details are provided in Appendix C. However, given that VOCs were detected in only one out of 22 borings and the 2005 DPT event identified an interval of clean groundwater between the VOC plume and the vadose zone preventing upward migration of vapor, the previous (2005 and 2008) conclusions that VI risks at OU 1 are low remain valid considering the conservatism of the VISL approach and changes in toxicity factors.

[10] This clean groundwater interval is not currently monitored by the existing OU 1 monitoring network.

Summary

In summary, risk assessment findings at NAS Jacksonville were based on current and proposed future industrial land use, with the potential for trespassing. The landfill is fenced with warning signs to prevent unauthorized access, and LUCs restrict unauthorized disturbance (e.g., construction, drilling, and excavation). Future receptors will be limited to air station personnel assigned to activities associated with the landfill. LUCs in place prevent agricultural, recreational, and residential use. Review of prior VI studies and re-assessment of 2005 data using VISL indicated that a clean groundwater lens prevents migration of vapors, minimizing risks from the VI pathway.

ARARs were used to design the groundwater remedy. Except for dioxins, this five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the ARAR-based remedy because the landfill is capped and LUCs are in place to prevent exposure. Further assessment of dioxin and dioxin-like compounds as emerging contaminants may be necessary to determine whether they are COCs at OU 1.

2.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

2.7 Issues and Recommendations/Follow-Up Actions

Issues and recommendations for follow-up actions identified during this five-year review are in Table 2-6.

2.8 Protectiveness Statement

The remedy at OU 1 is considered protective in the short term. The soil removal and capping components of the remedy implemented at OU 1 protect human health and the environment. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The Navy is implementing LUCs to prevent unacceptable soil and groundwater exposures. VI screening suggests that current groundwater concentrations/plume conditions do not affect protectiveness at this time. To ensure long-term protectiveness, additional work may be required to assess dioxins at OU 1.

Table 2-6
Issues and Recommendations/Follow-Up Actions at Operable Unit 1

Issue Number	Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	Emerging contaminants (dioxins/furans) were detected in soil above Florida Department of Environmental Protection (FDEP) residential and industrial toxicity equivalent thresholds at Operable Unit 1. Access controls prevent exposure.	Evaluate whether further assessment of dioxins/furans in soil is necessary. Document decision in a Technical Memorandum and modify remedy documents, as appropriate.	Navy	U.S. EPA, FDEP	31 March 2017	N	Y
2	At the time the 2005 Five-Year Review was generated, there were no Florida Surface Water Standards or Trigger Levels for Contingent Action (TLCAs) for groundwater/surface water contaminants of concern (COCs) 1,2-dichloroethane, trans-1,2-dichloroethene, or vinyl chloride. The 2011 Five-Year Review recommended the Naval Air Station (NAS) Jacksonville Partnering Team evaluate promulgated Surface Water Cleanup Target Levels (SWCTLs) and determine if they are applicable as TLCAs.	The NAS Jacksonville Partnering Team evaluated the Florida SWCTLs and determined they are applicable as TLCAs, and will prepare appropriate Record of Decision (ROD) modification documentation (e.g., Explanation of Significant Difference).	Navy	U.S. EPA, FDEP	31 March 2017	N	N

3.0 OPERABLE UNIT 2

OU 2 is comprised of the following PSCs formerly associated with the NAS Jacksonville wastewater treatment plant (WWTP), which treated industrial and domestic wastes from approximately 1970 to the mid-1980s: PSC 3 (Former Sludge Disposal Area), PSC 4 (Pine Tree Planting Area), PSC 41 (Domestic Waste Sludge Drying Beds [DSDBs]), PSC 42 (Polishing Pond), and PSC 43 (Industrial Waste Sludge Drying Beds [ISDBs]). OU 2 is located in the northwest portion of NAS Jacksonville; the L-shaped Patrol Road borders various OU 2 PSCs to the north and west (beyond the road is the Timuquana Country Club golf course). NAS Jacksonville John Towers Field runways border OU 2 to the south and taxiways and aprons are to the east. Figures 3-1 and 3-2 show the location of OU 2 and the surrounding area, and Figure 3-3 shows the location of each PSC within OU 2.

PSC 2, a former Fire Fighter Training Area (FFTA) used between 1966 and 1991, was initially investigated as part of OU 2 because of its location within the WWTP site boundary. Petroleum-contaminated soil and groundwater attributed to former firefighting training activities were identified at PSC 2 during a 1994 Focused RI that included PSCs 41 and 43. Total Recoverable Petroleum Hydrocarbon (TRPH)-contaminated soil and free product were removed from PSC 2 in 1995 as an IRA, after which the U.S. EPA approved transferring PSC 2 groundwater contamination to Florida's Petroleum Restoration Program. Therefore, PSC 2 (now PCA 15) is not included in this Five-Year Review.

3.1 Site Chronology

Historical events and relevant dates in the OU 2 chronology are listed in Table 3-1.

Table 3-1 **Chronology of Site Events at Operable Unit 2**	**Date**
Initial discovery of problem or contamination: Potential Sources of Contamination (PSCs) 2, 3, and 4 were identified	1983
Hazardous and Solid Waste Amendment/Resource Conservation and Recovery Act (RCRA) Permit H016-119108 issued to Naval Air Station (NAS) Jacksonville	June 1987
Site placed on the National Priorities List	November 1989
RCRA compliance monitoring detected contamination at PSCs 41 and 42	1991
PSC 4 added to OU 2	1991
Focused Remedial Investigation (RI)/Feasibility Study (FS) and Interim Record of Decision (ROD) for PSCs 2, 41, and 43	1994
Focused RI/FS for PSCs 3 and 42	1995
Interim ROD for PSC 42	1995
Soil removals conducted at PSCs 3 and 4, incorporated in an Interim Remedial Action at PSC 42	1997
Certification and Closure reports for PSCs 41, 42, and 43	1997
Operable Unit 2 (includes PSCs 2, 3, 4, 41, 42, and 43) ROD signed	20 October 1998
Land Use Control Implementation Plans per Memorandum of Agreement	October 1998
Annual RCRA Post-Closure groundwater monitoring at PSCs 41, 42, and/or 43	1999 through 2010
FDEP approved termination of post-closure care groundwater monitoring at PSCs 41 and 43	5 February 2007
Annual RCRA Post-Closure groundwater monitoring at PSC 42	Since 2011
Previous Five-Year Reviews	2001, 2005, and 2011

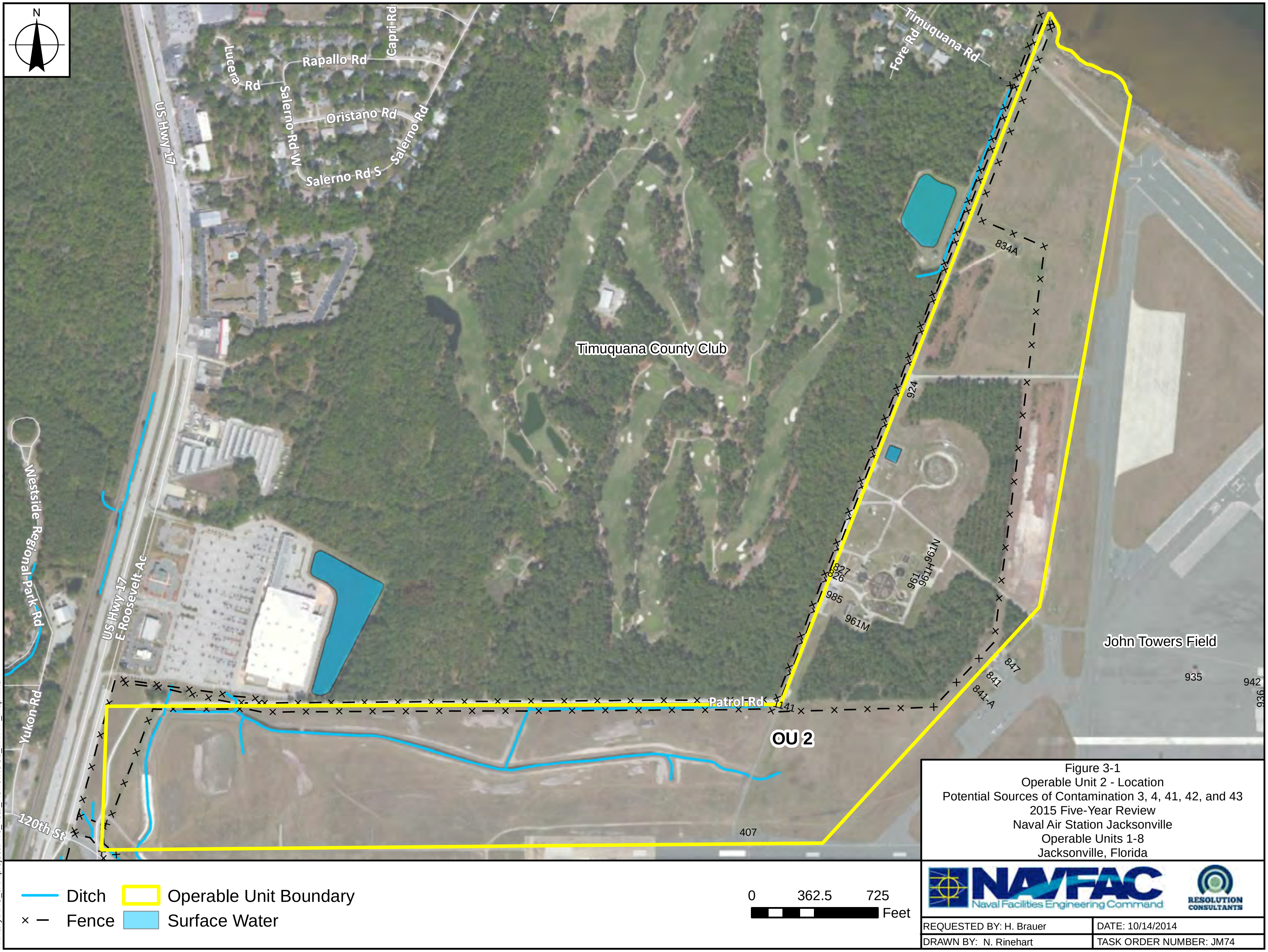

Figure 3-1
Operable Unit 2 - Location
Potential Sources of Contamination 3, 4, 41, 42, and 43
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

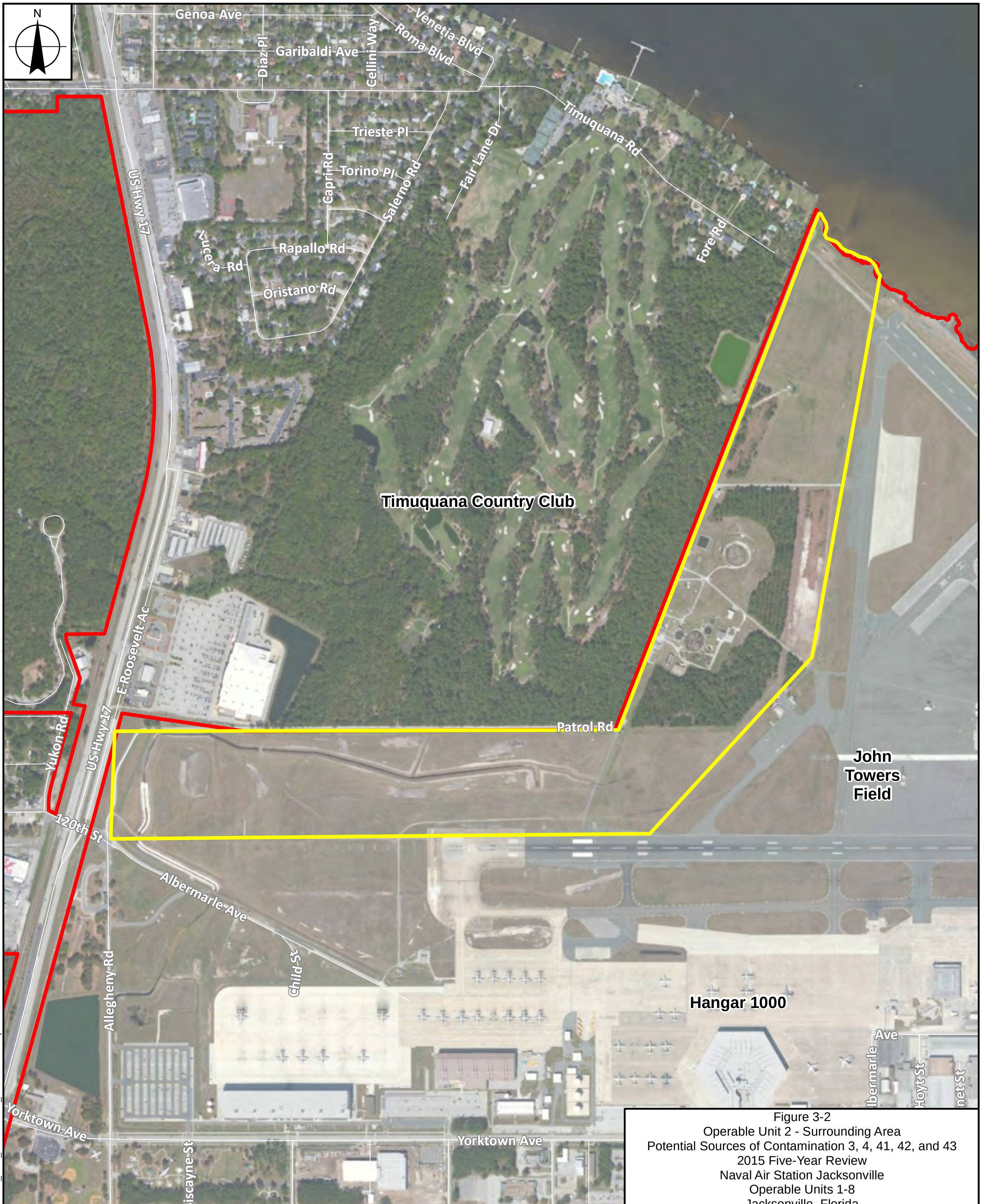

Figure 3-2
Operable Unit 2 - Surrounding Area
Potential Sources of Contamination 3, 4, 41, 42, and 43
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Operable Unit 2 Boundary
NAS Jacksonville Boundary

0 500 1,000 Feet

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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

X:\Navy\NAS_JAX\project\Five_Year_Review\OU2_SiteLocationMap.mxd

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

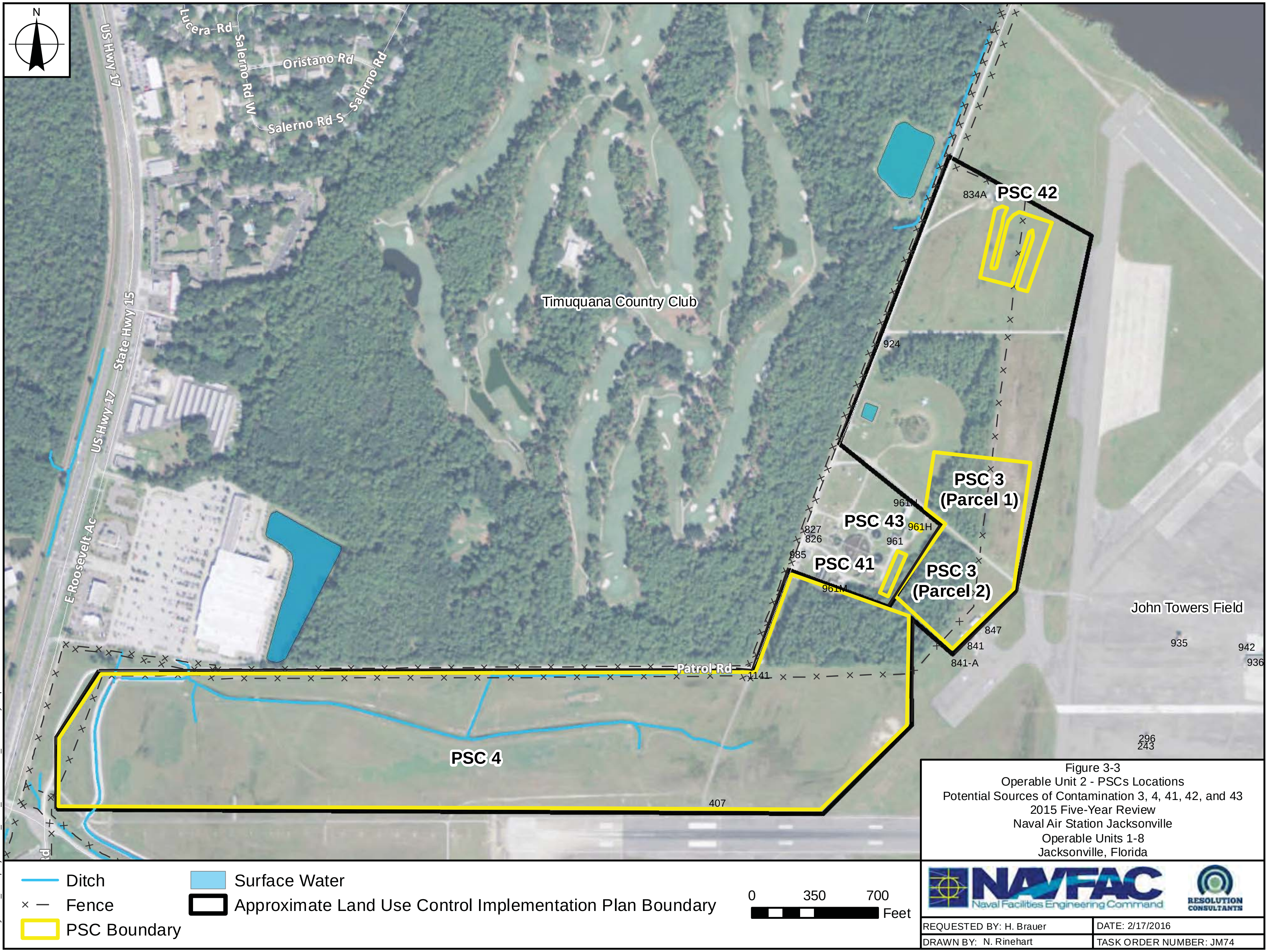

Figure 3-3
Operable Unit 2 - PSCs Locations
Potential Sources of Contamination 3, 4, 41, 42, and 43
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 2/17/2016
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

3.2 Background

3.2.1 Physical Characteristics

The following describe the physical characteristics and location of each OU 2 PSC.

- PSC 3 is comprised of two contiguous parcels (north Parcel 1 and south Parcel 2) divided by an access road, totaling approximately 15 acres east of PSCs 41 and 43, and northeast of PSC 4.

- PSC 4 is approximately 70 acres southwest of the WWTP, bound by Patrol Road to the north and west and Runway 10/28 to the south and east. This southernmost PSC within OU 2 was named because approximately 5 to 6 acres in the north part of the area were planted with pine trees after 1975.

- PSC 41 is an approximately one-third-acre rectangular area west of PSC 3, north of PSC 4, and south of PSC 43.

- PSC 42 is a former approximately 4.5-acre S-shaped Polishing Pond approximately 300 feet east of Patrol Road and 600 feet north of PSC 3; the shape is indistinguishable now because the pond was filled, as discussed in Section 3.2.4.

- PSC 43 is an approximately 1,000-square-foot rectangular area north of PSC 41 and east of PSC 3.

The NAS Jacksonville Master Plan reports that only a narrow portion of the northern part of OU 2 is inside the 100-year floodplain and that none of the OU 2 PSCs is within the 100-year flood level for the station (EDAW 2009). The former PSC 42 pond, slightly mounded as a result of soil remediation, has the highest elevation (10 to 15 feet msl) within OU 2.

Ditches in several areas of OU 2 from which samples were collected were evaluated as soil because they were predominantly grass-lined swales that only contain water during or immediately following rain storms. Only samples collected from a drainage ditch in the open field area of PSC 4, which contained water on a continual basis, were evaluated as sediment.

A drainage divide in the vicinity of the access road that separates PSC 3 into Parcels 1 and 2 runs between former PSC 41 and PSC 43 sludge drying beds. South of the divide, runoff flows south then west into a drainage ditch that parallels the Runway 10/28 for approximately 3,000 feet before it flows offsite. North of the divide, runoff flows toward the St. Johns River via drainage swales on both sides of Patrol Road and in two 36-inch diameter storm water drainage pipes that parallel the taxiway on the east side of OU 2.

3.2.2 Land and Resource Use

OU 2 is in an industrial portion of NAS Jacksonville between the Timuquana Country Club golf course and the John Towers Field runways. Buildings remain within the WWTP but most of OU 2 is grassland with scattered trees and more densely wooded areas. Small low-lying areas, swales, and ditches are the only surface water bodies. At PSC 3, north Parcel 1 is planted with pine trees and south Parcel 2 is an open field.

NFA issued under CERCLA at OU 2 was based on an industrial land use scenario, base-wide access restrictions to prevent consumption of groundwater from the surficial aquifer, and security controls (fencing) to prevent trespassing. Land use at OU 2 remains industrial. Details of LUCs and LUCIP inspections conducted at OU 2 are discussed in Sections 3.3.2 and 3.6.1.

3.2.3 History of Contamination

PSC 3 — Wastewater Treatment Plant Former Sludge Disposal Area

Approximately 20,000 tons of domestic and industrial sludge containing metals and organic compounds were disposed of (dumped in piles or spread on the ground) between 1962 and 1980.

PSC 4 — Pine Tree Planting Area

PSC 4 was used for disposal (dumped in piles or spread on the ground) of paint shavings, sewage sludge, oil, asbestos, and petroleum products from 1968 to 1975; evidence of sludge disposal was not observed throughout most of PSC 4.

PSC 41 — Domestic Waste Sludge Drying Beds

Five unlined DSDBs were constructed in 1970 to dry sludge from the domestic WWTP anaerobic digester. Sludge was dried, removed from the DSDBs, and disposed of at PSC 3, PSC 4, or a landfill. Prior to construction of the PSC 43 ISDBs in 1980, sludge from the industrial wastewater treatment operations (paint-stripping operations with lesser contributions from plating and metal-treating shops) were channeled to the DSDBs. In 1987, the U.S. EPA classified the

DSDBs as surface impoundments used to treat hazardous wastes; store sludge from electroplating operations and wastes from paint stripping/parts cleaning operations; and store sludge from the anaerobic digester of the domestic WWTP.[1]

PSC 42 — Polishing Pond

The effluent Polishing Pond was built in 1970 to provide final clarification for approximately 2.3 million gpd of treated wastewater from both domestic and industrial WWTPs prior to chlorination and discharge to the St. Johns River. In 1983, the U.S. EPA classified the Polishing Pond as a surface impoundment used to treat RCRA-listed hazardous wastes.

PSC 43 — Industrial Waste Sludge Drying Beds

Four ISDBs were constructed in 1980 to dewater industrial wastewater treatment sludge from electroplating and parts cleaning operations. Between 1980 and 1988, when the ISDBs were operating, approximately 8,250 gallons of dried sludge were excavated and disposed of annually from the surface impoundment; approximately 40 cubic yards were disposed of by land spreading at PSCs 3 and 4.

3.2.4 Initial Response

PSC 3

Focused RI investigations identified chromium, lead, and cadmium in surface soil. Lead was detected above guidance cleanup goals in one surface soil sample at south Parcel 2 (where paint chips were observed); other metal concentrations in the sample were also much higher than those detected elsewhere in PSC 3. The area around that sample location was excavated in January 1997 and incorporated into the ongoing IRA at PSC 42.

PSC 4

Samples from the sludge piles contained high metal concentrations, which indicated that the piles contained sludge from the WWTP. In 1998, the piles were removed and the excavated sludge material and soil were incorporated into the ongoing IRA at PSC 42.

PSCs 41, 42, and 43

Under the facility's 1987 HSWA permit, NAS Jacksonville discontinued adding wastes to designated surface impoundments including the Polishing Pond which, in anticipation of the permit, had been

[1] Waste codes F006 and F019 include wastewater treatment sludge from electroplating operations and from the chemical conversion coating of aluminum. Waste codes F001 to F005 are for hazardous waste from nonspecific sources and include spent halogenated and nonhalogenated solvents.

removed from service. Sludge remaining in the DSDBs at the time of closure in 1987 was removed and disposed of offsite. RCRA Corrective Action investigations that began in 1988 identified shallow and deep groundwater contaminated with VOCs, SVOCs, and metals. In 1991, FDEP issued a Closure Permit for PSCs 41, 42, and 43, and the remaining ISDB sludge was removed and taken to an offsite landfill.

The former DSDBs (PSC 41) and ISDBs (PSC 43) were investigated during the Focused RI. High concentrations of metals exceeding industrial or general worker risk-based screening levels were detected in samples of sludge bed filter media and underlying soil. In order to reduce potential risks associated with metals contamination and to comply with RCRA closure requirements, IRAs were performed concurrently at PSCs 41 and 43. During the IRA, approximately 3,000 cubic yards of material were excavated and treated to meet stabilization criteria, then used as backfill during completion of the IRA at PSC 42. Site restoration was completed by hydro-seeding the newly graded area. Because the source area had been removed and treated, RCRA closure reports for PSCs 41 and 43 were completed in 1997.

PSC 42

Post-closure groundwater monitoring conducted through 1991 detected contaminants above background in shallow wells. COCs at PSC 42 were cadmium, chromium, lead, nickel, and silver. Based on the high concentrations of metals in sediment and surface water, an IRA was needed to support RCRA closure. RAOs in the 1995 IROD for PSC 42 were to lower the risk of potential future exposure to humans and the environment by reducing the leachability of contaminated material and close the Polishing Pond in accordance with RCRA requirements. Leachability remedial goals were Toxicity Characteristic Leaching Procedure (TCLP) levels not more than the following: 0.19 milligrams per liter (mg/L) cadmium, 0.86 mg/L chromium, 0.37 mg/L lead, 5 mg/L nickel, and 0.30 mg/L silver.

Implementation of the IROD included in-situ stabilization (de-watering) of approximately 9,500 cubic yards of soil and 12,500 cubic yards of sludge material along the bottom and sides of the pond to meet TCLP treatment criteria. Stabilized soil and filter material from PSCs 41 and 43 and approximately 20 cubic yards of previously dried sludge and soil from surface layers and piles at PSCs 3 and 4 were incorporated into the stabilized Polishing Pond. The area was graded and covered with clean soil and grass.

3.2.5 Basis for Taking Action

A Risk Assessment that included an HHRA and an ERA performed for OU 2 evaluated the contaminants detected in site media during Focused RIs (PSCs 2, 3, 41, 42, and 43) and an RI (PSC 4, OU 2 groundwater, and OU 2 drainage areas). COPCs included:

- PSC 3 — lead and dieldrin in surface soil, lead in subsurface soil
- PSC 4 — metals and TRPH in soil and sludges
- PSC 41 — VOCs and metals in surface soil/filter media and subsurface soil/filter media
- PSC 42 — metals in surface soil
- PSC 43 — VOCs and metals in surface soil/filter media and subsurface soil/filter media
- OU 2 groundwater — VOCs, SVOCs, metals
- OU 2 drainage areas — VOCs, SVOCs, and metals in surface water; SVOCs, metals, and TRPH in sediment; and SVOCs, metals, and TRPH in surface soil

The Risk Assessment evaluated commercial and industrial use scenarios (current use), and a potential residential use scenario. Potential human health risks were addressed during implementation of IRAs at PSCs 2, 41, and 43, with remedial goals developed based on the industrial-use scenario. NFA was recommended at PSC 4 and OU 2 drainage areas based on current (industrial use) within the drainage areas. Groundwater exceeded both FDEP and U.S. EPA acceptable risk/hazard thresholds, however the ROD noted that under the current (industrial) land use scenario, groundwater is not used and that LUCs could be used to prevent future groundwater use and trespassing.

3.3 Remedial Actions

The ROD, signed 20 October 1998, was the final action under CERCLA for OU 2. Other than post-closure groundwater monitoring required under the NAS Jacksonville RCRA Permit, no additional remedial action was necessary for OU 2 (HLA 1998).

3.3.1 Remedy Selection

The preferred remedial action at OU 2 was NFA with LUCs because of the following.

- IRAs were conducted at PSCs 2, 41, 42, and 43.
- PSC 2 was transferred to Florida's Petroleum Restoration Program due to the presence of LNAPL and petroleum-related contaminants and the CERCLA petroleum exclusion.
- A Focused Risk Evaluation supported NFA after a localized area of surface soil with lead concentrations above industrial land use scenario was excavated from PSC 3.
- Sludge piles with elevated levels of metals at PSC 4 were excavated to concentrations within the U.S. EPA acceptable carcinogenic risk range.

The ROD based the permanence of the selected NFA remedy on continued compliance with LUCs.

3.3.2 Remedy Implementation

Land Use Controls

Separate LUCIPs (Appendix F) were prepared in October 1998 for OU 2 (PSCs 2, 3, and 4), PSC 41, PSC 42, and PSC 43. The objective of each LUCIP was to prevent residential use. The 2014 RCRA Permit indicates LUCs were a component of the basis for NFA (Site Rehabilitation Completion Determination with Controls) at PSCs 3, 4, 41, and 43. Table 3-2 lists general OU 2 and PSC-specific LUCs implemented under the LUCIPs; LUC inspections at PSCs 41 and 43 have been terminated based on FDEP approval to end post-closure care in 2007.

Table 3-2
Land Use Control Implementation Plan Requirements at Operable Unit 2
Potential Sources of Contamination (PSCs) 3, 4, 41, 42, and 43

Land Use Control Implemented	PSC 3	PSC 4	PSC 41	PSC 42	PSC 43
Maintain existing fence which restricts airfield trespassing	√	√	√	√	√
Maintain industrial use — no residential usage allowed	√	√	√	√	√
Restrict construction which may impact groundwater	√	√	√	√	√
Obtain U.S. EPA and FDEP concurrence prior to construction design	√	√	√	√	√
Provide worker notification of potential hazard in soil (under cover), sediment, or groundwater as applicable	√	√	√	√	√
Prevent direct contact with groundwater				√	
Maintain soil cover over solidified material				√	
No water supply wells allowed within the restricted area			√		√

RCRA Post-Closure Groundwater Monitoring

Because the sources had been removed, contamination in groundwater was expected to naturally attenuate. RCRA post-closure groundwater monitoring data would be used to identify any significant changes in COC levels that could potentially impact human health and the environment. The RCRA post-closure monitoring program for OU 2 included semi-annual sampling of eight wells associated with PSCs 41 and 43 and annual sampling events of five wells associated with PSC 42. Monitoring wells were sampled for VOCs, SVOCs, metals, gross beta, gross alpha, radium-226, radium-228, cyanide, phenols, arsenic, mercury, lead, and selenium.

During the first years of post-closure monitoring (1997 to 2004), various COCs were detected intermittently above MCLs. Between 2004 and 2007, groundwater concentrations remained below FDEP GCTLs and the Navy submitted a request to end post-closure care monitoring for PSCs 41 and 43 on 9 January 2007. FDEP approved the request on 5 February 2007. The Navy has terminated all post-closure monitoring and LUC inspections for PSCs 41 and 43 based on the 2007 FDEP approval.

The current RCRA Permit 0072437-HO-011, issued 22 July 2014, covers all regulated hazardous waste activities at NAS Jacksonville including post-closure groundwater monitoring at PSC 42. Figure 3-4 shows the location of PSC 42 monitoring wells included in the current monitoring program. Table 3-3 lists the groundwater cleanup target levels for PSC 42 in the RCRA Permit, which are FDEP GCTLs.

Table 3-3
Resource Conservation and Recovery Act Post-Closure Permit Groundwater Cleanup Target Levels
Potential Source of Contamination 42

Contaminant of Concern	Cleanup Target Level (micrograms per liter)
Arsenic	10
Barium	2,000
Cadmium	5
Chromium	100
Lead	15
Mercury	2
Selenium	50
Silver	100

Figure 3-4
Operable Unit 2 - PSC 42 Monitoring Well Locations
Potential Sources of Contamination 3, 4, 41, 42, and 43
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Shallow Monitoring Well
Ditch
Fence
PSC 42
Surface Water

Note:
Wells NAS42-9R and
WELL-Z are approximate.

0 130 260 Feet

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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

3.4 Progress Since the Last Five-Year Review

3.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review provided the following protectiveness statement.

> *The remedy at OU 2 is protective of human health and the environment. The institutional controls and RCRA groundwater monitoring at OU 2 provides an acceptable degree of protection of human health and the environment as long as they are conducted as required. The institutional controls help protect against exposure to groundwater and the stabilized soil and sediment.*

3.4.2 Status of Recommendations/Follow-Up Actions from the 2011 Five-Year Review

The 2011 Five-Year Review consisted of a review of 2005 to 2010 annual RCRA post-closure groundwater monitoring reports for PSC 42 and LUCIP Inspection Checklists. No issues or recommendations for follow-up actions were identified.

3.5 2015 Five-Year Review Process

3.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the review period end date for the 2011 Five-Year Review, and applicable information from previous documents including the RI, ROD, LUCIPs, and prior five-year review reports. This five-year review also included review of the current RCRA Permit, NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Checklists for 2010 through 2014.

3.5.2 Data Review

RCRA post-closure groundwater monitoring at PSC 42 uses five wells to provide groundwater flow direction and four wells to monitor concentrations of RCRA metals. The RCRA Permit designates NAS-4-9 (near WWTP structures) as the background well, and NAS-42-5R (southeast corner of the former pond) and NAS-42-8-2R (northeast corner of the former pond) as point of compliance (POC) wells. Monitoring well NAS-42-9R was installed in 2011 to provide an additional downgradient monitoring point as required by an FDEP in August 2010. Well Z is not sampled for metals analysis but is used to provide groundwater elevation and flow direction data.

Annual sampling data are used to monitor groundwater constituent trends for comparison to FDEP GCTLs. Table 3-4 lists analytical results for PSC 42 wells NAS 4-9, NAS 42-5R, and NAS 42-8-2R since 2010, and NAS-42-8-2R since 2011. Groundwater samples have been analyzed for RCRA metals in addition to groundwater quality parameters (pH, specific conductance, and turbidity). The most recent sampling event was 14 January 2014.

Table 3-4
Groundwater Analytical Results Summary at Operable Unit 2 — Potential Source of Contamination 42
(Results are presented in micrograms per liter)

Contaminant	Well ID	GCTL	2010	2011	2012	2013	2014
Arsenic	NAS 4-9	10	<5.8	<6.7	<4.2	<2.5	<2.4
	NAS 42-5R		**18.7**	**16.8**	**19.9**	**13.2**	**57.5**
	NAS 42-8-2R		<5.8	7.85 I	<4.2	<2.5	<2.4
	NAS-42-9R		NI	<6.7	<4.2	<2.5	<2.4
Barium	NAS 4-9	2,000	30	33.8	18.1	41.1 I	25.9 I
	NAS 42-5R		65	108	79.6	109 I	60.3 I
	NAS 42-8-2R		15.5	30.5	21.8	29.4 I	32.6 I
	NAS-42-9R		Not Installed	14.9	11.5	10.6 I	13.2 I
Cadmium	NAS 4-9	5	<0.42	<0.37	<0.32	<0.50	<0.50
	NAS 42-5R		<0.42	<0.37	<0.32	<0.50	<0.50
	NAS 42-8-2R		<0.42	<0.37	<0.32	<0.50	<0.50
	NAS-42-9R		Not Installed	<0.37	<0.32	<0.50	<0.50
Chromium (total)	NAS 4-9	100	<0.8	<1.3	1.12	<2.0	<2.0
	NAS 42-5R		5.57 I	3.58 I	4.65 I	4.3 I	12.7
	NAS 42-8-2R		5.86 I	4.99 I	5.53 I	5.6 I	7.3 I
	NAS-42-9R		Not Installed	2.86 I	5.99 I	<2.0	2.4 I
Lead	NAS 4-9	15	<2.4	<2.9	<1.2	11.8	<1.1
	NAS 42-5R		<2.4	<2.9	<1.2	8.3	<1.1
	NAS 42-8-2R		<2.4	<2.9	<1.2	7.6	3.4 I
	NAS-42-9R		Not Installed	<2.9	<1.2	8.2	<1.1
Mercury	NAS 4-9	2	<0.046	<0.072	<0.17	<0.030	<0.030
	NAS 42-5R		<0.046	<0.072	<0.17	<0.030	<0.030
	NAS 42-8-2R		<0.046	<0.072	<0.17	<0.030	<0.030
	NAS-42-9R		Not Installed	<0.072	<0.17	<0.030	<0.030
Selenium	NAS 4-9	50	<8	<8.9	<4.6	<2.0	<2.3
	NAS 42-5R		<8	<8.9	<4.6	<2.0	2.4 I
	NAS 42-8-2R		<8	<8.9	<4.6	<2.0	<2.3
	NAS-42-9R		Not Installed	8.97 I	<4.6	<2.0	<2.3
Silver	NAS 4-9	100	<1.8	<1.5	<0.95	<0.50	<0.77
	NAS 42-5R		<1.8	<1.5	<0.95	<0.50	<0.77
	NAS 42-8-2R		<1.8	<1.5	<0.95	<0.50	<0.77
	NAS-42-9R		Not Installed	<1.5	<0.95	<0.50	<0.77

Notes:
GCTL = Groundwater Cleanup Target Level (2005), Chapter 62-777, FAC
I = Result is greater than or equal to the Method Detection Limit but less than the PQL

Arsenic remains the only COC detected above its GCTL since 2011. Arsenic concentrations have ranged between 13.2 µg/L (2013) and 57.5 µg/L (2014) in POC well NAS-42-5R. Although a limited number of data points are available for review, concentrations appear to have remained stable, fluctuating within a narrow range (between 10.8 and 57.5 µg/L) since 2006. Arsenic in other wells and other RCRA metals detected have not exceeded their respective GCTLs.

3.5.3 Site Inspection and Interviews

Resolution Consultants drove throughout OU 2, accompanied by Mr. Curtin and Ms. Wilson, on 1 October 2014. Grassy areas were mowed. Warning signs were observed at PSC 42 and on OU 2 fencing that restricts unauthorized access and airfield encroachment/trespassing. During the site visit, Mr. Curtin indicated that additional monitoring wells associated with Former PSC 2/PCA 15 were planned for installation within PSC 3 north Parcel 1, which is planted with pine trees.

3.6 Technical Assessment

3.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

NFA was the selected remedy under CERCLA for OU 2. As noted above, OU 2 includes PSC 42, which remains under RCRA post-closure groundwater monitoring. Permit monitoring requirements, the ROD, and LUCIPs provide the controls to maintain protectiveness of OU 2. Those controls include periodic site inspections, condition certification, and agency notification procedures designed to ensure the maintenance of site-specific LUCs deemed necessary for future protection of human health and the environment. This five-year review has determined that the remedy is functioning as intended by the ROD. The following conclusions support the determination that the remedy at OU 2 is protective of human health and the environment.

Remedial Action Performance

LUCs limit human exposure by restricting access and land and groundwater use. Based on the ROD, the NFA remedy requirements are satisfied while LUCs are being implemented in accordance with the LUCIPs.

Systems Operation/Operations & Maintenance

The only systems operation and O&M are well maintenance and annual sampling in accordance with the NAS Jacksonville RCRA Permit, and activities associated with LUCIP inspections. Well maintenance activities are performed in conjunction with RCRA post-closure care activities.

Opportunities for Optimization

Opportunities for optimization are considered annually. Recent changes discussed or implemented included surveying and well abandonment activities, which were integrated into RCRA Permit monitoring and NAS Jacksonville-wide abandonment programs.

Implementation of Land Use Controls and Institutional/Engineering Controls

Navy IRP personnel conduct quarterly visual inspections to verify LUCs that have been implemented are being properly maintained. Information obtained during the Five-Year Review indicates the north Parcel 1 of PSC 3 is the proposed location for monitoring wells to investigate PCA 15 (former PSC 2). Based on review of LUCIPs, controls in place at PSC 3 (1) restrict construction that may impact groundwater, (2) require concurrence from U.S. EPA and FDEP prior to design, and (3) require worker notification of potential hazards in groundwater. Because investigation activities are being implemented at the direction of the NAS Jacksonville Partnering Team, these elements will be completed through approvals of work plans and site-specific health and safety plans.

Early Indicators of Potential Remedy Problems

This five-year review identified no early indicators of potential remedy problems.

3.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

Location- and action-specific ARARs are discussed in Section 1.7. Chemical-specific ARARs and TBC criteria considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. Soil remedies were implemented using FDEP SCTLs and site-specific risk-based criteria. The 2014 RCRA Permit ARAR-based Groundwater Protection Standards (GWPS) are current GCTLs (FDEP 2005).

Exposure Assumptions

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

Expected Progress towards Meeting RAOs

Post-closure groundwater monitoring will be required until 2027 (30 years from the approved 1997 closure date) unless a shorter term has been approved by FDEP. The only COC remaining above its GCTL is arsenic, the concentration of which has fluctuated in POC well NAS-42-5R, with an increase from 13.2 µg/L to 57.5 µg/L between 2013 and 2014.

Changes in Exposure Pathways

There have been no changes in site conditions or land use that affect exposure pathways for the primary COC arsenic and other RCRA metals at OU 2. Exposure to site groundwater remains restricted by institutional controls.

Changes in Land Use

There have been no land use changes at OU 2.

New/Emerging Contaminants and Contaminant Sources

The emerging contaminant 1,4-dioxane is associated with the use or presence of 1,1,1-TCA but was not a routinely monitored parameter during the 1990s and early 2000s. Although 1,4-dioxane was detected above its FDEP GCTL at PSCs 41 and 42 during early investigations, it was not an analytical parameter included in the RI/FS or subsequent sampling events. The NAS Jacksonville Partnering Team should determine the necessity for evaluating this emerging contaminant at OU 2.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The BRA and other risk assessment documents in the RI/FS were developed using RAGS, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992). The basis for remedial action is summarized in Section 3.2.5. An HHRA and ERA determined no unacceptable human health or ecological risks remained at OU 2 after the IRAs given the industrial land use scenario, and no other remedial alternatives were considered. PSCs 41, 42, and 43 were classified as RCRA units that required post-closure groundwater monitoring until groundwater standards are achieved in compliance with the NAS Jacksonville RCRA Permit.

The risk assessment changes discussed in Section 1.8 are applicable because RAD wastes were left in place at OU 2 and COCs originally included radium-226, radium-228, gross alpha, and gross beta. In September 2014, U.S. EPA changed its approach for evaluating risk at sites with RAD waste. The new guidance states that exposure rates above 12 millirems per year are presumptively not protective, which is more conservative than prior guidance. The change in U.S. EPA-recommended criteria for RAD waste is not expected to affect protectiveness while LUCs restricting trespassing and residential use, and prohibit groundwater use remain in place.

Vapor Intrusion

Metals are the only remaining COCs in groundwater at OU 2; therefore, VI is not an issue.

Summary

In summary, risk assessment findings at NAS Jacksonville were based on current and proposed future use assuming industrial land use or trespassing could occur. LUCs have been implemented to prevent future residential land use, and ARARs were used to design the groundwater remedy. This five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the ARAR-based remedy while LUCs are in place to prevent exposure.

The only findings from this risk review that may affect long-term site management or protectiveness is the potential presence of the emerging contaminant 1,4-dioxane. It may be appropriate for the NAS Jacksonville Partnering Team to review the need for additional sampling for this parameter; however, given current LUCs prohibiting groundwater use, there is no effect on remedy protectiveness associated with emerging contaminants.

3.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

3.7 Issues and Recommendations/Follow-up Actions

Issues and recommendations for follow-up actions are listed in Table 3-5.

3.8 Protectiveness Statement

The remedy at OU 2 is protective of human health and the environment because soil removal, RCRA closure, and LUCs have eliminated risk from direct exposure to soil and groundwater in excess of industrial criteria. LUCs continue to protect human health and environment by prohibiting residential land use and groundwater uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. The emerging contaminant 1,4-dioxane has been identified at the site, but protectiveness of the remedy is not affected while LUCs prevent groundwater use.

Table 3-5
Issues and Recommendations/Follow-Up Actions — Operable Unit 2

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	The emerging contaminant 1,4-dioxane was an early contaminant detected at Potential Sources of Contamination 41 and 42. However, 1,4-dioxane was not an analytical parameter included in the Remedial Investigation/Feasibility Study or subsequent sampling events. Protectiveness is not affected while Land Use Controls prevent groundwater use.	Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions as appropriate.	Navy	U.S. EPA, FDEP	31 March 2018	N	N

4.0 OPERABLE UNIT 3

OU 3 encompasses much of the FRCSE, which is a major industrial complex with a primary mission to perform in-depth repair and modification of aircraft, engines, and aeronautical components. OU 3 is 134 acres located on the east edge of NAS Jacksonville, south of a major east/west runway within the John Towers Field flight line (Figure 4-1). Given the ongoing investigations to consolidate remedial actions at OU 3, this section briefly summarizes the history and existing remedies at OU 3 in the context of the five-year review process, and integrates (where appropriate) RI Addendum findings (Tetra Tech 2014).[1] The forthcoming FS Addendum and planned remedy modification documents (ROD amendment, LUC RD, etc.) will be used to evaluate long-term protectiveness at OU 3 during the next five-year review. Table 4-1 summarizes the physical characteristics and relative location of each PSC, area of contamination, and isolated groundwater contaminated areas, as shown on Figures 4-2 and 4-3.

4.1 Site Chronology

Major historical events and relevant dates in the OU 3 chronology are listed in Table 4-2. The information in Table 4-2 is not a comprehensive list of every environmental investigation or remedial action for each PSC, building, or groundwater plume, but provides a broad overview of significant events at OU 3.

4.2 Background

4.2.1 Physical Characteristics

The FRCSE, formerly the Naval Air Rework Facility and Naval Aviation Depot, maintains and upgrades aircraft and ground support equipment. In addition to the FRCSE, OU 3 includes the helicopter squadron hangars and flight line, the fire station, former drycleaner (Building 106), some NAVFAC facilities, and the Hazardous Materials Minimization Center. Building 101, the largest in the FRCSE, houses diverse operations and has several outbuildings, contiguous buildings, and subdivided portions (named 101S, 101X, 101D, etc.). The FRCSE also includes separate hangars and buildings housing paint booths, engine test cells, maintenance/machine shops, and offices. FRCSE structures that have been removed or replaced since 2006 are shown on Figure 4-4.

Over 90 percent of OU 3 is developed with buildings or is paved (some of it greater than 1 foot thick). Generally, the only unpaved areas are exposed soil at the south end of the OU 3 or small landscaped areas bordering buildings. The St. Johns River shoreline is mostly paved, except on the rocky south shore; pavement ends at the seawall. There are no wetlands; the east and south sides border the St. Johns River, which is the only surface water body associated with OU 3.

[1] The June 2014 Draft RI Addendum was submitted to U.S. EPA and FDEP and is undergoing revision based on regulatory review.

Figure 4-1
Operable Unit 3 - Location
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

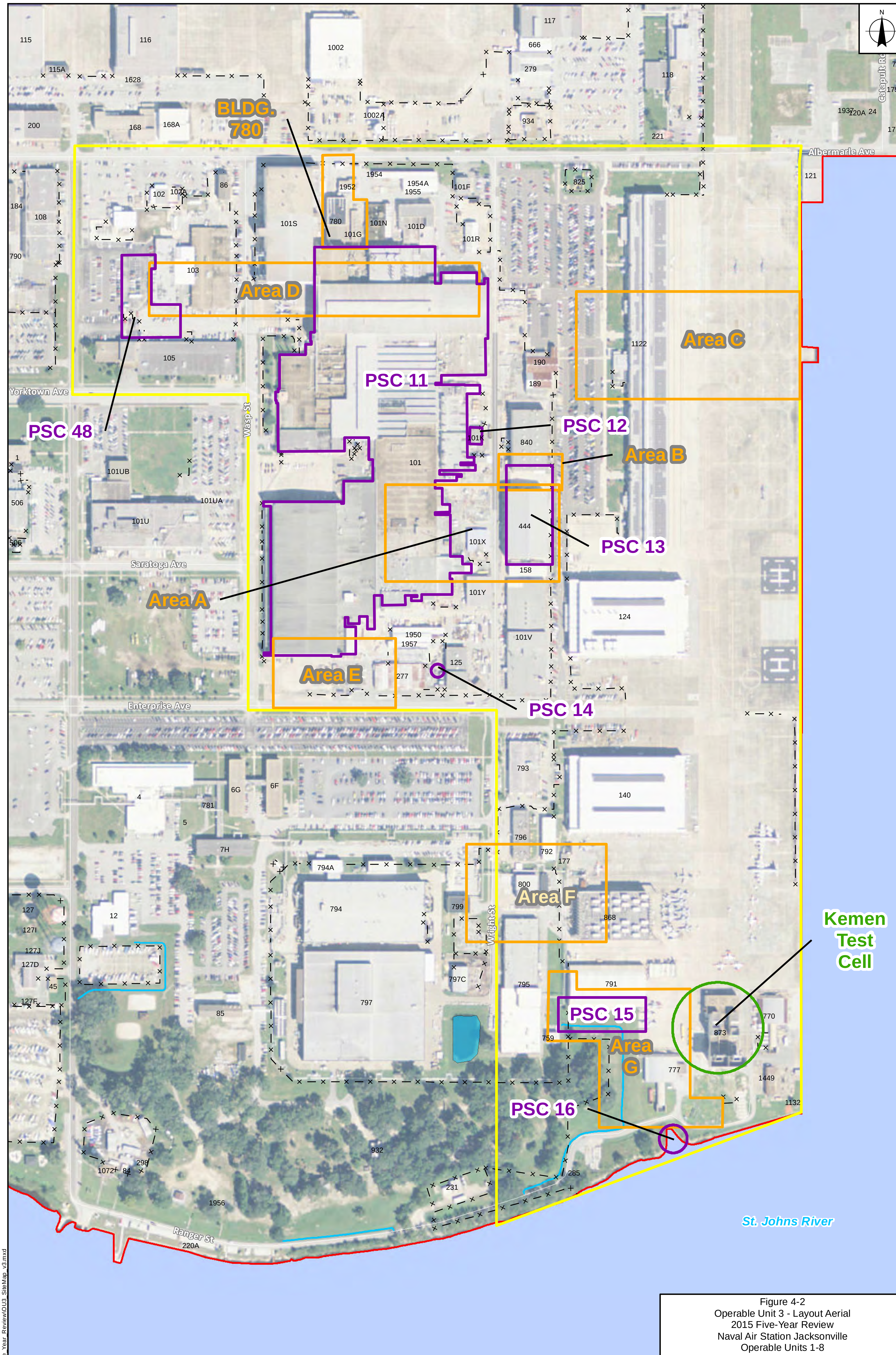

Figure 4-2
Operable Unit 3 - Layout Aerial
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Ditch
Fence
Operable Unit 3 Boundary
Operable Unit 3 Area Boundary
PCA Boundary
PSC Boundary
NAS Jacksonville Boundary
Surface Water

Some boundaries are approximate.

0 150 300 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer | DATE: 2/1/2016
DRAWN BY: B. Lipscomb | TASK ORDER NUMBER: JM74

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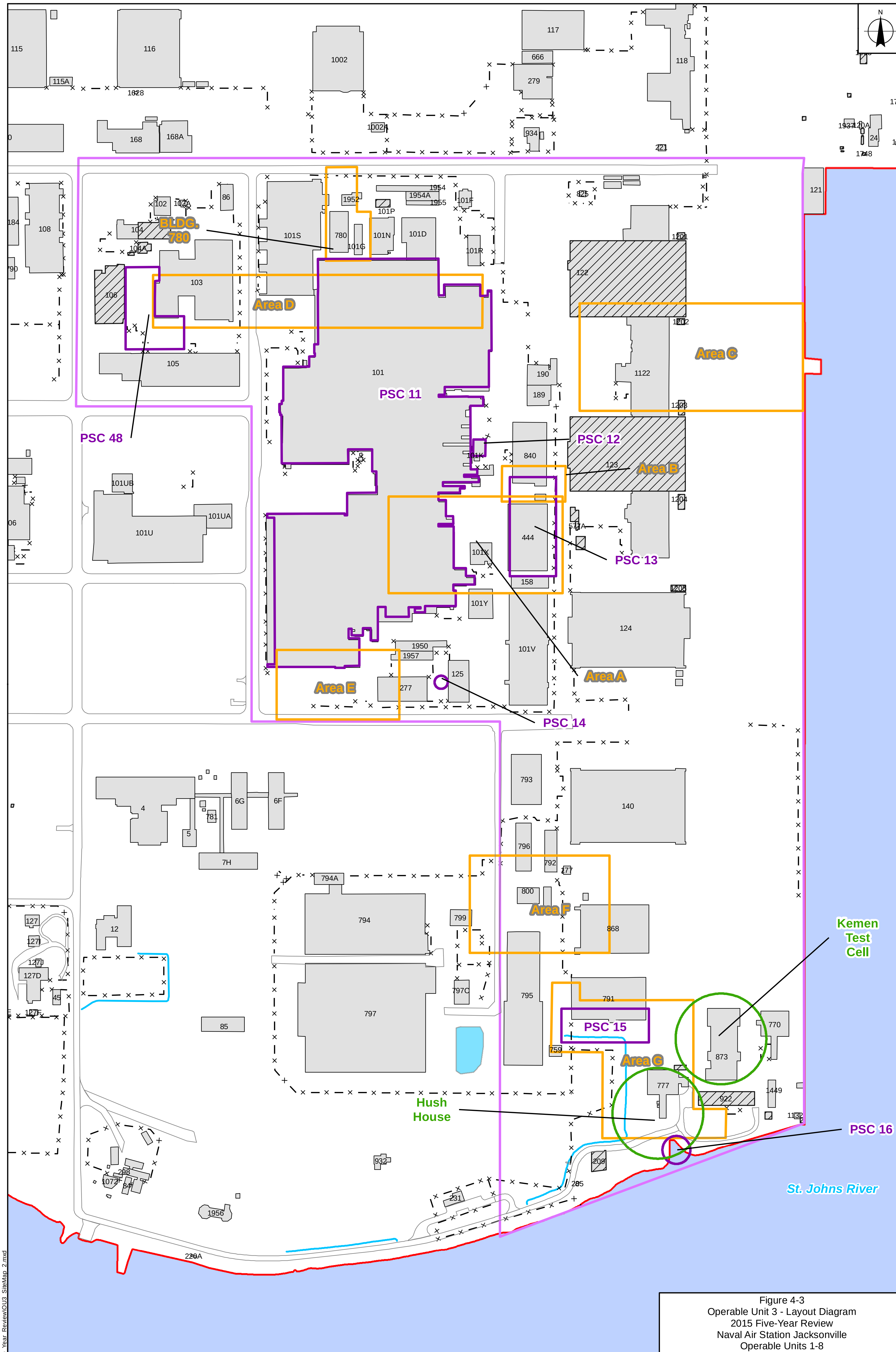
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.



Ditch
Fence
Road
Existing Building
Demolished Building
NAS Jacksonville Boundary
Operable Unit 3 Boundary
Operable Unit 3 Area Boundary
PCA Boundary
PSC Boundary
Surface Water

Building 101P, 922, and some boundaries are approximate.

0 150 300 Feet

Figure 4-3
Operable Unit 3 - Layout Diagram
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer | DATE: 2/12/2016
DRAWN BY: B. Lipscomb | TASK ORDER NUMBER: JM74

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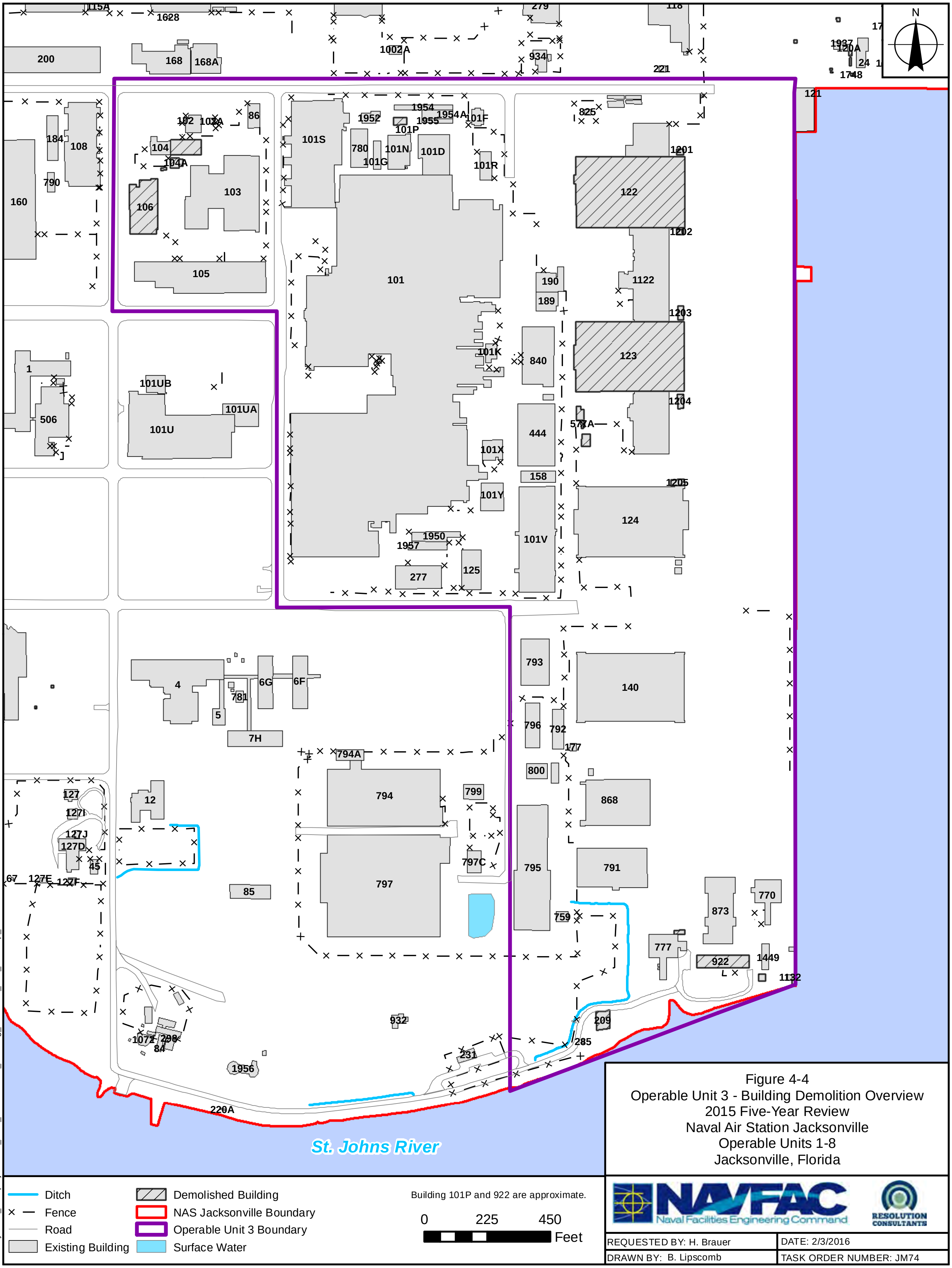

Figure 4-4
Operable Unit 3 - Building Demolition Overview
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

REQUESTED BY: H. Brauer | DATE: 2/3/2016
DRAWN BY: B. Lipscomb | TASK ORDER NUMBER: JM74

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Table 4-1
Location and Physical Characteristics of Operable Unit 3 — Potential Sources of Contamination 11-16 and 48, Building 780, Multiple Storm Sewers, Hangar 101S, and Isolated Groundwater Contamination Areas A-G

Site		Location and Physical Characteristics
Potential Source of Contamination (PSC) 11 — Building 101 (aka Building 101S/Hangar 101S)		Building 101 is in the north-central portion of Operable Unit (OU) 3, overlaps Groundwater Contamination Areas A, D, and E, and abuts Building 780 plume and PSC 12.
PSC 12 — Old Test Cell Building		Building 101K is outside the Building 101 east exterior wall in the north-central portion of OU 3.
PSC 13 — Radium Paint Disposal Pit		Encompasses Building 444 and the south end of Building 840 in central OU 3, abuts Buildings 158 and 158A, and overlaps Groundwater Contamination Areas A and B.
PSC 14 — Battery Shop		Small area outside, near the west exterior wall of Building 125 in the south-central portion of OU 3. Does not overlap Groundwater Contamination Areas.
PSC 15 — Solvent and Paint Sludge Disposal Area		Encompasses south end of Building 791 in the south end of OU 3, abuts Building 759 and east-adjoins Building 795, west of the Kemen Test Cell Petroleum Contaminated Areas (PCAs), and overlaps Groundwater Contamination Area G.
PSC 16 — Black Point Storm Sewer Discharge		At the south edge of OU 3, south of Building 777, within the Hush House PCA. Abuts Groundwater Contamination Area G to the north and St. Johns River to the south.
PSC 48 — Station's Drycleaners (Building 106)		In the northwest portion of OU 3, east of former Building 106, west of Building 103, and north of Building 105. Overlaps Groundwater Contamination Area D.
Building 780		In the north-central portion of OU 3, along the south side of Albermarle Avenue. Encompasses Buildings 101G, 780, and 1952. Abuts west wall of Building 101N and north wall of Building 101.
Multiple Storm Sewers		Throughout OU 3; see Figures 2-2 through 2-4 excerpted from the 2014 Draft Remedial Investigation (RI) Addendum Report, and located in Appendix E of this five-year review report
Isolated Groundwater Contamination Areas (covers approximately 11 of 134 total acres of OU 3)		
	Area A	In the central portion of OU 3, underlies Buildings 444, 101X, 158, 158A, 101Y, 101, and 101C, and overlaps Area B and PSC 13
	Area B (aka Site 11)	In the central portion of OU 3, underlies Building 840, and overlaps Groundwater Contamination Area A and PSC 13
	Area C	In northeast portion of OU 3, east of south of MILCON P-159 PCAs. Underlies Buildings 1122, 1202, and Former Building 1203.
	Area D	In the northwest portion of OU 3, underlies Buildings 103, 101S, and the north end of 101. Overlaps portions of PSC 48, Building 780, and PSC 11.
	Area E	In the west-central portion of OU 3, west of PSC 14. Underlies the south end of Building 101W and west ends of Buildings 277, 1957, and 1950A, and overlaps PSC 11.
	Area F	In the south end of OU 3, underlies Buildings 796, 792, 800, 177, 868, and 795. Partially extends west of OU 3 beneath Building 799. North of Groundwater Contamination Area G and PSC 15.
	Area G (aka Site 15)	At the south end of OU 3, underlies Buildings 791, 759, and 777, and overlaps PSCs 15 and 16, and Kemen Test Cell and Hush House PCA plumes.

Table 4-2
Chronology of Site Events at Operable Unit 3

Event	Date
Hazardous Waste Management Inventory of generation, storage, and disposal of hazardous waste at Naval Air Station (NAS) Jacksonville identified three Potential Sources of Contamination (PSCs) at Operable Unit (OU) 3	1982
Initial Assessment Study recommended PSCs 11, 12, 14, and 15 for additional study	1983
Utility technical study and evaluation of storm water drainage system cross connections in OU 3 where leaks were identified in sewer and industrial lines	1988
Site placed on the National Priorities List	November 1989
Certification and Closure Report documented an emergency response removal action to demolish a Resource Conservation and Recovery Act (RCRA) unit within Building 101 and excavate 1,600 cubic yards of soil contaminated with metals from electroplating processes	1992
Scoping Study Field Program in preparation for developing the Remedial Investigation (RI)	1993
Engineering Evaluation/Cost Analysis for Buildings 106 and 780 recommended Interim Remedial Actions	1995
Engineering Evaluation of areas with elevated groundwater contamination at OU 3	1996 to 1997
RI/Feasibility Study (FS) for OU 3	1998 to 2000
OU 3 PSCs 11, 12, 13, 14, 15, 16, and 48, Building 780, and Groundwater Contamination Areas B, C, D, F, and G Record of Decision signed	25 September 2000
RI/FS Report for OU 3 Groundwater Contamination Areas A and E	August 2004
Area A Record of Decision signed	22 September 2006
Long-term groundwater and natural attenuation monitoring at PSC 48/Building 106, Building 780, and Areas A, B, C, D, and G	2002 to 2014
Five-Year Reviews	2005 and 2011
Supplemental soil, groundwater, sediment, surface water, and vapor intrusion/indoor air sampling in response to 2005 and 2011 Five-Year Reviews and for an RI Addendum	2006 to 2014
Building 780 groundwater extraction and treatment/soil-vapor extraction system decommissioned	2013
Draft Comprehensive RI Addendum for OU 3	June 2014

4.2.2 Land and Resource Use

Land Use

Land use at OU 3 is heavily industrial, related to maintaining, repairing, and operating aircraft engines, bodies, components, and accessories. Administrative functions include engineering services, hardware design, and technical services related to design and logistics issues. Access to OU 3 is limited to FRCSE and helicopter squadron personnel and authorized visitors, and is restricted by fences, manned and automatic gates, and security guards. Water access from the adjoining St. Johns River is limited by security patrols. There are no plans to discontinue industrial military operations involving aircraft at this location. Under a reasonable future land use, the area is expected to remain industrial with future receptors strictly limited to personnel assigned to activities within the FRCSE. LUCs that restrict land and groundwater use at OU 3 are discussed in Section 4.4.3.

Groundwater Use

The surficial aquifer at OU 3 is not used for domestic, industrial, or potable purposes, and is not planned for future use. A low aquifer yield, insufficient to provide an adequate supply for FRCSE activities, makes future use unlikely and not feasible. NAS Jacksonville obtains its drinking water from on-base wells and a public water source with wells screened in the Floridan aquifer.

Surface Water

Storm water runoff discharges to drains or catch basins and is directed to the storm sewer system, which discharges to the St. Johns River. The St. Johns River is used for commercial and recreational purposes by adults and adolescents, with similar future land uses anticipated. FDEP has classified the St. Johns River and its tributaries as Class III waters.[2]

4.2.3 History of Contamination

Contamination histories for each OU 3 area of contamination were derived from numerous investigations summarized in and conducted as part of the 2000 RI/FS and subsequent investigations conducted to implement IRAs, further delineate contamination, and monitor changing conditions. Implementation of post-ROD actions in the early to mid-2000s led to subsequent optimization of environmental response actions at OU 3, including the Navy's decision to collect additional data to better understand the CSM. The additional data filled data gaps, replaced outdated elements of the previous investigation and decision documents, incorporated newly developing risk-based approaches to environmental cleanups, and combined all contaminated media within OU 3. The additional data collected has been documented in the RI Addendum.
Table 4-3 summarizes contamination histories including past operations and sources of releases at each PSC, building, media, and groundwater contamination area identified to date at OU 3.[3]

4.2.4 Initial Response

Multiple IRAs were completed at OU 3 (HLA 2000); they are summarized in Table 4-3.

4.2.5 Basis for Taking Action

Contamination that posed a risk to human health or the environment at OU 3 consisted of a small area of sediment contamination at one storm water outfall (PSC 16), a small section of the storm sewer, and nine groundwater plumes. Although low levels (less than 100 µg/L) of VOCs were ubiquitous in

[2] Florida defines Class III Waters as used for recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife, commonly referred to as fishable/swimmable.
[3] Information provided in this five-year review is a summary and details of any individual PSC, specific area, contaminated media, or basis for decisions should be obtained from the repository of referenced publicly available documents in the Administrative Record.

groundwater throughout OU 3, remedial action was necessary for plumes with concentrations exceeding 1,000 µg/L identified at Areas A through G, PSC 48, and Building 780.[4] Dense non-aqueous phase liquids (DNAPLs) were identified at two of the groundwater plume areas: PSC 48 and Building 780.

Supplemental (post-ROD) investigations at OU 3 have been ongoing as part of optimizing environmental response actions, the results of which will be used to prepare a revised FS and remedy documents; those efforts are listed in Table 4-3 and discussed in subsequent sections as appropriate.

4.2.5.1 Human Health Risk Assessment

Operable Unit 3

The 2000 RI HHRA for OU 3 indicated that overall human health risks from OU 3 were negligible for soil, surface water, and storm sewer water. Evaluation of findings from each stage of the RI indicated no evidence to suggest that ongoing point sources of contamination were present within the vadose zone.

The 2000 HHRA indicated elevated risks from VOCs in groundwater. The risk and hazard associated with use of groundwater as drinking water by future occupational workers was assessed. The HHRA indicated risk and hazard exceeded U.S. EPA's acceptable risk range, FDEP's Target Cancer Risk, and Target HI of 1.0 because of the groundwater contamination at Areas B, C, D, F, and G. Groundwater COCs differ among the various areas. Only Area D has a COC (arsenic) that is not a VOC.

A formal risk analysis was not conducted for Building 780 because the concentrations of chlorinated VOCs detected — 260 µg/L 1,1,1-TCA; 8,900 µg/L methylene chloride; 6,900 µg/L chloroethane; 870 µg/L TCE; 8,800 µg/L DCE; and 6,400 µg/L vinyl chloride — exceeded state and federal action levels.

Area A

The HHRA for Area A considered exposure to future occupational workers because land use is industrial in nature for the foreseeable future and no drinking water wells are present. Exposure of occupational workers to Area A groundwater would result in an Incremental Lifetime Cancer Risk (ILCR) of 4.0E-03 and an HI of 24, both exceeding U.S. EPA and FDEP criteria. The cause for unacceptable cancer risks to future occupational workers (via ingestion) was due to elevated concentrations of 1,1-DCE, 1,2-DCE (total), TCE, and vinyl chloride.

[4] Confirmatory sampling in the early 1990s detected relatively low levels (86 µg/L and 34 µg/L) of TCE at one location near a storm sewer; this area was initially called Area H. However, subsequent OU 3 investigation reports do not include this area.

Table 4-3
Contamination Summary and Response Actions (Pre- and Post-Record of Decision) at Operable Unit 3

PSC/Area	Operations/Source(s) of Release(s) [1]	Interim Response Actions/Interim Removal Actions	Selected Remedy/Remedy Decision	Post-ROD Discoveries, Investigation(s), and Remedy Status	Planned/Future Investigations for Feasibility Study Addendum
PSC 11 Building 101 Plating Shop	• Wastewater treatment system • Hazardous materials storage • Unauthorized disposal of waste solvents and other materials in the Jetline Hangar Area • Mercury spill (150 pounds) • Cyanide and chromium waste treatment • Tin, copper, cadmium, lead, nickel, silver, chromium, and gold electroplating were conducted between the 1940s and 1990.	A removal action was conducted between 1992 and 1995. The storage, dip, and wash tanks, all associated piping, overlying concrete floor and underlying soil were removed, and the plating shop building was demolished and removed. RCRA groundwater monitoring was implemented.	NFA. The specific risk evaluation, reported in the ROD, concluded contamination remaining after the IRA was completed at PSC 11 did not pose unacceptable risk to human or ecological receptors, and no additional cleanup was required.	Not Required	Not Required
PSC 12 Old Test Cell Building (101K)	• Spills of toxic and reactive chemicals from rusted and ruptured drums • Potential discharge of solvents/wastes from ruptures/breaks in storm, sanitary, and industrial sewer connections	No significant contamination was detected in soil.	NFA. The risk evaluation conducted at PSC 12 showed contaminants in the soil were within state and federal regulatory limits and did not pose an unacceptable risk to human health or the environment that required cleanup.	Not Required	Not Required
PSC 13 Radium Disposal Pit	A 2,000-square-foot pit, approximately 1 foot deep, used to dispose of radioactive radium paint waste in the 1940s and 1950s.	The pit (including radium paint waste, discarded luminous dials, and associated contaminated soil and asphalt) was excavated during the late 1950s. Following a RAD survey of the area in 1995, additional contaminated soil and a few painted dials were found and removed from the area surrounding the former disposal pit. The contaminated soil and dials were placed beneath the landfill cap at OU 1.	NFA. Radium-contaminated soil and dials removal abated the risk to humans or ecological receptors. The site was cleared for unrestricted use by the U.S. Navy Radiological Affairs Support Office.	Not Required	Not Required
PSC 14 Battery Shop	Battery shop with seepage pit for disposal of approximately 100 gallons of lead battery acid annually from 1959 to 1982.	Lead was detected in one soil sample at concentrations between FDEP Residential and Commercial/Industrial SCTLs (FDEP 1999).	NFA with LUCs to ensure industrial land use.	Not Required	Not Required
PSC 15 Solvent and Paint Sludge Disposal Area	Paint sludge and solvent disposal pit that received up to 2,000 gallons of waste solvent and paint annually between 1968 and 1978. In 1997, a RAD characterization survey in the PSC 15 area identified radium-226-contaminated soil.	In 1998, RAD-contaminated soil was removed and placed beneath the landfill cap at OU 1, and the excavation was backfilled with clean soil. Due to stability concerns, small quantities of contaminated soil were left in place beneath water pipes (at approximately 3 feet bgs) and a thick concrete pad (Naval Facilities Engineering Command 2000).	NFA with LUCs preventing direct contact, invasive activities, and industrial land use.	Not Required	Not Required

Table 4-3
Contamination Summary and Response Actions (Pre- and Post-Record of Decision) at Operable Unit 3

PSC/Area	Operations/Source(s) of Release(s) [1]	Interim Response Actions/Interim Removal Actions	Selected Remedy/Remedy Decision	Post-ROD Discoveries, Investigation(s), and Remedy Status	Planned/Future Investigations for Feasibility Study Addendum
PSC 16 Black Point Storm Sewer Discharge	Storm sewer outfall to the St. Johns River. • Recurring discharges of JP-5 fuel and hydraulic oil that reportedly entered the storm sewer from a fuel tank overflow in the vicinity of PSC 11 (along the east side of Building 101) • Additional reported spills of chromium, cyanide, and other chemicals	Sediment contaminated with PAHs and metals and TCE in storm sewer water exceeding FSWS	Removal of tar balls that were believed to contain the toxic components (lead and PAHs) within the upper 6 inches of sediment, with post-remediation analytical and toxicity sampling. Approximately 2 feet of sediment was removed and samples collected for chemical analysis and toxicity testing in April 2000, which indicated the removal had not achieved the anticipated results.	Additional sediment sampling was conducted within the storm water outfall and St. Johns River to evaluate if toxicity data collected after the removal was the result of remaining tar balls or the contribution of other sources discharging into the river. Concentrations of PAHs and lead detected in sediment taken from the outfall exceeded ecological screening values. However, comparison of PAH and lead concentrations in sediment to those in the lower St. Johns River indicated they are within background concentrations determined by the St. Johns River Water Management District; therefore, any potential risk to benthic receptors was not site-related and no additional ecological investigation or toxicity testing was warranted for PSC 16.	The RAO for PSC 16 was amended to state sediment would be cleaned up to St. Johns River background concentrations. FDEP and U.S. EPA concurred with this change. The revised remedy modification documents for OU 3 (i.e., ROD amendment, revised LUC RD) will state that NFA is required for PSC 16 sediment because background concentrations have been achieved.
PSC 48 Station Drycleaners (Building 106)	• Dry cleaning operations from 1962 to 1990 involving use of PCE • 150-gallon AST for bulk storage of PCE DNAPLs were presumed to be present within the aquifer matrix; however, they were not considered to be principal threat wastes (i.e., pose an unacceptable risk) given current or reasonably expected exposure scenarios.	The AST was removed in 1990. Air sparge (AS) with soil-vapor extraction (SVE) and carbon adsorption began as an IRA in March 1998. The AS system was used to strip VOCs from groundwater and a SVE system was used to capture VOCs from the subsurface. One year of continuing operations between 30 March 1998 and 25 March 1999 removed the equivalent of 14.7 gallons of PCE at Building 106. Groundwater analytical data suggested reductive dechlorination of the original PCE into degradation products (TCE, cis-1,2-DCE, and vinyl chloride) was occurring.	Continue the IRA, with ongoing system O&M, groundwater monitoring, and five-year reviews to evaluate performance. The IRA at PSC 48 was not designed to achieve NFA endpoints (i.e., fully address the statutory mandate for permanence and treatment to the maximum extent practicable) but was selected as the remedy without planned actions to address potential risks posed by any residual contamination remaining at PSC 48 after the IRA.	The system continued to operate through August 2005, removing an additional estimated 5.84 pounds of VOCs. The NAS Jacksonville Partnering Team optimization study concluded the system was unlikely to achieve the RAOs and was shut down in 2005 and decommissioned from 2011 through 2012. See Section 4.4.3.	See Section 4.4.4.4
Building 780	Aircraft refurbishment from 1970 through mid-1980s with the following activities: • Painting and chemical stripping of aircraft and parts using solvents such as: 1,1,1-TCA, TCE, methylene chloride, butyl acetate, and naphthalene • Flushing of fuel tanks and lines • Disposal of paints and solvents in floor drains and industrial sewer systems DNAPLs were presumed to be present within the aquifer matrix; however, they were not considered to be principal threat wastes (i.e., pose an unacceptable risk) given current or future exposure scenarios.	Groundwater extraction and treatment (GWT) with SVE and catalytic oxidation began as an IRA in 1998. Building 780C was constructed north of Building 780 to house the GWT/SVE system equipment.	Continue the IRA, with ongoing system O&M, groundwater monitoring, and five-year reviews to evaluate performance. The IRA at Building 780 was not designed to achieve NFA endpoints (i.e., fully address the statutory mandate for permanence and treatment to the maximum extent practicable) but was selected as the remedy without planned actions to address potential risks posed by any residual contamination remaining at the Building 780 area after the IRA.	The NAS Jacksonville Partnering Team optimization study concluded the system was unlikely to achieve the RAOs and was shut down in 2005 and decommissioned in 2008.	Building 101S, which is located to the west of Building 780, is a RCRA-regulated unit undergoing RCRA closure. Abandoned underground ventilation piping was found in Building 101S c. August 2007. Various size pipes in concrete trenches and pits formerly conveyed (1) solvent-laden air from the aircraft stripping area to outside air scrubbers and (2) aircraft stripping wastewater to the FRCSE Industrial WWTP. Results from a December 2011 event indicated vinyl chloride above GCTLs in the surficial aquifer. Based on proximity, the vinyl chloride concentrations at Building 101S have been attributed to Building 780.

Table 4-3
Contamination Summary and Response Actions (Pre- and Post-Record of Decision) at Operable Unit 3

PSC/Area	Operations/Source(s) of Release(s) [1]	Interim Response Actions/Interim Removal Actions	Selected Remedy/Remedy Decision	Post-ROD Discoveries, Investigation(s), and Remedy Status	Planned/Future Investigations for Feasibility Study Addendum
Multiple Storm Sewers	Storm sewers are: • impacted by chlorinated solvents, particularly TCE, for which a source could not be identified but was attributed to groundwater infiltration • tidally influenced • discharging to the St. Johns River • Receiving discharges from groundwater Areas A, E, F, and G HHRA: TCE (Utility worker, dermal contact)	Not Required	Monitoring after completion of the selected remedy (in-situ chemical oxidation [ISCO]) for Area F, with a contingent action of installing cured-in-place piping to eliminate future contaminated groundwater infiltration, followed by regular monitoring until VOCs are below the FSWS. The ISCO remedy was not implemented at Area F. A 2007 groundwater investigation of Areas F and G indicated contamination co-mingled and groundwater infiltrated a second storm sewer located east of the original (west) storm sewer. A 2008 investigation of the east storm sewer detected VOCs consistent with Areas F and G groundwater plumes, and levels of 1,1-DCE and vinyl chloride exceeded FSWS criteria.	The cured-in-place piping was installed in the west storm sewer from its outfall location in the St. Johns River approximately 400 feet to the north, terminating on the east side of Area G.	See Section 4.4.4.4
Area A	Shallow surficial aquifer plume on the east side of Building 101 from an unknown source, believed to have originated from a former engine cleaning area. The plume posed carcinogenic risk to an occupational worker because exposure to groundwater exceeds 1.0E-06 for future occupational workers and chemical-specific standards for drinking water (i.e., MCLs and GCTLs) were exceeded.	Not Required	MNA was the selected remedy; ongoing groundwater monitoring and LUCs were implemented. The wells were to be sampled for COCs (VOCs) and geochemical parameters, as needed. The RI/FS estimated a duration of 55 years to reduce the COCs to acceptable levels.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4
Area B	Intermediate surficial aquifer plume beneath the southwest corner of Building 840. HHRA: 1,1-DCE, PCE, TCE (Occupational worker, ingestion as drinking water)	Not Required	MNA. Groundwater sampling for COCs (VOCs) and parameters that indicated the likelihood of ongoing and potential future biodegradation. Modeling the contaminant plume in the intermediate surficial aquifer at Area B predicted it would slowly migrate into a "clay plug" within 41 years. Modeling of the progress of the plume for assimilation into a clay unit was expected every five years. If remediation did not appear to be on track, a contingent action would be implemented.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4
Area C	Intermediate surficial aquifer plume between former Hangars 122 and 123. Contamination at PSC 11 (Building 101) is believed to be the source for groundwater contamination at Area C. HHRA: TCE (Occupational worker, ingestion as drinking water)	Not Required	Enhanced biodegradation using hydrogen-release compound (HRC) within the intermediate zone of the surficial aquifer was the selected remedy. Two applications within four years were expected to effectively destroy VOCs and achieve ARARs within five years of implementation such that no controls (administrative or physical) of residual risk would be required. Area C groundwater was to be monitored for COCs (VOCs) and natural attenuation parameters on a quarterly basis for five years.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4

Table 4-3
Contamination Summary and Response Actions (Pre- and Post-Record of Decision) at Operable Unit 3

PSC/Area	Operations/Source(s) of Release(s) [1]	Interim Response Actions/Interim Removal Actions	Selected Remedy/Remedy Decision	Post-ROD Discoveries, Investigation(s), and Remedy Status	Planned/Future Investigations for Feasibility Study Addendum
Area D	Intermediate surficial aquifer plume at the west end of the former Jetline Hangar at Building 101, extending beneath portions of Buildings 101, 101S, and 103. HHRA: 1,1-DCE, PCE, TCE, Arsenic (Occupational worker, ingestion as drinking water)	Not Required	Enhanced biodegradation using HRC within the intermediate zone of the surficial aquifer was the selected remedy. Two applications within four years were expected to effectively destroy VOCs and achieve ARARs within five years of implementation such that no controls (administrative or physical) of residual risk would be required. Area D groundwater was to be monitored for COCs (VOCs) and natural attenuation parameters on a quarterly basis for five years.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4
Area E	Shallow surficial aquifer plume at the south end of Building 101W P3 Hangar area north of Enterprise Avenue. Apparently originated from a single discharge or spill event with preferential transport from an unidentified upgradient source. Appears to flow directly toward the storm sewer beneath Enterprise Avenue that discharges into the St. Johns River.	Not Required	Deferred — not part of the current RODs.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4
Area F	The MILCON P-615 plume is on the east side of Wright Street, surrounded by Buildings 800, 795, 796, and 868 (Aircraft Final Finish Facility). HHRA: 1,1-DCE, TCE, Vinyl chloride (Occupational worker, ingestion as drinking water)	Not Required	ISCO recirculating injected potassium permanganate and groundwater extraction, which would control groundwater flow paths within the contaminated plume to prevent migration while oxidizing the VOCs. Annual monitoring for VOCs and inorganic compounds would be used to track progress of the cleanup and proper utilization of the ISCO compound. The remedial action was expected to achieve ARARs within five years of implementation such that no controls (administrative or physical) would be required for residual risk.	Data from historical sampling, ISCO pilot study, and subsequent investigations were conflicting as to the suitability of using ISCO. The ISCO remedy was not implemented. Additional investigation conducted to define the extent of the Area F plume and validate the plume model indicated a secondary sewer line was a potential receptor for shallow groundwater contamination for which additional investigation was necessary.	See Section 4.4.4.4
Area G	Near Area F. May be impacted by migration of constituents from PSC 15. HHRA: 1,1-DCE, 1,2-DCE (total), TCE, vinyl chloride (Occupational worker, ingestion as drinking water)	Not Required	MNA. Groundwater to be monitored for COCs (VOCs) and parameters that indicate the likelihood of ongoing and potential future biodegradation. The contaminant plume in the intermediate zone of the surficial aquifer at Area G was expected to naturally decay to non-detectable levels in 39 years. The plume appeared to be unconfined in the surficial aquifer. Modeling of the progress of the plume toward final decay was to occur every five years. If remediation did not appear to be on track, a contingent action would be implemented.	The RI Addendum reassessed all groundwater holistically (relative to northern, central, and southern portions of OU 3).	See Section 4.4.4.4

Note:
[1] The risk assessment found no surface soil, and minimal surface soil risks; risk is discussed primarily related to the groundwater plumes and the surface water issues.

2014 RI Addendum HHRA

Finalization of the 2014 RI Addendum HHRA is pending; the following is a summary of major findings, as discussed in the draft document. The updated (2014) HHRA focused on potential future risk for exposure to soil and groundwater by a hypothetical resident. Arsenic, evaluated in the original risk assessment, remained a COC for subsurface soil.[5] The widespread elevated concentrations of chlorinated solvents that were the predominant contributors to risks associated with potential exposure to groundwater evaluated in the original risk assessment were updated to consider the potential residential receptor. The cancer and non-cancer benchmarks associated with residential exposure to contaminated groundwater were exceeded and the VOCs listed in the OU 3 RODs were retained as COCs.

The second element of the updated HHRA focused on two exposure scenarios identified after the RODs were issued. One exposure scenario pertains to the potential risk to a utility worker exposed to COCs detected in the newly identified storm sewer. Because the cancer and non-cancer hazards associated with a utility worker's exposure to storm sewer water were below benchmark values, no COCs were retained.

The second HHRA exposure scenario concerned a potential unacceptable risk of exposure for the industrial/commercial worker and the potential future residential receptor to VI in commercial and residential structures. VOC contamination in groundwater is wide-spread across OU 3, with over 167 buildings positioned over the VOC plume in the upper surficial aquifer. Most of the buildings were constructed in the 1940s resulting in older slabs that may be structurally compromised. Phase I of the VI evaluation identified 37 *Buildings of Interest* for which CSMs were developed and used to prioritize buildings for the Phase II VI investigation.

TCE and trans-1,2-DCE are indoor air COCs identified for the industrial/commercial scenario. Tetrachloroethylene (PCE), TCE, and trans-1,2-DCE detected in sub-slab soil gas had calculated indoor air concentrations that yielded an ILCR or HI in excess of toxicity benchmarks for the residential receptor.

Target risk range exceedances for indoor air industrial risk within Buildings 101 and 103 may have been due to vapors from indoor sources that were not fully controlled during indoor air sampling. Therefore, the potential risk to the current commercial/industrial receptor may actually represent a

[5] There is very little surface soil since most of the site is covered by impervious surfaces. Future development may result in removal of the impervious surfaces, at which time the subsurface soil would become surface soil. To be consistent with information in the original risk assessment, the term "subsurface soil" was retained in the RI Addendum.

threat from indoor source(s) instead of from sub-slab source(s) such as contaminated groundwater. Variability in indoor air concentrations was within the range observed at other Navy industrial sites and in literature.

4.2.5.2 Ecological Risk Assessment

Operable Unit 3

Approximately 2 to 5 percent of OU 3 is covered by shrub-like vegetation. A small area of disturbed shrub habitat adjoins the PSC 16 storm sewer outlet. There is a drainage ditch with hydrophytic vegetation such as cattails and other reeds; the ditch is normally dry and contains standing water only during periods of heavy rainfall. There is no natural shoreline to support semiaquatic wading birds at OU 3. Given the relative lack of terrestrial wildlife habitat at OU 3, only small terrestrial mammals and birds would forage at the site. NAS Jacksonville has an active Bird Aircraft Strike Hazard Program that strives to dissuade semiaquatic birds (e.g., seagulls) from landing on runways and taxiways.

The St. Johns River estuary provides a valuable nursery habitat for many species of aquatic organisms. This estuarine environment supports sport and commercial fishing. Surface water runoff from OU 3 flows towards the river, which discharges to the Atlantic Ocean approximately 24 miles north and east of the facility. In general, the St. Johns River Water Management District (SJRWMD) has rated the water quality of the river as poor in the urban reaches of Jacksonville and fair along OU 3.

Of the exposure pathways evaluated in the Screening Level Ecological Risk Assessment (SLERA), two (direct contact and indirect ingestion of PAHs and metals in the sediment by aquatic receptors) were recommended for further evaluation in a BRA. The data indicated that contaminated sediment contributing to macroinvertebrate toxicity was localized to a small area directly adjacent to the PSC 16 storm water outfall; PAHs and lead were the main contaminants. Potential sources of PAH contamination in the St. Johns River were a one-time historical release from the outfall and a release from an adjacent storm sewer located south of the Kemen Test Cell and east of the PSC 16 outfall.

The presence of *tar balls* was further evidence that a previous release of hydrocarbons may have occurred from one of the outfalls south of OU 3. In laboratory toxicity tests, 100 percent mortality was observed in amphipods exposed to sediment from the PSC 16 storm sewer outfall. In addition, the TCE concentrations in the storm sewer water exceeded FSWS. The RI/FS SLERA retained for further evaluation several preliminary COCs (PAHs, cadmium, chromium, lead, mercury, and silver) in St. Johns River sediment adjacent to OU 3.

Area A

The ERA performed as part of the RI/FS evaluated potential and adverse effects to ecological receptors exposed to contamination at Area A (HLA 2000). No ecological risk was identified at Area A because the entire site is paved and no surface water features are present. The only potential pathway is for contaminated groundwater to leak into the storm sewer system that empties into the St. Johns River; however, surface water criteria have not been exceeded for samples collected from the storm sewer during annual monitoring events.

2014 Addendum

The data gaps associated with the original ERA included surface water from areas potentially receiving recharge from groundwater contaminant plumes, and water discharging from storm sewers. The ERA Addendum evaluated pore water and storm water. Initial screening detected several contaminants above conservative screening levels or for which no screening levels had been issued. Subsequent evaluation to better characterize risks to ecological receptors did not identify COCs that posed risks to aquatic organisms or sediment invertebrates.

The Addendum concluded no unacceptable risk to ecological receptors. Contaminants that migrate are attenuating prior to discharge to surface water such that only periodic monitoring of pore and surface water in discharge zones would be necessary to ensure that future risks remain within acceptable levels.

4.2.5.3 Geology and Hydrogeology

Migration of contaminants within groundwater is controlled by complex stratigraphy. The surficial aquifer is divided into upper and lower zones (shallow and intermediate) separated by an extensive low permeability clay layer in the north half, but the clay layer is discontinuous in the south half of OU 3. The USGS estimated groundwater plumes were migrating very slowly, with 60 years the shortest duration travel time to reach the St. Johns River.

OU 3 is comprised of three distinct geologic settings (north, central, and south portions) that impact and control migration of contaminants in the subsurface.

North Portion

The north portion of OU 3 has two distinct zones (shallow and intermediate) within the surficial aquifer system separated by a clay unit. Both zones of the surficial aquifer have been impacted by releases of chlorinated VOCs at Buildings 106 and 780. Groundwater contamination at Areas C and D were previously identified in the intermediate zone of the surficial aquifer downgradient of Building 106. In absence of an identified independent source, Areas C and D are believed to represent downgradient transport of contamination that originated at Buildings 106 and 780. Documented exposure pathways in the north part of OU 3 include VI into onsite buildings and migration of contaminants in the intermediate zone to the St. Johns River.

Central Portion

The geologic setting in the central portion of OU 3 is characterized by extensive fine-grained clay deposits that retard/prevent contaminant transport in the subsurface. Chlorinated solvent groundwater contamination at Areas A, B, and E are characterized by smaller localized plumes that have been fully delineated in both vertical and horizontal dimensions. Documented exposure pathways in the central part of OU 3 include VI into onsite buildings and infiltration of contaminated groundwater into storm sewers that discharge to the St. Johns River south of OU 3.

South Portion

The geologic setting in the south portion of OU 3 is characterized by a lack of extensive clay deposits such that the shallow and intermediate zones of the surficial aquifer are considered a single homogenous aquifer zone. Groundwater contamination at Areas F and G consist of chlorinated solvent plumes that extend from shallow intervals less than 10 feet bgs to the base of the surficial aquifer at approximately 60 feet bgs. Those plumes have migrated to the southeast to comingle at the south end of OU 3, as shown on plume maps developed for the RI Addendum report. Documented exposure pathways in the south part of OU 3 include VI into onsite buildings and infiltration of contaminated groundwater into storm sewers that discharge to the St. Johns River.

As discussed previously, two storm sewers in the south portion of OU 3 have been impacted by infiltration of contaminated groundwater. One was extensively evaluated during the initial RI/FS and a remedy (cured-in-place piping) implemented. Impacts to the second storm sewer were identified in 2007. The second storm sewer is tidally influenced and the outfall is buried beneath sediment in the St. Johns River. Assessment data indicates that water in the storm sewer exceeds surface water screening criteria during low tide periods but is likely diluted by mixing with surface water within the storm sewer at high tide. Pore water and surface water sampling in the St. Johns River at outfall locations did not detect contaminants.

4.2.5.4 Fate and Transport

The RI Addendum summarizes general fate and transport processes while considering numerous variations in contaminant concentrations, distribution, and area-specific fate and transport processes. The presence of parent and degradation products throughout the site demonstrates that the occurring reductive dechlorination will continue. Plume analysis on an area-specific basis demonstrates that large-scale contaminant transport is no longer occurring in the aquifer above the clay layer in the north and central plume areas. Transportation of contaminants to the St. Johns River shoreline from Areas C and G have ceased due to source degradation, remedial actions at Area C, slow contaminant migration rates, and low hydraulic gradients.

For areas in the north portion of OU 3 (PSC 48, Building 780, and Areas A and E), surficial aquifer contaminants are bound in fine-grained materials, and back diffusion occurs between the clay and coarser-grained materials. Since degradation is occurring more efficiently in the coarser-grained, more permeable materials where transport occurs, natural attenuation processes limit downgradient migration and impact of contamination. Although back diffusion from the lower-permeability layers acts as a residual source and will impact the site for a long time, effects are localized.

Generally, most contaminant mass is located in the shallow aquifer zones in the north and central plume areas and in the deeper zone in the south plume area. Although desirable microbial populations are present to facilitate reductive dechlorination, only limited biological populations are present to significantly degrade contaminants to ethenes. Multiple lines of evidence show that reductive dechlorination is occurring across OU 3, albeit more robustly in some areas, and site-specific conditions are effectively limiting the extent of impacts in the downgradient locations. The most uncertainty remains in the south part of Area G where the plume has migrated to the shoreline with a few slight exceedances of FDEP Marine Surface Water Criteria (MSWC) detected in pore water but not in surface water. This suggests the plume is attenuating along the groundwater/surface water interface before discharging to surface water.

4.3 Remedial Actions

There are two RODs for OU 3. The Primary ROD, signed on 25 September 2000, includes seven PSCs, two buildings, the storm sewer, and five groundwater plumes (Areas B, C, D, F, and G) contaminated with chlorinated VOCs at OU 3 (HLA 2000). The Primary ROD did not include Areas A and E because additional groundwater data and evaluation was needed in order to select a final remedy. The Secondary ROD, signed on 22 September 2006, covered Area A; a ROD has not been completed for Area E. For continuity, the following RAOs, remedy selection, and remedy implementation sections are discussed separately for OU 3 and Area A.

4.3.1 Operable Unit 3

4.3.1.1 Remedial Action Objectives

RAOs were not established for soil or surface water at OU 3 because the RI/FS predicted no risks for human or ecological receptors exposed to those media.[6] RAOs were established for:

- storm sewer water due to a maximum detected concentration of TCE that exceeded the FSWS
- groundwater because of the excessive human health risk due to chlorinated VOC concentrations above state and federal regulatory limits
- sediment due to a small area posing lethal toxicity to aquatic receptors

Table 4-4 lists general medium-specific RAOs that were the design basis for the final remedy at OU 3.

Table 4-4
Remedial Action Objectives by Medium
Operable Unit 3 Groundwater Contaminated Areas B, C, D, F, and G, Storm Sewer Water, and Sediment

Medium	Contaminants of Concern	Remedial Action Objectives
Groundwater	Chlorinated Volatile Organic Compounds	Address groundwater contamination at Areas B, C, D, F, and G containing Contaminants of Concern above Applicable or Relevant and Appropriate Requirements
Storm Sewer Water	Trichloroethene	Manage contaminated storm sewer water to achieve Florida Surface Water Standards within the zone of tidal influence
Sediment	Lead and polynuclear aromatic hydrocarbons	Reduce ecological receptor exposure to sediment containing lethal concentrations of lead and polynuclear aromatic hydrocarbons

Table 4-5 summarizes specific COCs, chemical-specific ARARs and TBC Criteria for groundwater in Areas B, C, D, F, and G at the time the ROD was signed, as well as current ARARs (2005 FDEP GCTLs). The selection rationale is documented in the ROD.

[6] As noted in Sections 4.4.4.4 and 4.6.2, the need for supplemental LUCs for soil is being assessed further in the RI Addendum.

Table 4-5
Contaminants of Concern, Remedial Goals, and Applicable or Relevant and Appropriate Requirements
Operable Unit 3 Groundwater Contaminated Areas B, C, D, F, and G

Contaminant of Concern	ARAR-Based Remedial Goal[1] (Primary ROD)	Current ARARs[2]
Area B		
Chloromethane	2.7 [3]	2.7
Tetrachloroethene	3	3
Trichloroethene	3	3
Area C		
Methylene Chloride	5	5
Trichloroethene	3	3
Area D		
1,2-dichloroethene (total)	70 [4]	63
Methylene Chloride	5	5
Tetrachloroethene	3	3
Trichloroethene	3	3
Manganese	204 [5]	50
Area F		
1,1-dichloroethene	7	7
Tetrachloroethene	3	3
Trichloroethene	3	3
Vinyl Chloride	1	1
Area G		
1,1,1-trichloroethane	200	200
1,1,2-trichloroethane	5	5
1,1-dichloroethene	7	7
1,2-dichloroethene (total)	70 [4]	63
Benzene	1	1
Trichloroethene	3	3
Vinyl Chloride	1	1

Notes:
(1) Based on Florida Guidance Concentration unless otherwise noted (original ROD goals were based on 1994 GCTLs, 1996 Federal MCLs, and 1998 Region 3 Risk-Based Criteria)
(2) FDEP Groundwater Cleanup Target Level, Chapter 62-777, FAC (FDEP 2005)
(3) Based on Florida Guidance Concentration (original ROD based on 1994 GCTLs; five-year review comparison based on 2005 GCTLs)
(4) Concentration is for cis-1,2-dichloroethene
(5) Based on NAS Jacksonville Background Concentration (ABB-ES 1996)

4.3.1.2 Remedy Selection

Selected remedies are summarized in Table 4-3.

4.3.1.3 Remedy Implementation

After approval of the Primary ROD, the NAS Jacksonville Partnering Team determined that some components of the selected remedies were no longer necessary or should not be implemented based on additional data collected that indicated conditions had changed. Those areas are included in the remedy implementation discussions below and in Table 4-3. Ongoing supplemental investigations will result in remedy modifications, which are discussed further in Section 4.4.4.

PSCs 14 and 15

LUCs were implemented in December 2004 via inclusion in the NAS Jacksonville LUCIP Program. A comprehensive OU 3 LUC RD is discussed in Section 4.4.3.

Area B

A monitoring well network was designed and installed in 2002 to implement the selected MNA-based remedy. In June 2002, one multi-chamber well (MCW) was installed at cone penetrometer test (CPT) location CW31 to monitor seven intervals. Two additional wells were installed downgradient of the MCW to monitor the interval of concern (30 to 35 feet bgs). Bi-annual LTM began in July 2002; parameters include VOCs, alkalinity, total iron and manganese, select anions (nitrite, nitrate, chloride, and sulfate), dissolved gases (MEE), TOC, and sulfide.

Area C

The remedial design phase included a DPT groundwater investigation of varying depth intervals directly above the clay layer (22 to 26 feet bgs) followed by 4-foot intervals to 46 feet bgs around the source area (adjacent to CW-16 and MW-31) to verify the extent of the plume. Hydrogen Release Compound (HRC) was injected in the source area and around MW-31 between December 2002 and February 2003 followed by a one-year barrier application involving injection of 3,710 gallons of HRC into 262 injection points. HRC injection was followed by installation of baseline and other periodic post-injection monitoring wells. Semi-annual groundwater monitoring began in 2003 and included VOCs, metals, and natural attenuation parameters (dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, alkalinity, TOC, dissolved gasses, and metabolic acids).

A Remedial Action Completion Report (RACR) indicated that injection of HRC had resulted in conditions favorable for reductive dechlorination, and that active solvent biotransformation was observed at monitoring wells U3CMW31 and U3CMW40 but little evidence of active biotransformation processes were occurring elsewhere in Area C (CCI 2006). Groundwater sampling revealed conditions optimal for solvent biodegradation were highly localized within Area C.

An Annual Monitoring and Effectiveness Report (CCI 2008) concluded that transformation of TCE to cis-1,2-DCE by reductive dechlorination was observed and two monitored depth intervals showed increasing conversion of cis-1,2-DCE to vinyl chloride but no increase in ethane concentrations; methane production was occurring in the two intervals monitored.

The studies concluded that the HRC injection remedial action would not reduce VOCs in groundwater to UU/UE levels within five years.[7]

Area D

The remedial design phase included DPT groundwater investigation of varying depth intervals directly above the clay layer (23 to 27 feet bgs) followed by 4-foot intervals to 55 feet bgs around the source area (adjacent to CW-43 and D01) to verify the extent of the plume. HRC was injected in four zones (the source area, upgradient of Wasp Street, upgradient of Building 103, and within the Building 103 keyway) between August and December 2002. Approximately 4,156 gallons of HRC were injected into 346 injection points. Semi-annual groundwater monitoring began in 2003 and included VOCs, metals, and natural attenuation parameters (dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, alkalinity, TOC, dissolved gasses, and metabolic acids).

The RACR found that injection of HRC had resulted in conditions favorable for reductive dechlorination processes in wells U3CMW30 and U3D-GEW002 but little evidence of active biotransformation processes were occurring elsewhere in Area D (CCI 2006). Groundwater sampling revealed conditions optimal for solvent biodegradation were highly localized within Area D.

An Annual Monitoring and Effectiveness Report (CCI 2008) concluded that transformation of TCE to cis-1,2-DCE by reductive dechlorination was observed and two monitored depth intervals showed increasing conversion of cis-1,2-DCE to vinyl chloride but no increase in ethane concentrations; methane production was occurring in the two intervals monitored.

[7] As discussed in Table 4-3, two applications within four years were expected to effectively destroy VOCs and achieve ARARs within five years of implementation such that no controls (administrative or physical) of residual risk would be required.

The studies concluded that the HRC injection remedial action would not reduce VOCs in groundwater to UU/UE levels within five years.

Area F

Initial characterization studies conducted in 2001 for in-situ chemical oxidation (ISCO) implementation determined TCE was not present at levels reported in 2000 so ISCO was not warranted. However, the groundwater plume had migrated significantly beyond the known boundaries and entered the second storm sewer identified downgradient of Area F at concentrations above regulatory criteria, warranting additional investigation. The site was reassessed in September 2002 with the following conclusions:

- TCE concentrations detected in groundwater in 2002 were similar to those reported in the RI/FS and ROD.
- Subsurface heterogeneities between 30 and 40 feet bgs retarded the downward migration of contaminants.
- Conditions at Area F are not conducive for biodegradation of contaminants over most of the plume area, which had not been delineated at the conclusion of the 2002 investigation.

On 12 November 2002, the NAS Jacksonville Partnering Team decided that ISCO would remain the preferred remedial action based on the September 2002 investigation.

A DPT groundwater investigation to define the extent of contamination conducted in October 2006 concluded:

- Chlorinated VOCs are in groundwater above GCTLs east of Building 868, generally within the boundary of the TCE plume except for cis-1,2-DCE and vinyl chloride, which were detected at less than 3 µg/L in the east line of DPT locations.
- Groundwater contamination east of Building 868 was limited to 50 feet bgs by an underlying finer-grained sedimentary layer.
- Reductive dechlorination of TCE is the probable source of cis-1,2-DCE and vinyl chloride.

- An additional source of TCE and 1,1-DCE may be near the southeast corner of Building 868.
- The concentrations of VOCs in some sample locations along the south boundary suggest the VOC plume extends to the south and southeast.

Additional DPT groundwater sampling was conducted in June 2007 to further define the groundwater plume and to design a well network to verify the horizontal extent of the east portion of the Area F plume and observe downgradient contaminant concentrations over time. A multi-chamber well was installed in June 2008. The DPT groundwater investigation indicated the plume at Area F was not suitable for treatment by ISCO. The ROD allows use of a different technology if found to be more suitable than ISCO.

Further implementation of the remedy at Area F has been deferred by the NAS Jacksonville Partnering Team pending completion of the FS Addendum and modification of the remedy, as required, in expected OU 3 remedy modification documents (e.g., ROD amendment, revised LUC RD).

Area G

A monitoring well network was designed and installed in 2002 to implement the selected MNA-based remedy. In June 2002, six MCWs were installed at CPT location CW31 to monitor seven intervals. Two additional wells were installed downgradient of the MCW to monitor the interval of concern (30 to 35 feet bgs). LTM began in 2002; parameters include VOCs, alkalinity, total iron and manganese, select anions (nitrite, nitrate, chloride, and sulfate), dissolved gases (MEE), TOC, and sulfide.

Data collected in 2002 and 2003 resulted in questions regarding the lateral/vertical extent of groundwater contamination. A subsequent (September and October 2004) DPT groundwater investigation focused on assessment of areas downgradient of the contaminant plume. The investigation concluded that some of the contamination originating from Area G may have reached the St. Johns River and recommended additional investigation to further define the extent of contamination in areas downgradient of Area G.

A subsequent investigation of the east storm sewer included samples at six accessible manholes during low and high tide and detected VOCs consistent with Areas F and G groundwater plumes. Vinyl chloride and 1,1-DCE exceeded Florida Surface Water Criteria (CCI 2008). Based on the findings, the NAS Jacksonville Partnering Team determined that additional assessment was needed and data would be collected and included in the RI/FS Addendums.

As discussed in Section 4.4.4, the groundwater plume at Area G has migrated to the shoreline with a few slight exceedances of FDEP MSWC detected in pore water but not in surface water (Tetra Tech 2014).

4.3.2 Area A

4.3.2.1 Remedial Action Objectives

The following RAOs, which assume future industrial use of the site, were established for groundwater at OU 3 Area A.

- Reduce human health risk associated with potential exposure to surficial aquifer groundwater at Area A due to various organic compounds such as 1,1-DCE, TCE, and vinyl chloride.
- Reduce groundwater contamination at Area A to meet chemical-specific ARARs.

Table 4-6 lists groundwater COCs and ARARs (2005 FDEP GCTLs) for Area A. GCTLs have not changed since the signature date of the ROD.

Table 4-6
Remedial Action Objectives and Contaminants of Concern
Operable Unit 3 Groundwater Contaminated Area A

Contaminant of Concern	Florida Department of Environmental Protection Groundwater Cleanup Target Level
1,1-dichloroethane	70
1,1-dichloroethene	7
1,1,1-trichloroethane	200
1,1,2-trichloroethane	5
cis-1,2-dichloroethene	70
trans-1,2-dichloroethene	100
Acetone	6,300
Benzene	1
Bromodichloromethane	0.6
Carbon disulfide	700
Chloroform	70
Tetrachloroethene	3
Trichloroethene	3
Toluene	40
Vinyl chloride	1

4.3.2.2 Remedy Selection

The remedy for Area A is summarized in Table 4-3.

4.3.2.3 Remedy Implementation

An LTM program developed in 2003 in anticipation of the ROD made use of groundwater wells previously installed at the site and called for analyses of select COC VOCs (TtNUS 2003). The first groundwater monitoring event at Area A was conducted in November 2003 and annual monitoring events of eight wells have occurred since 2003. Findings indicated reductive dechlorination was occurring at the site. All of the monitoring events concluded that contaminated groundwater was infiltrating into the storm sewer. After 2010, sampling frequency decreased to a biennial basis.

4.3.3 Remedial Investigation Addendum Recommended Remedial Action Objectives

Recommended RAOs for future evaluation during the FS Addendum are to:

- Prevent unacceptable risks to human or ecological receptors from contaminated storm sewer water.
- Address groundwater contamination at OU 3 containing concentrations of chemicals that exceed ARARs.
- Reduce chemical concentrations in DNAPL source zones to levels that enhance the effectiveness of ongoing natural attenuation processes and reduce the time of remediation to achieve ARARs.
- Prevent unacceptable risks to site workers inhaling contaminants resulting from VI, to be documented in the final Phase III Technical Memorandum which will conclude that the potential risk to this receptor due to VI exceeds an ARAR.
- Reduce ecological receptor exposure to sediment containing contaminants above background conditions.

4.4 Progress Since the Last Five-Year Review

4.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review included individual protectiveness statements.

> *The remedies for PSC 14, PSC 15, and PSC 16 are protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.*

The remedies at PSC 48, Building 780, and Area D are protective in the short term with regulatory approval of the LUC RD for OU 3 groundwater use restrictions; however, in order for the remedies to be protective on the long-term, follow-up actions need to be taken. After completion of the RI/FS Addendum and updated ROD, an updated protectiveness determination will be made via an addendum to this Five-Year Review anticipated to be completed by September 30, 2013.

For remedies at Areas C, E, F, and G, no completed human health or ecological risk exposure pathways are known to exist; however, the potential exposure pathway for ecological receptors in the St. Johns River is still being evaluated considering the potential for contaminated groundwater to discharge to the river from the aquifer and via storm sewers. Therefore, protectiveness determinations for the remedies in these areas cannot be made at this time and are being deferred until further actions currently underway are completed supporting the development of an RI/FS Addendum. After completion of the RI/FS Addendum and updated ROD, an updated protectiveness determination will be made via an addendum to this Five-Year Review anticipated to be completed by September 30, 2013.

The remedies for Areas A and B are protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

4.4.2 Status of Recommendations and Follow-Up Actions from Last Review

The 2011 Five-Year Review recommended the following actions.

Continue ongoing assessment activities for OU 3 and complete an RI/FS Addendum, Proposed Plan, and updated ROD, an updated LUC RD, and appropriate post-ROD documents and actions.[8] Update the RAOs for PSC 16 in the updated ROD to specify remediation to background levels for the St. Johns River.

This section discusses issues identified during the 2011 Five-Year Review, some of which remained unresolved from the 2005 Five-Year Reviews. In some cases, the issues identified in the 2005 Five-Year Review were no longer applicable at the time of the 2011 Five-Year Review because site conditions had changed. Other conditions would be fully addressed as part of the

[8] These actions apply to PSC 48, Building 780, and Groundwater Contaminated Areas C, D, E, F, and G.

planned RI and FS Addendums. The investigations have been documented in numerous individual reports and the Draft RI Addendum. Once complete, the RI Addendum, FS Addendum, and resulting comprehensive revised remedy modification documents will fully address any outstanding issues from the 2005 and 2011 Five-Year Reviews.

The Draft RI Addendum was submitted to U.S. EPA and FDEP in June 2014, and will be finalized upon regulatory review and approval. The FS Addendum will be completed thereafter, with subsequent revisions to remedy modification documents.

4.4.3 Other Issues and Follow-Up Actions

Since the last five-year review, multiple supporting activities have been implemented to address historical five-year review issues/recommendations.

LUC RD

The 7 February 2011 LUC RD lists the following performance objectives implemented at OU 3.

- Ensure no excavation activities occur below the water table (saturated soil) in shallow contaminated groundwater areas designated by the NAS Jacksonville Partnering Team without special handling and disposal procedures for the saturated soil. Ensure workers performing these actions are properly protected.

- Prohibit withdrawal or use of the groundwater from the surficial aquifer underlying the site for commercial industrial purposes (including dewatering, irrigation, heating/cooling purposes, and other industrial processes) without prior written approval from the U.S. EPA and FDEP until cleanup levels are met.

- Prohibit human consumption of groundwater that exceeds U.S. EPA MCLs or FDEP GCTLs.

- Maintain the integrity of any current or future remedial or monitoring systems (e.g., monitoring wells included in the MNA program).

- Ensure any workers potentially exposed to contaminated groundwater at the site are properly protected.

The OU 3 LUC boundaries are shown on Figure 4-5. Shallow groundwater areas impacted by OU 3 COCs are designated by the Partnering Team.

PSC 48/Building 106 System Decommissioning

In August 2010, the Building 106 slab was demolished and converted into a parking lot. The PSC 48/Building 160 decommissioning activities — including disassembly of the existing air sparge (AS) and soil-vapor extraction (SVE) systems, AS well abandonment, and transport and disposal of AS and SVE system wastes — were conducted from 1 to 8 August 2011. The spent granular activated carbon filter media was sampled in February 2012 and transported for offsite disposal as hazardous waste (RCRA Waste Codes F001 and F002) in April 2012. Details of the PSC 48/Building 106 AS/SVE system decommissioning are in a CCR (AGVIQ Environmental Services [AGVIQ]-CCI 2012).

Building 780 GWT/SVE System Decommissioning

The Building 780 groundwater extraction and treatment (GWT)/SVE system stored sequestering agent (a chemical additive used to protect operation of GWT systems) in a tank inside Building 780C. The agent was conveyed from the tank to the groundwater extraction well via above- and below-ground piping.

Building 780C decommissioning activities — including disassembly of remaining GWT/SVE system, extraction well and well vault abandonment, and transport and disposal of construction debris — were conducted from July to August 2013. Details of the Building 780 system decommissioning are in a CCR that includes other air station-wide decommissioning and well abandonment activities (AGVIQ-CCI 2014).

4.4.4 Remedial Investigation Addendum

The findings of the RI Addendum, which are summarized below (and also cited, as appropriate, throughout this section) will be used to develop an FS Addendum and remedy modification documents that will effectively combine the OU 3 and Area A sites to optimize remedial action efforts.

4.4.4.1 RI Addendum Monitoring Well Installations and Sampling

Building 101S

Building 101S has been in a semi-annual monitoring program since December 2009. Results from a December 2011 event indicated vinyl chloride above GCTLs in the surficial aquifer. Based on the proximity of Building 101S to Building 780, the vinyl chloride concentrations have been attributed to Building 780 (Tetra Tech 2014).

LABEL	easting	northing
1	443345.75	443345.75
2	445777.17	445777.17
3	445777.07	445777.07
4	444758.46	444758.46
5	444758.46	444758.46
6	443926.24	443926.24
7	443926.24	443926.24
8	443338.15	443338.15

Figure 4-5
Operable Unit 3 - LUC Boundary
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/21/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

Source:
- Map was aquired from Naval Air Station Jacksonville Land Use Control Remedial Design Operable Unite 3 by Tetra Tech NUS, Inc. February 2011.

X:\Navy\NAS_JAX\project\Five_Year_Review\OU3_LUC_Boundary_V2.mxd

During the most recent event (December 2013), several low-level VOCs and arsenic were detected in the surficial aquifer; of those, vinyl chloride and arsenic exceeded a GCTL. Tables summarizing LTM groundwater analytical results since 2000, contaminant maps, and groundwater contour maps can be found in the *Building 101S Groundwater Monitoring Results, December 2013, FDEP Permit Number 72437-HO-010* letter report (SIES 2014). Trend graphs for historical concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, and vinyl chloride in select shallow wells excerpted from that report are included in Appendix E of this five-year review.

Buildings 106 and 780 / Areas C and D

To provide additional LTM data points in the north OU 3 area, 20 monitoring wells were installed in September 2012 using rotary sonic drilling techniques. Those wells were analyzed for VOC COCs (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, total 1,2-DCE, isopropylbenzene, 1,1,1-TCA, 1,1-DCA, 1,1-DCE, 1,2-DCA, chloroethane, toluene, and vinyl chloride) for comparison to GCTLs. Data from these wells have been integrated into the holistic data evaluation for OU 3, as discussed previously (Sections 4.2.5.3 and 4.2.5.4 of this five-year review), and as presented in the RI Addendum.

Monitored Natural Attenuation and Trend Analysis

The following three groundwater monitoring events were conducted as part of the RI Addendum to support MNA and trend analysis.

- Between 1 February and 1 March 2010, 126 wells throughout OU 3 not already included in LTM were sampled

- Between 1 and 12 October 2012, 153 wells not already included in LTM were sampled, with the newly installed (September 2012) wells

- Between 14 and 24 January 2013, 153 wells were sampled

Samples from each well were analyzed for VOCs, with natural attenuation parameters analyzed from select wells.

To fill data gaps, 14 wells were sampled in September 2013 and analyzed for natural attenuation parameters and molecular biological tools to model natural attenuation and mass flux parameters at the site. These are documented further in the Draft RI Addendum and Environmental Security Technology Certification Program (ESTCP) Project ER-200705; they were used to develop the hydrogeology and fate and transport conclusions (Sections 4.2.5.3 and 4.2.5.4 of this five-year review).

4.4.4.2 Operable Unit 3 Perimeter Soil Sampling

The potential for exposure to soil within OU 3, which is almost entirely paved or covered with buildings, is limited to construction and repair activities where excavation occurs. Short-term protectiveness is accomplished through implementation of LUCs covering the entire OU 3. Shallow soil sampling conducted along the boundary of OU 3 did not detect COCs above screening criteria, and the Navy plans to conduct additional shallow soil investigation to define contamination in the vicinity of each source area for the purpose of reducing the size of LUC boundaries that apply to site workers.

4.4.4.3 Vapor Intrusion Studies

The RI Addendum discusses the following VI studies conducted at OU 3.

- The ESTCP study to develop an integrated strategy that combines direct measurement methods with forensic methods to partition background sources directly in indoor air
- A Phase II VI investigation that evaluated migration of VOCs from contaminated groundwater into OU 3 buildings
- A Phase III VI investigation of the short-term (sample duration comparison) and long-term (seasonal) temporal variability of indoor air and sub-slab soil-gas VOC concentrations at three OU 3 buildings

The most recent Building 101 indoor air sampling event (conducted by AGVIQ in February 2014) employed active sample collection using sorbent tubes and method TO-17 analysis. One Building 101 indoor air sample (OU3-BLDG101-A106) yielded a TCE concentration of 1.39 micrograms per cubic meter (µg/m^3); this risk is below FDEP's 1.0E-06 ELCR threshold. A 14-day indoor air sample (OU3-BLDG103-A109) collected from Building 103 on 5 February 2014 yielded a TCE concentration of 3.25 µg/m^3. These data suggest that VI is occurring at Building 103 and the reported TCE concentration is above FDEP's 1.0E-06 ELCR threshold.

The final Phase III Technical Memorandum concludes that the potential risk to site workers due to VI exceeds an ARAR.

4.4.4.4 RI Addendum — Recommendations for Future Work

The RI Addendum is a compilation of the findings from the series of extensive investigations conducted by the Navy to support development of a ROD amendment. The findings in the RI Addendum will be used to support development of an FS Addendum that will detail potential remedial solutions for OU 3. Additional work is planned by the Navy to supplement the information collected to date for the following areas.[9]

- Evaluate temporal variations on the mechanisms that control potential for VI into indoor work spaces.
- An enhanced bioremediation treatability study for treating contaminated groundwater in permeable zones will be implemented at several areas including Building 780, Area F, and Area G.
- A treatability study to test an innovative technology has been implemented to directly address contaminants in the clay layer at Building 106 using an electro-kinetic process to distribute biological amendments through a direct current electric field. The results are pending completion of the study.
- Additional work is also planned to conduct additional monitoring events within the storm sewer system.
- A shallow soil evaluation of source zones within OU 3 is also being planned. The purpose of the shallow soil evaluation will be to reduce the size of potential LUC individual source zone areas rather than to the entirety of OU 3.

In addition to those efforts, routine monitoring activities will continue at each groundwater contaminated area as outlined in the prior RODs. The RI Addendum also recommended additional sampling of pore water in potential contaminant discharge areas in the St. Johns River to monitor for any future impacts to these areas.

[9] Note that modeling and supplemental investigations described in Table 4-3 have been integrated into ongoing RI/FS Addendums activities, including reassessment of groundwater holistically.

4.5 2015 Five-Year Review Process

4.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the RODs, groundwater monitoring reports, prior five-year reviews, and the Draft RI Addendum. This five-year review also included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Sheets for 2010 through 2014.

4.5.2 Data Review

Data for this five-year review was obtained from post-ROD investigation summaries in the RI Addendum which, because of its recent preparation date, provided a comprehensive, holistic overview and, where available, recent annual groundwater monitoring reports. Data from OU 3 have not been re-analyzed for holistic site trends or attainment of remedial goals, as the RI Addendum provides the most recent evaluation to date, but has not been approved at this time. Conclusions regarding OU 3 will be deferred to the addendum. The Final RI Addendum, following approval, will be used to prepare the FS addendum as well as remedy modification documents (e.g., ROD amendment, revised LUC RD).

Area A

Three temporary piezometers were installed on 25 January 2013 to delineate shallow groundwater contamination at Area A: two were installed within Building 101 and one was in the Building 101 keyway. The most recent sampling event, conducted in June 2013, included eight wells. COCs detected in the shallow groundwater zone above GCTLs were cis-1,2-DCE, TCE, and vinyl chloride in one well. A slight decreasing trend since LTM began in 2002 was noted (SIES 2013). LTM results since 2002 and contaminant maps are included in a *2013 Annual Groundwater Monitoring Report, Operable Unit 3, Area A,* report (SIES 2013).[10] Trend graphs for historical concentrations of TCE, cis-1,2-DCE, and vinyl chloride in the source area well excerpted from that report are included in Appendix E of this five-year review.

Area B

The selected remedy for Area B is MNA, with assessment of plume progress every five years and contingent actions if natural attenuation does not occur. LTM began at Area B in mid-2002. In general, LTM conducted between 2005 and 2011 indicated COCs decreased, and the presence of

[10] A final version of the report was not available; the Draft Revision 2 report was reviewed.

degradation products and other data suggested reductive dechlorination remained active at the site. The January 2011 event reported TCE was detected above its GCTL in the source area well; remaining COCs were below GCTLs. The presence of degradation products DCE and vinyl chloride at Area B supported the occurrence of dechlorination processes at the site. Geochemical data from 2011 also provided strong evidence supporting anaerobic biodegradation. The overall downward trend of TCE and DCE data also suggested reductive dechlorination was occurring within the source well.

The most recent sampling event, conducted concurrent with Area G in June 2013, included three wells. TCE was detected in one well above its GCTL, and was not detected in the other two wells. Concentrations of TCE, cis-1,2-DCE, and vinyl chloride decreased in the source area well since the 2011 event. Tables summarizing LTM results since 2002 and contaminant maps are included in a *June 2013 Biannual Groundwater Monitoring Report, Operable Unit 3 — Areas B and G* report (SIES 2013).[11] A trend graph for historical concentrations of TCE in the source area well excerpted from that report is included in Appendix E of this five-year review.

Area G

The selected remedy for Area G is MNA, with assessment of plume progress every five years and contingent actions if natural attenuation does not occur. LTM began at Area G in mid-2002. As discussed in Section 4.3.1.3, results of the initial (2002 and 2003) sampling events necessitated additional investigation of the Area G groundwater plume. LTM continued at Area G concurrent with additional DPT groundwater delineation activities (and further investigations conducted through 2007 as discussed in the RI Addendum) to evaluate the effectiveness of natural attenuation at Area G.

Results from 2005 to 2008 indicated some degree of reductive dechlorination but also suggested the continued presence of source material. Results from sampling conducted in 2009 identified a maximum TCE concentration (1,060 µg/L) in the deep aquifer southeast compliance well, which indicated a possibly imminent groundwater-to-surface water discharge to the St. Johns River that resulted in additional investigation of the Area G plume.

The 2011 event detected the highest concentrations of degradation products (cis-1,2-DCE and 1,1-DCE) within the shallow aquifer source well, and the highest concentration of vinyl chloride in the deep aquifer southeast compliance well (which had the elevated TCE concentration in 2009). Groundwater quality results from 2011 were evaluated for indications of anaerobic biodegradation of chlorinated VOCs/solvents. Most wells showed limited to adequate signs of biologically

[11] A final version of the report was not available; the Draft Revision 2 report was reviewed.

mediated natural attenuation and the overall downward trend of TCE also suggested that reductive dechlorination was occurring within the source well. Data from 2013 are consistent with 2011 results. Tables summarizing LTM results since 2002 as well as contaminant and contour maps are included in a *June 2013 Biannual Groundwater Monitoring Report, Operable Unit 3 — Areas B and G* report (SIES 2013).[12] Trend graphs for historical concentrations of TCE in select wells excerpted from that report are included in Appendix E of this five-year review.

PSC 48

The LTM well network at PSC 48 was expanded in October 2012; groundwater samples were collected in June 2013. Concentrations of COCs exceeded GCTLs in 13 of 19 wells. Tables summarizing LTM groundwater analytical results since 2000, contaminant maps, and groundwater contour maps are included in a *June 2013, 2013 Groundwater Monitoring Report, Operable Unit 3 — Potential Source of Contamination 48* report (SIES 2013).[9] Trend graphs for historical concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, and vinyl chloride in select shallow wells excerpted from that report are included in Appendix E.

Conclusions

Current conditions are being evaluated in the RI Addendum; groundwater data and remedial (e.g., natural attenuation) effectiveness will be evaluated following issuance of the FS Addendum and remedy modification documents.

4.5.3 Site Inspection and Interviews

Resolution Consultants drove through portions of OU 3 where access was permitted while accompanied by Mr. Curtin, Ms. Wilson, and Tarryn Garlington, FRCSE Environmental Scientist, on 1 October 2014. Portions of the FRCSE had more highly restricted access where photographs were not permitted.

4.6 Technical Assessment

4.6.1 Question A: Is the remedy functioning as intended by the Record of Decision(s)?

When the Primary ROD was developed, the overall strategy at OU 3 was to devise and implement cleanup remedies that minimize the need for LUCs or other administrative controls. Therefore, the basis and rationale for developing RAOs for storm sewer water, groundwater, and sediment was to bring storm sewer effluent into compliance with FSWS, to make groundwater suitable for drinking water purposes, and to remove ecological mortality risk in

[12] A final version of the report was not available; the Draft Revision 2 report was reviewed.

sediment. The Secondary (Area A) ROD RAOs are to reduce human health risk associated with potential exposure to surficial aquifer groundwater and reduce groundwater contamination to meet chemical-specific ARARs.

Remedial Action Performance

- The remedies selected for PSC 48/Building 106 (AS/SVE), Building 780 (GWT/SVE), and Areas C and D (enhanced bioremediation using HRC injection) did not achieve the RAOs of reducing VOCs in groundwater to the ARARs/action levels within the specified timeframe. Revisions to the RAOs were proposed in the Draft RI Addendum, as discussed in Section 4.3.3; revisions to the OU 3 remedies will be developed after the FS Addendum is complete and will be summarized in revised remedy documents.

- The remedy for PSC 16 (removal of tar balls) removed concentrations of COCs in sediment to meet the background levels established by the SJRWMD for St. Johns River. The RAOs established in the ROD were baseline ERA exposure endpoints: PAH and lead levels would decrease and not adversely affect the survival and growth of amphipods exposed to sediment without adversely affecting the overlying surface water. The remedy modification documents will amend the RAO for sediment to require meeting St. Johns River background concentrations.

- For sites where MNA is a component of the selected remedy (Areas A, B, C, D, and G, PSC 48, and Building 780) and monitoring events have been conducted, natural attenuation appears to be occurring. The studies conducted as part of the RI Addendum and those recommended in conjunction with preparing the FS Addendum will be used to assess applicability and suitability for MNA at OU 3.

- In some locations, plumes have migrated horizontally or vertically such that the existing network of wells may not fully encompass groundwater contamination for monitoring purposes. The RI Addendum is assessing the monitoring well network and holistic LTM program.

- A LUC RD has been submitted to regulatory agencies and is awaiting approval. An updated LUC RD will be completed in conjunction with other remedy modification documents. The LUC RD and NAS Jacksonville administrative restrictions on excavations may also be updated following review of supplemental sampling results after the RI/FS Addendum.

- Information obtained subsequent to the ROD indicated the selected remedy for Area F (ISCO) was not viable based on changed site conditions. A remedial action start date at Area F has been delayed to allow for completion of the RI/FS Addendum and ROD amendment.

System Operation/Operations & Maintenance

Wells are maintained and inspected regularly as part of various LTM programs and ongoing RI/FS Addendum investigations. At this time, there are no active remediation systems requiring O&M at OU 3; this may change after completion of the FS Addendum and issuance of remedy modification documents.

Opportunities for Optimization

The overall purpose of the RI Addendum, FS Addendum, and remedy modification documents is to provide comprehensive optimization of the selected remedies for OU 3.

Implementation of LUC and Institutional/Engineering Controls

Quarterly LUCIP inspections conducted by the Navy document industrial use at PSCs 14 and 15, and restricted construction, groundwater use, and land use at Area A. LUCIP inspection sheets are submitted to the U.S. EPA and FDEP annually. LUCIP inspections are conducted under the 7 September 1999 MOA. NAS Jacksonville prepared a revised LUC RD in 2011, for which review by regulatory agencies is pending. The original remedies contemplated future unrestricted land use. If site conditions preclude unrestricted use, or future land use is expected to change and will preclude unrestricted use, modification to the revised LUC RD may be warranted.

Early Indicators of Potential Remedy Problems

The documented limitations of prior remedies, which focus on individual source areas, will be addressed by the FS Addendum and remedy modification documents.

4.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

No. The RI and FS Addendums will update exposure assumptions. The remedy modification documents will provide revised cleanup levels and establish new RAOs based on the ongoing comprehensive evaluation of OU 3 groundwater and soil, and potential exposure pathways.

Changes in Chemical-Specific ARARs and TBC Criteria

ARARs and TBC criteria considered during preparation of the Primary and Secondary RODs were reviewed to determine changes to standards since the remedies were implemented. The ARAR-based action levels listed in the ROD (and Tables 4-6 and 4-7 of this five-year review) for groundwater COCs have not changed. Changes to SCTLs (chemical-specific TBC Criteria) and FDEP Marine SWCTLs (chemical-specific ARARs) will be included in the remedy modification documents.

Expected Progress towards Meeting RAOs

Based on the NAS Jacksonville Partnering Team's revised approach to OU 3, which involves preparation of remedy modification documents that will establish new RAOs, this five-year review did not assess the progress toward meeting the RAOs in the 2000 and 2006 RODs.

Changes in Exposure Pathways

The RI and FS Addendums will assess potential changes in exposure pathways. As noted in Section 4.4.3, utility/construction worker exposures are controlled by LUCs; appropriate modification to LUCs should follow the shallow soil source investigations (described in Section 4.4.4.4) and further evaluation of shallow groundwater plumes.

Changes in Land Use

Land use at OU 3 has not changed since the RODs were signed, and is not anticipated to change. Current LUCs are discussed in Section 4.4.3; revisions to the LUC RD will be developed in conjunction with remedy modification documents, as required.

New/Emerging Contaminants and Contaminant Sources

The emerging contaminant 1,4-dioxane is associated with the use or presence of certain chlorinated solvents, including site COC 1,1,1-TCA; therefore, the NAS Jacksonville Partnering Team should determine the necessity for including 1,4-dioxane as a parameter during future sampling events.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

Given recent investigation findings, the risk assessment for OU 3 has been revised and re-submitted in the RI Addendum. Risk assessment findings will be incorporated into an FS Addendum and remedy modification documents.

Vapor Intrusion

As discussed in the Phase III VI study, low-level TCE concentrations have been quantified in indoor air samples in two buildings (101 and 103), and may suggest the potential for VI (see Section 4.4.4.3). Ongoing VI studies and indoor air sampling events conducted as part of the RI Addendum and FS Addendum will continue to address VI at OU 3.

Summary

Given that the risk assessment has been revised and approval of the draft document (RI Addendum) is pending, the status of Question B relative to risk assessment findings has been deferred. Chemical-specific ARARs have not changed since the Primary or Secondary RODs, and land use has remained the same. Because ROD goals are based on ARARs, the risk assessments are expected to have little effect on remedy protectiveness. LUCs may need to be reassessed based on the findings of the RI Addendum soil assessment, and re-evaluation of shallow groundwater plumes. LUCs are in place to prevent withdrawal or use of the groundwater from the surficial aquifer. The emerging contaminant 1,4-dioxane may need to be assessed to determine if it is present/absent; however, because LUCs are in place to prevent groundwater use, it does not affect protectiveness at this time. VI at OU 3 will be addressed through ongoing investigations and risk assessment.

4.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

4.7 Issues and Recommendations/Follow-Up Actions

Issues and recommendations for follow-up actions are in Table 4-7.

4.8 Protectiveness Statement

Conditions at OU 3 are protective in the short term. The Navy is implementing LUCs, which prevent unacceptable groundwater exposures. The current remedy, if determined to be necessary, will be modified after the RI and FS addendums, proposed plan addendum, and ROD amendment. The RI and FS addendums will be completed by 31 March 2018.

Table 4-7
Issues and Recommendations / Follow-Up Actions
Operable Unit 3 — Fleet Readiness Center Southeast

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y / N)	
						Current	Future
1	The Remedial Investigation (RI) and Feasibility Study (FS) addendums for Operable Unit (OU) 3 are still underway. However, given Land Use Controls (LUCs) are in place, there is no protectiveness issue at this time.	Complete the RI/FS addendums, so that OU 3 remedy documents can be modified.	Navy	U.S. EPA, FDEP	31 March 2018	N	Y
2	The emerging contaminant 1,4-dioxane is associated with 1,1,1-trichloroethane, which has historically been detected at OU 3. However, 1,4-dioxane was not an analytical parameter included in the original Remedial Investigation/ Feasibility Study; ensure that this is incorporated into the RI/FS Addendum process. Protectiveness is not affected while LUCs prevent groundwater use.	Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions as appropriate.	Navy	U.S. EPA, FDEP	31 March 2018	N	N

5.0 OPERABLE UNIT 4

OU 4 is Casa Linda Lake (PSC 21), an 11-acre manmade surface water retention basin within the east-central portion of NAS Jacksonville (Figure 5-1). Casa Linda Lake is bordered on the east, south, and west by Casa Linda Oaks Golf Course. Most fairways and greens of the golf course are south of the lake, and one green is on a peninsula within the lake. Birmingham Avenue and Mustin Road border the golf course to the north and east, respectively. Beyond Birmingham Avenue to the north are industrial buildings and partially paved parking areas.

5.1 Site Chronology

Historical events and relevant dates in the OU 4 chronology are listed in Table 5-1.

Table 5-1
Chronology of Site Events at Operable Unit 4 — Potential Source of Contamination 21

Event	Date
Fish kill caused by runoff from application of pesticide Dasanit on banks	May 1979
Initial Assessment Study identified contaminants of concern above Applicable or Relevant and Appropriate Requirements (ARARs) in surface water and sediment	1983
Site placed on the National Priorities List	November 1989
ARARs exceeded in surface water and sediment and Risk Assessment revealed a cancer risk for polychlorinated biphenyls	1993
Remedial Investigation	July to October 1997
Final Remedial Investigation Report and Baseline Risk Assessment	June 1999
Focused Feasibility Study	November 1999
Record of Decision Signed	6 September 2000
Final Close-Out Report	July 2003
Storm Water Pollutant Prevention Plan Monitoring	Through c. 2002
Quarterly Land Use Control Implementation Program Inspections	2004 to present
Previous Five-Year Reviews	2005 and 2011

5.2 Background

5.2.1 Physical Characteristics

Casa Linda Lake is an approximately 1,800-foot long by 250-foot wide collection and discharge basin for storm water and surface water in NAS Jacksonville Storm Water Management Basin 17 (see Figures 5-2 and 5-3). Within the northwest portion of Basin 17, which is densely developed with industrial operations and is extensively paved, runoff is drained by storm sewers and an open drainage ditch system. Storm water runoff from the portion of Basin 17 immediately south of Casa Linda Lake, which is almost entirely golf course, drains primarily by overland flow due to the lack of drainage ditches or other natural storm water conveyances.

Figure 5-1
Operable Unit 4 - Location
Potential Source of Contamination 21 - Casa Linda Lake
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

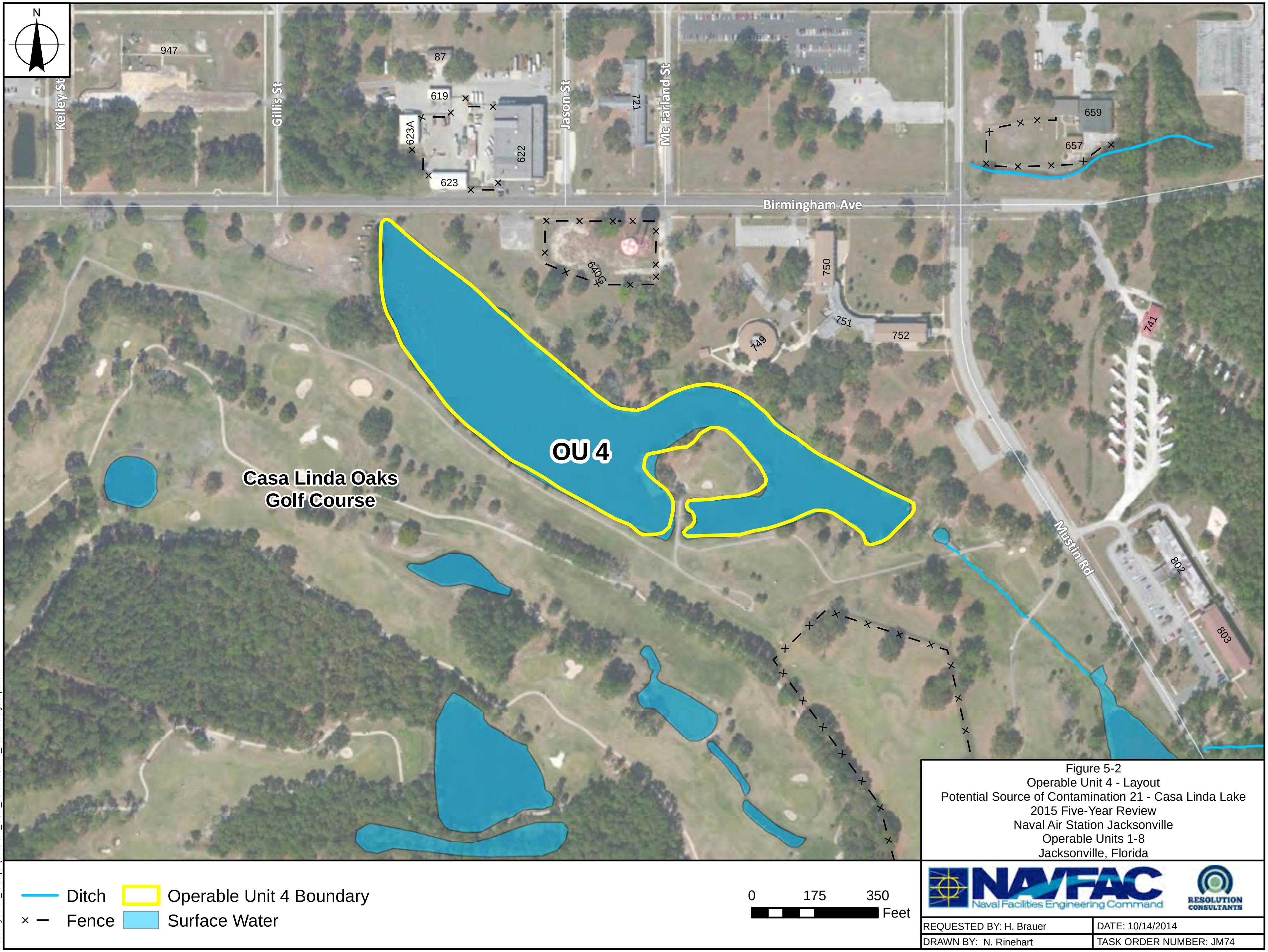

Figure 5-2
Operable Unit 4 - Layout
Potential Source of Contamination 21 - Casa Linda Lake
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

Figure 5-3
Operable Unit 4 - Storm Water Basin 17
Potential Source of Contamination 21 - Casa Linda Lake
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Stormwater Management Basin 17 approximated from ARCADIS; Road data are from the United States Census Bureau.

Additionally, some water enters Casa Linda Lake via infiltration of groundwater from the shallow surficial aquifer (ARCADIS Geraghty & Miller, Inc. [AG&M] 1999). Infiltration of groundwater to Casa Linda Lake is supported by higher groundwater levels in the shallow surficial aquifer surrounding the lake and upward hydraulic gradients from the deep to shallow surficial aquifers.

When the lake's level exceeds the height of the drainage structures at the east end of the lake, the water flows into these structures and then into a ditch that flows approximately 650 feet southeast toward Turtle Pond. Turtle Pond is a confluence of discharge from Casa Linda Lake and water draining from the south areas of Basin 17. From Turtle Pond, overflow drains approximately 500 feet east to the St. Johns River via Mulberry Cove. The St. Johns River is approximately 1,500 feet from Casa Linda Lake.

The 100-year flood stage for NAS Jacksonville is 5 feet msl (AG&M 1999). The average elevation of Casa Linda Lake's top bank is approximately 15 feet msl and the lake averages approximately 9 feet deep.

5.2.2 Land and Resource Use

Land use surrounding OU 4 is primarily recreational (church complex to the northeast, RV park and hotel to the east beyond Mustin Road, and the golf course and country club to the south and west). Industrial activities are north of the lake, typically beyond Enterprise Avenue. The Navy anticipates continually using the lake as a storm water retention basin and as a source of irrigation water for the golf course. Future development of surrounding area green space may increase storm water runoff into the lake. Future use of the various resources (e.g., water and fish) at Casa Linda Lake will be controlled by LUCs.

Minimal natural habitat has developed within and around the lake. While fish, birds, ducks, turtles, and alligators are present in the area, the intent when constructing Casa Linda Lake was not to provide a sanctuary for wildlife and aquatic species, or human recreational activities such as hunting, fishing, or swimming.

5.2.3 History of Contamination

A fish kill within Casa Linda Lake occurred on 6 May 1979. The fish kill was caused by application of the pesticide Dasanit (fensulfothion) on the golf course and subsequent heavy rains that resulted in overland flow that transported the pesticide into the lake (AG&M 1999). Surface water and sediment samples collected in 1983 indicated that there were also impacts to the sediment and surface water that were not attributable to the pesticide release (AG&M 1999). Those contaminants were likely the result of storm water runoff.

5.2.4 Initial Response

No follow-up action was conducted for the 1979 fish kill because of the short half-life of fensulfothion. No removal actions have been performed at Casa Linda Lake, and the preferred remedial alternative identified in the Focused FS did not involve removal actions (AG&M 1999).

5.2.5 Basis for Taking Action

The RI included an HHRA and ERA that identified constituents and evaluated potential risk to human and ecological receptors from exposure to groundwater, surface soil, surface water, sediment, aquatic plant tissue, and fish tissue.

The HHRA evaluated the following receptors/exposure scenarios: maintenance worker exposure to surface soil, diving exposure to sediment and surface water, and fish ingestion for sustenance.[1] Groundwater at the site is not potable and was not considered a drinking water source for the HHRA. No unacceptable risk was indicated for maintenance workers or divers.

For the fish ingestion scenario, the calculated cancer risk (ELCR 3.0E-05) falls within the U.S. EPA benchmark range for acceptable cancer risk (1.0E-06 to 1.0E-04). The non-cancer risk estimate (HI of 2) exceeds the benchmark (HI of 1). The RI concluded that actual exposure to contaminants in fish tissue in the lake were likely overestimated based on the (1) catch-and-release fishing policy in place for Casa Linda Lake, (2) expected reduction in organic chemical concentrations during preparation and cooking of fillets, and (3) limited toxicity of the form of arsenic concentrated in fish tissues. Based on the results of the HHRA, constituent concentrations in media at the Casa Linda Lake site were not expected to produce significant risks for the human population.

The ERA evaluated the following receptors: benthic invertebrates (through surface water and sediment screening and abundance and diversity studies), piscivorous birds, omnivorous mammals, and herbivorous reptiles. The ERA identified a potential for unacceptable risks to various ecological receptors due to PAHs, pesticides, PCBs, and inorganics. Potential risks due to lead concentrations in sediment and aquatic vegetation were associated with herbivorous reptiles. Ecological risks, though present, were deemed to be overestimated due to (1) the conservative assumptions in the ERA and (2) the proximity of more favorable habitat, such as the St. Johns River, in the vicinity of Casa Linda Lake, which reduced the probability that fish-eating birds use Casa Linda Lake as a predominant food source.

[1] Defined as consumption of fish 350 days a year for 30 years.

Because Casa Linda Lake is a functional storm water retention basin, the ERA concluded that some level of contamination and associated risk is to be expected. COCs have a tendency to sorb to sediment, and sediment settles out in the retention basin; therefore, Casa Linda Lake acts as a natural filter to remove the contaminants from the collected storm water prior to discharge to the St. Johns River. The added protection that the lake affords the receiving streams of the St. Johns River through the retention of storm water provides a higher ecological value than the protection of the resident wildlife and benthic community within the lake. Therefore, no ecological COCs were retained for surface water.

5.3 Remedial Actions

The ROD for OU 4 was signed on 6 September 2000.

5.3.1 Remedial Action Objectives

The following RAOs were presented in the ROD.

- Eliminate the human exposure pathway (fish consumption).
- Ensure protection of the St. Johns River from COCs identified in environmental media in Casa Linda Lake.
- Protect the neighboring wildlife habitat from COCs in media within and around the retention basin.

5.3.2 Remedy Selection

The remedial alternative selected was monitoring with institutional and passive habitat controls. The alternative assumed that lake sediments remain in place with the following components implemented to address risks due to exposure to those sediments:

- Institutional controls comprised of use restrictions and advisory signs.
- Monitoring of Casa Linda Lake in compliance with the NAS Jacksonville Storm Water Management Program, including the Storm Water Pollution Prevention Plan (SWPPP) and related Best Management Practices.
- Control of the habitats in the vicinity of Casa Linda Lake via passive habitat control.

5.3.3 Remedy Implementation

Because the long-term care for management of Casa Linda Lake had been transferred to the NAS Jacksonville Storm Water Management Program and institutional controls were in place, the alternative was implemented without complying with the formal Remedial Design/Remedial Action process under CERCLA (AG&M 2000).

Institutional Controls

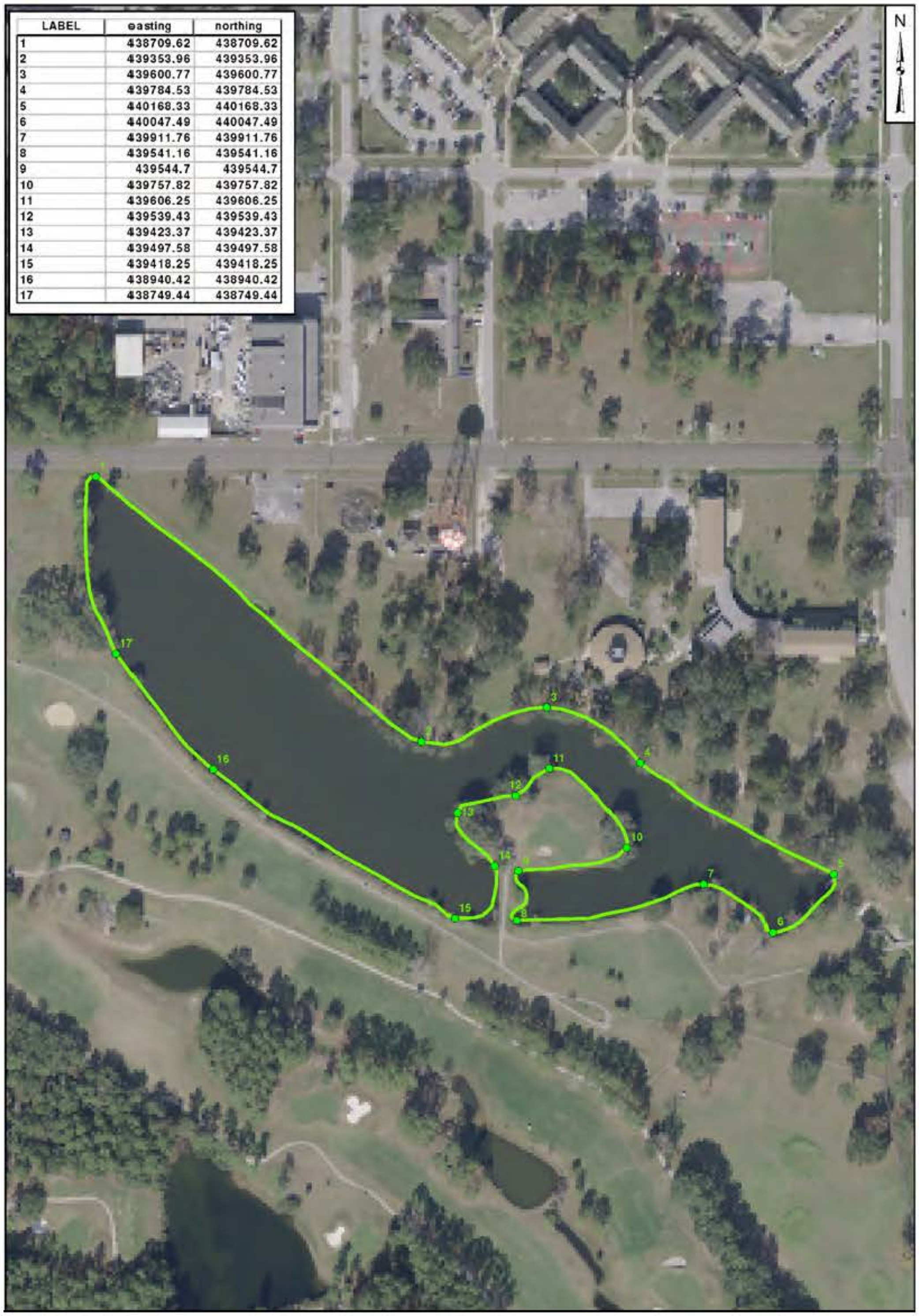
Institutional controls are used to reduce potential human and ecological exposure pathways. The existing institutional controls enforced by NAS Jacksonville include land use restrictions, advisory signs, and a catch-and-release program for all fishing activities around the lake.

The 30 December 2011 LUC RD lists the following performance objectives for the LUC remedy at PSC 21.[2]

- Prohibit agricultural or residential use of OU 4 including any form of housing, childcare facilities, schools, playgrounds, or convalescent/nursing care facilities.
- Prevent unauthorized disturbance (e.g., dredging and excavation) of contaminated sediment in Casa Linda Lake.
- Maintain the integrity of any existing or future remediation system.
- Prevent human exposure (fish consumption).
- Ensure protection of the St. Johns River and neighboring wildlife habitat from constituents of ecological interest.

If NAS Jacksonville is to be redeveloped or expanded such that the storage volume or capacity of Casa Linda Lake needs to be increased, the NAS Jacksonville Master Plan will specify the proper removal, handling, and disposal procedures for the lake sediments. Proposed LUC boundaries are shown on Figure 5-4.

[2] FDEP has indicated that revisions will be required to update the LUC language.



LABEL	easting	northing
1	438709.62	438709.62
2	439353.96	439353.96
3	439600.77	439600.77
4	439784.53	439784.53
5	440168.33	440168.33
6	440047.49	440047.49
7	439911.76	439911.76
8	439541.16	439541.16
9	439544.7	439544.7
10	439757.82	439757.82
11	439606.25	439606.25
12	439539.43	439539.43
13	439423.37	439423.37
14	439497.58	439497.58
15	439418.25	439418.25
16	438940.42	438940.42
17	438749.44	438749.44

Figure 5-4
Operable Unit 4 - Land Use Control Boundaries
Potential Source of Contamination 21 - Casa Linda Lake
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

LUC Boundary

Source:
- Map was acquired from Naval Air Station Jacksonville Land Use Control Remedial Design Operable Unit 4 - Casa Linda Lake by Tetra Tech NUS, Inc. December 2011.

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REQUESTED BY: H. Brauer	DATE: 10/16/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Storm Water Monitoring

NAS Jacksonville implemented a SWPPP in 1997 that incorporated quarterly visual inspections of all outfalls, where storm water is examined for evidence of sheen, solids, and debris. Per the ROD, the portions of Casa Linda Lake included in outfall inspections are (1) inlet culverts to Casa Linda Lake, (2) the lake, (3) the lake's control structure, and (4) outfall C-3 at Mulberry Cove.

The NAS Jacksonville Storm Water Management Team evaluated storm water management and monitoring programs on a semi-annual basis. Casa Linda Lake monitoring results were routinely evaluated and monitoring procedures updated as necessary to ensure compliance with applicable storm water regulations. Storm water quality summary reports for Casa Linda Lake were prepared and submitted in compliance with the reporting requirements specified in the SWPPP. Based on the results, the NAS Jacksonville Storm Water Management Team removed Casa Linda Lake from the SWPPP and storm water monitoring program in approximately 2002.

Habitat Control

Passive habitat controls have been implemented to reduce human health and ecological risks due to exposure to the lake sediments and the food chain. Habitat controls include removal of (mowing) shoreline vegetation and placement of statues of predatory birds and animals around the lake banks to discourage wildlife from seeking refuge. The lake banks are periodically inspected to monitor the effectiveness of the passive habitat controls, and to identify the frequency of bank maintenance necessary to minimize vegetation along the perimeter of the lake. To ensure they are properly maintained, the habitat controls were also incorporated into the overall NAS Jacksonville Master Plan (EDAW 2009).

5.4 Progress Since the Last Five-Year Review

5.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review made the following protectiveness statement.

The selected remedy for OU 4 is protective of human health and the environment.

5.4.2 Issues, Recommendations, and Status of Follow-Up Actions from Last Review

Although LUCs had been implemented, a LUC RD had not been completed. The NAS Jacksonville Partnering Team determined that a LUC RD was needed because (1) there was no LUCIP document, (2) OU 4 inspections were not covered by the MOA, and (3) the ROD stated that natural attenuation will reduce COC levels in sediment to attain the OU 4 remedial goal (meet industrial use scenario and prevent consumption of fish and exposure to sediment) but there were no LTM monitoring requirements. A LUC RD was submitted to the U.S. EPA and FDEP on 30 December 2011; FDEP has indicated that revisions will be required to update the LUC language.

5.5 2015 Five-Year Review Process

5.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the Final RI and BRA, ROD, Final Close-Out Report, and prior five-year review reports. This five-year review included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Checklists for 2010 through 2014.

5.5.2 Data Review

There has been no analytical data generated since the Final RI and BRA, as LTM was not a component of the selected remedy.

5.5.3 Site Inspection and Interviews

Resolution Consultants drove along the banks of OU 4 accompanied by Mr. Curtin and Ms. Wilson. During the 1 October 2014 site inspection, warning signs were observed at regular intervals along the perimeter of the lake, the banks and vegetation were maintained as specified in the ROD, and additional predatory statues (owls) had recently been placed, according to Mr. Curtin. No prohibited uses of the lake were observed. Photographs taken during the site visit are in Appendix A.

Based on information obtained from the NAS Jacksonville Master Plan and NAS Jacksonville Partnering Team member interviews, the outfall structure was modified to bring Casa Linda Lake into compliance with SJRWMD regulations and accommodate storm water retention for an additional 38 acres of impervious future development within Basin 17.

5.6 Technical Assessment

5.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

Casa Linda Lake is a storm water and sediment retention basin for Basin 17 at NAS Jacksonville. Upon reaching a certain level, storm water flows out of the basin to the St. Johns River. Because COCs have a tendency to sorb to sediment, it acts as a natural filter to remove the contaminants from the collected storm water prior to discharge to the St. Johns River.

Remedial Action Performance

Institutional and passive habitat controls prevent unauthorized access and limit human and ecological exposures. The remedy selected for OU 4 does not involve sampling/analysis that generates quantitative data to determine if contaminants in sediment are attenuating. Qualitative sampling (visual observations) for storm water pollution parameters under the NAS Jacksonville Storm Water Program ceased circa 2002, and Casa Linda Lake was removed from the station's SWPPP.

System Operation/Operations & Maintenance

There are no active remediation systems; therefore, no system O&M is required. Vegetation control (mowing) is conducted by golf course maintenance personnel. NAS Jacksonville IRP personnel install predator statues, conduct LUCIP inspections quarterly, and submit inspections to the U.S. EPA and FDEP annually.

Opportunities for Optimization

LTM, sampling, and analysis are not part of the selected remedy so opportunities for optimization are not applicable.

Implementation of LUCs and Institutional/Engineering Controls

LUCs have been implemented and a LUC RD prepared and submitted to the U.S. EPA and FDEP for review; FDEP has indicated that revisions will be required to update the LUC language. Quarterly LUCIP inspections conducted between March 2010 and November 2013 noted that additional owls and statues were needed in September 2012 and August 2013; no other issues were noted. Owl statues are routinely replaced when damaged or missing statues are discovered.

Early Indicators of Potential Remedy Problems

This five-year review did not identify early indicators of potential remedy problems; the remedy is functioning as designed.

5.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

The ROD identified no location-specific ARARs associated with Casa Linda Lake. The ROD stated that action-specific ARARs at OU 4 would be met because NAS Jacksonville site workers receive safety training updates on a regular basis to comply with applicable health and safety regulations. The ROD did not require active monitoring of natural attenuation of sediments remaining in place on the lake bottom; therefore, there were no relevant data to review with respect to the progress of natural attenuation or that required a review against ARARs, TBC criteria, or risk goals.

Expected Progress towards Meeting RAOs

The RAOs for eliminating the human exposure pathway (fish consumption) and protecting the neighboring wildlife habitat from COCs in media within and around the retention basin appear to be met through continued catch-and-release programs, signage, mowing, and placement of predatory statues.

The RAO of protecting the St. Johns River from COCs in environmental media at Casa Linda Lake was to be achieved by NAS Jacksonville Storm Water Management Team monitoring and compliance programs. Because the NAS Jacksonville Storm Water Management Team discontinued storm water monitoring in approximately 2002 and removed the basin from the NAS Jacksonville SWPPP, the long-term effectiveness of the remedy could be questioned. Documentation of the NAS Jacksonville Storm Water Management Team's rationale for discontinuing monitoring at Casa Linda Lake should be reviewed by the NAS Jacksonville Partnering Team to determine if decision modification documents are necessary.

Changes in Exposure Pathways

Exposure pathways identified in the ROD have not changed; LUCs are in place to prevent exposure for human receptors (e.g., catch and release fishing policies are in place), and management strategies are in place to minimize use of the lake as habitat by predatory species.

Changes in Land Use

Land use surrounding OU 4 is recreational, and use of natural resources (e.g., water and fish) at Casa Linda Lake is controlled by LUCs. Minimal natural habitat has developed within and around the lake, such that some wildlife are present in the area. However, the intent when constructing Casa Linda Lake was to manage storm water and surface water runoff, not to provide a sanctuary for wildlife and aquatic species, or to provide any resource for human recreational activities such as hunting, fishing, or swimming. The Navy anticipates continuing to use the lake as a storm water retention basin and a source of irrigation water for the golf course.

New/Emerging Contaminants and Contaminant Sources

The U.S. EPA comments on the 2011 Five-Year Review identified the need for reassessing dioxin toxicity during this five-year review. Documents reviewed for this five-year review did not identify investigations that included sampling and analysis of media for dioxins or furans; therefore this reassessment requirement does not apply to OU 4.

No remedy byproducts or degradation products have been identified which would be considered new or emerging contaminants.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The BRA and other risk assessment documents in the RI/Focused FS were developed using RAGS for Superfund, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992). The basis for remedial actions (including both human health and ecological risk evaluations) is summarized in Section 5.2.5. Site-related cancer risks for current land use were greater than 1.0E-06, which exceeds FDEP's acceptable risk threshold, but they were based primarily on fish ingestion, which is not a complete pathway at the site because of LUCs.

As discussed previously, Casa Linda Lake is a functional storm water retention basin and, as such, some level of contamination and associated risk is to be expected. The ERA results indicate a potential for unacceptable risks to ecological receptors. However, the original ERA concluded that the added protection that the lake affords the receiving streams of the St. Johns River through the retention of storm water provided a higher ecological value than the protection of the resident wildlife and benthic community within the lake. This conclusion has not changed since the original risk assessment.

Given the LUCs in place at OU 4 to protect human health and incidental wildlife, no further risk review was performed based on the engineering function of the lake and protections provided to downgradient receptors.

Vapor Intrusion

Neither VOCs nor naphthalene are COCs in groundwater and there are no occupied structures at OU 4; therefore, VI is not considered a potential pathway.

Summary

In summary, risk assessment findings determined that Casa Linda Lake is a functional storm water retention basin and, as such, some level of contamination and associated risk is to be expected as it removes contaminated sediments prior to discharge to the higher-level receiving streams of the St. Johns River. LUCs and passive habitat controls are being implemented by NAS Jacksonville for protection of human health and to minimize ecological impacts at Casa Linda Lake. This five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the remedy. The rationale for removing Casa Linda Lake from the NAS Jacksonville Storm Water Management Program needs to be documented to demonstrate remedy effectiveness relative to long-term protectiveness.

5.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that calls into question the protectiveness of the remedy.

5.7 Issues and Recommendations/Follow-Up Actions

Issues discovered during the 2015 Five-Year Review are summarized in Table 5-2, with recommendations for follow-up actions.

5.8 Protectiveness Statement

The remedy at OU 4 is protective of human health and the environment as exposures to contaminated sediment are mitigated as outlined in the ROD, and signage and passive habitat controls mitigate human health and ecological direct contact exposure at this site.

Table 5-2
Issues and Recommendations/Follow-Up Actions at Operable Unit 4

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	Storm water monitoring through the Naval Air Station (NAS) Jacksonville Storm Water Program was a component of the selected remedial alternative to meet Remedial Action Objectives in the Record of Decision. The NAS Jacksonville Storm Water Management Team discontinued monitoring in approximately 2002 and subsequently removed Casa Linda Lake from the NAS Jacksonville Storm Water Pollution Prevention Plan.	Obtain documentation justifying the removal of Casa Linda Lake from the NAS Jacksonville Storm Water Management Program and determine if decision modification documents are necessary.	Navy	U.S. EPA, FDEP	31 March 2018	N	N
2	Florida Department of Environmental Protection has indicated that the language in the 30 December 2011 Land Use Control Remedial Design (LUC RD) document is outdated.	Revise and resubmit the Operable Unit 4 LUD RD document.	Navy	U.S EPA, FDEP	31 March 2017	N	N

6.0 OPERABLE UNIT 5

OU 5 is in the west portion of the South Antenna Field, just inside the NAS Jacksonville fenced south perimeter. OU 5 is bordered on the north, east, and west by similar grassy fields and on the south by Patrol Road (Figure 6-1). OU 5 is comprised of a Former Oil Disposal Area (ODA) and Former FFTA, collectively known as PSC 51 because of their proximity and similar operation dates (1943 to 1952). Early investigations at this PSC identify the Former ODA as Area 1 and the Former FFTA as Area 2.

6.1 Site Chronology

Historical events and relevant dates in the OU 5 chronology are listed in Table 6-1.

Table 6-1
Chronology of Site Events at Operable Unit 5
Potential Source of Contamination 51

Event	Date
Site placed on the National Priorities List	November 1989
Identified as a Potential Source of Contamination after review of past facility activities	Early 1995
Site screening indicated evidence of metals and volatile organic compounds in surface soil	February 1996
Sampling event identified chemical and radiological soil contamination	March to September 1997
Interim Removal Action: radiological- and lead-contaminated soil excavated	March to October 1998
Additional radiological contaminant groundwater sampling events	July 1999
Remedial Investigation/Feasibility Study	September 2002
Record of Decision	17 August 2005
Land Use Control Remedial Design	December 2006
Previous Five-Year Review	2011

6.2 Background

6.2.1 Physical Characteristics

OU 5 is approximately 5 acres of relatively flat grassy field, gently sloping to the southeast to an unnamed creek at the south boundary of the installation (Figure 6-2). The creek eventually discharges to the St. Johns River (approximately 4,000 feet downstream). The Former FFTA and Former ODA areal limits are relatively indistinguishable in the grassy field.

6.2.2 Land and Resource Use

PSC 51 is in an industrial area of NAS Jacksonville, near the former WWTP (OU 2). The Navy's plans provide for continued non-residential use of the site. LUCs in place to prohibit residential use and unauthorized construction or excavation will be maintained at PSC 51 until contaminant concentrations allow for UU/UE. The surficial aquifer at OU 5 is not used for domestic, industrial, or potable purposes. The LUC remedy prohibits withdrawal or use of surficial aquifer groundwater for commercial or industrial purposes including dewatering, irrigation, and heating and cooling processes, and prohibits human consumption of groundwater that exceeds U.S. EPA MCLs or FDEP GCTLs.

Figure 6-1
Operable Unit 5 - Location
Potential Source of Contamination 51 - Former FFTA and ODA
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command
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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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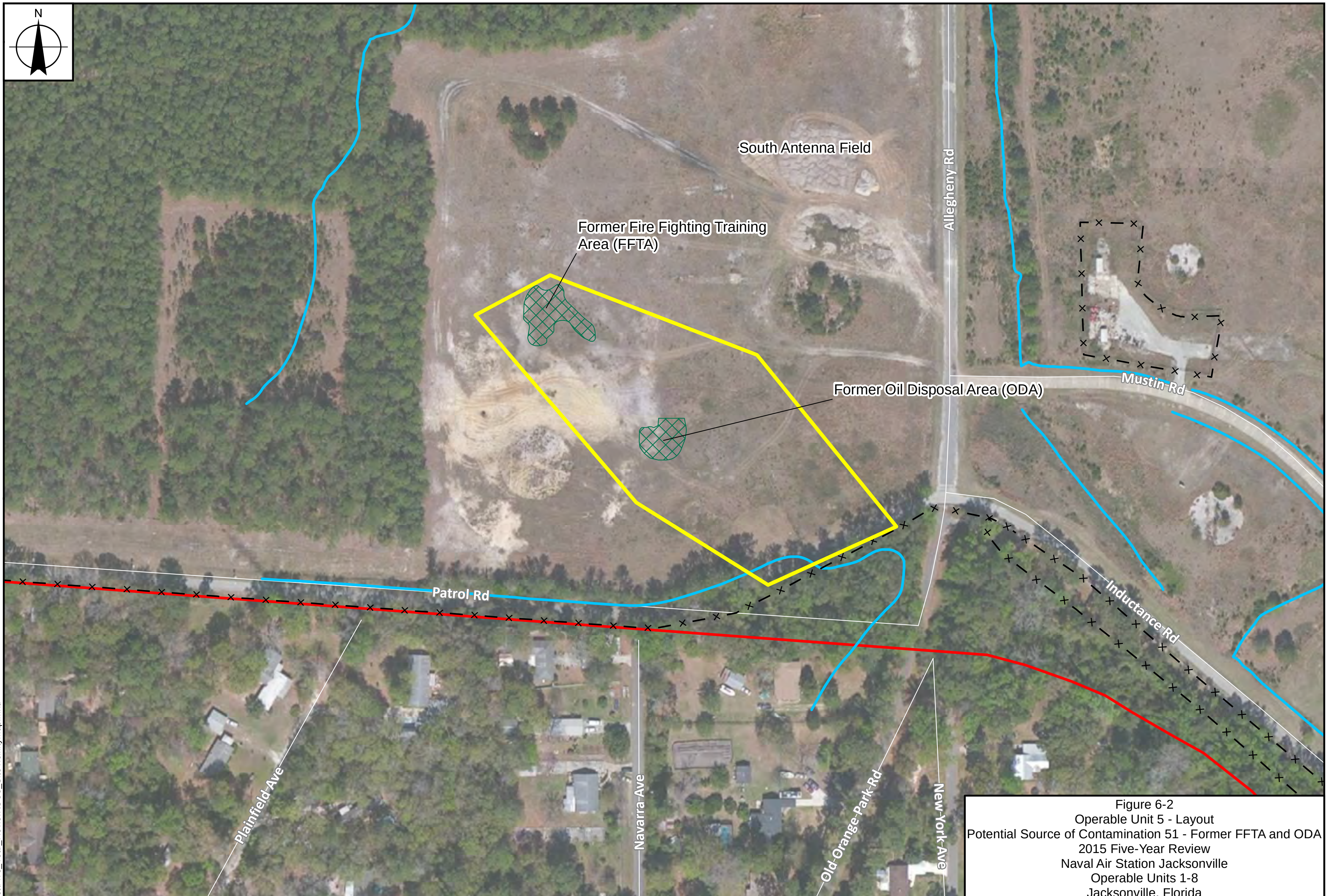

Figure 6-2
Operable Unit 5 - Layout
Potential Source of Contamination 51 - Former FFTA and ODA
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Ditch — Fence — Approximate Excavation Boundary — NAS Jacksonville Boundary — OU 5 Boundary

Ditch on Southern border of OU 5 is approximate.

0 100 200 Feet

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Ditch on Southern OU 5 Border and Excavation Areas approximated from Solutions-IES, Inc.; Road data are from the United States Census Bureau.

6.2.3 History of Contamination

The Former FFTA included a nearly circular (60-foot diameter/3,000-square-foot) area used by the NAS Jacksonville fire department to train firefighters. The Former ODA included a circular (50-foot diameter/2,000-square-foot) area used to drain hydraulic fluid, fuel, and oil from aircraft before transfer offsite. The FFTA was approximately 250 feet northwest of the ODA (BEI 1997). Both sites were identified in 1995 during a review of past facility activities in the area and observations of barren soil and debris. A 1997 sampling event detected metals in soil and VOCs in groundwater; a concurrent radiological survey detected RAD attributed to burned aircraft and aircraft parts that contained instruments with radium dials.

6.2.4 Initial Response

Soil

In 1998, BEI excavated RAD-contaminated soil (containing radium-226 above 5 picocuries per gram [pCi/g]) identified during the 1997 RAD survey. Soil was excavated to approximately 30 inches bgs at the Former FFTA and 24 inches bgs at the Former ODA (BEI 1999). During excavation at the Former ODA, oily black material with gamma readings indicative of a localized source was observed in a concave depression in which a 20-gallon drum had been buried to contain oils removed from airplanes. Black sludge in the drum was also RAD-contaminated. Approximately 1,000 cubic yards of RAD-contaminated soil excavated from the Former FFTA and Former ODA and the drummed sludge were transported offsite for disposal. Confirmation soil samples collected at the Former FFTA and Former ODA documented RAD contamination below 5 pCi/g.

During the RAD-contaminated soil removal activities, soil samples were also collected and analyzed for TCLP VOCs, SVOCs, and metals to determine the presence of chemically and RAD-mixed wastes. Approximately 20 cubic yards of non-RAD lead-contaminated soil from the Former ODA was disposed of offsite as hazardous waste. The lead excavation extended to approximately 9 feet bgs. Excavated areas, shown on Figure 6-2, were backfilled with clean soil (BEI 1999).

Groundwater

Groundwater intrusion in the Former ODA excavation prompted sampling of the ponded water. Since groundwater had not accumulated in the Former FFTA excavation, a shallow boring was installed within the excavation to sample groundwater. The sample from the Former FFTA contained 46.9 picocuries per liter (pCi/L) radium-226 and thorium-230; the sample from the Former ODA contained 164 pCi/L uranium-238.

Pre- and post-excavation groundwater samples were collected from one shallow well and one intermediate well installed downgradient of the Former FFTA and Former ODA. Samples contained benzene, cis-1,2-DCE, TCE, and vinyl chloride exceeding GCTLs, and RAD contaminants radium-226 and thorium-230.

6.2.5 Basis for Taking Action

The following synopsis of media-specific COCs and HHRA and ERA conclusions from the RI/FS are the basis for action at OU 5.

Soil

Surface and shallow subsurface soil contamination was defined by COC concentrations which exceeded FDEP Residential SCTLs, U.S. EPA Region 3 Risk-Based Criteria (RBC), and NAS Jacksonville Background Concentrations.[1,2] The horizontal extent of soil contamination was defined to less than industrial criteria, and was assumed to extend to the water table. The estimated volume of contaminated soil was 1,114 cubic yards.

Groundwater

Groundwater in the surficial aquifer contained petroleum compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX] and naphthalene) and chlorinated VOC concentrations above U.S. EPA MCLs and FDEP GCTLs.[3] Initial groundwater detections formed a definitive plume that extended vertically to approximately 20 feet bgs with concentrations decreasing downgradient and near lateral boundaries. The estimated volume of contaminated groundwater was 3.9M gallons (from a 59,903-square-foot surface area extending to 37 feet bgs) (TtNUS 2005). The horizontal extent of groundwater contamination was defined by the monitoring well network, with the leading edge to the south beyond well PSC51-MW-08S, which adjoins the north side of the unnamed creek.

Sediment and Surface Water

Groundwater in the surficial aquifer beneath PSC 51 discharges into the unnamed creek where surface water samples provide the downgradient control points for the groundwater plume. Surface water and sediment samples collected from three locations in the unnamed creek during the RI/FS did not contain VOCs above action levels. Groundwater samples from two shallow and two deep wells south of the creek confirmed that contamination did not extend beyond the creek.

[1] The site use is industrial but the extent of soil contamination evaluated in the FS was derived using residential criteria.
[2] Soil COCs included aluminum, antimony, arsenic, barium, chromium, copper, iron, lead, mercury, nickel, and vanadium.
[3] Groundwater COCs included vinyl chloride, TCE, cis-1,2-DCE, trans-1,2-DCE, and 1,1-DCE.

Human Health Risk Assessment

The HHRA considered exposures to future construction workers, current/future maintenance workers, future occupational workers, current/future adolescent trespassers, current/future adult trespassers, hypothetical future child residents, and hypothetical future adult residents.

- No adverse health effects were identified for exposure to surface water or sediment within the unnamed creek.

- ILCRs for all receptors exposed to soil were less than or within U.S. EPA's target cancer risk range of 1.0E-04 to 1.0E-06. Although ILCRs for the occupational worker, child resident, and adult resident exceeded FDEP's target risk level of 1.0E-06, arsenic was the only chemical in soil with cancer risks greater than 1.0E-06. The cancer risk calculated for the occupational worker was 1.1E-06 using the original data only.[4]

- In groundwater, benzene, vinyl chloride, and 1,1-DCE were the cause for unacceptable cancer risks to adolescent, adult, and lifelong residents using FDEP's 1.0E-06 criteria.

HIs for receptors exposed to soil were less than the U.S. EPA and FDEP acceptable level of 1.0 indicating a minimal potential for adverse health effects under the conditions established in the risk assessment. HIs for child residents exposed to individual media were less than 1 but the total HI (1.3) for all media slightly exceeded the acceptable level.

Ecological Risk Assessment

An ERA was performed as part of the RI to evaluate potential at-risk receptors. Soil- and sediment-dwelling organisms, terrestrial plants, pelagic/planktonic organisms, aquatic plants, and organisms that may ingest the above were all considered potential receptors in the ERA. The results indicated that metals in the surface soil could be harmful to plant and soil organisms, but should not pose a significant risk to wildlife in the area. The ERA concluded the impacts of groundwater upon the unnamed creek south of the site were uncertain and risks from the chemicals in surface water and sediment were low. The ERA determined remedial action for ecological risks was unnecessary if land use at PSC 51 remained industrial.

6.3 Remedial Actions

The ROD was signed 17 August 2005.

[4] This risk was based on a maximum arsenic concentration; if a 95 percent upper confidence limit value was used, no threat was posed to the occupational worker.

6.3.1 Remedial Action Objectives

The following RAOs are listed in the ROD.

- Protect human health by eliminating or preventing exposure to COCs (metals) in surface and subsurface soil.
- Protect human health and the environment by preventing potential exposure to surface water, should dissolved contaminants in groundwater (primarily VOCs) discharge into the unnamed creek that borders PSC 51 to the south.
- Reduce human health risk associated with potential exposure to surficial aquifer groundwater due to various VOCs.
- Reduce groundwater contamination to meet chemical-specific ARARs, defined as the lower of U.S. EPA MCLs and FDEP GCTLs.

Table 6-2 lists COCs, groundwater remedial goals, and FDEP Natural Attenuation Default Concentrations (NADCs).

Table 6-2
Groundwater Remedial Goals
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

Contaminant of Concern	Remedial Goal	Applicable or Relevant and Appropriate Requirements		
		U.S. EPA Maximum Contaminant Level	FDEP Groundwater Cleanup Target Level (2005)	FDEP Natural Attenuation Default Concentration (2005)
cis-1,2-dichloroethene	70	Not Listed	70	Not Listed
trans-1,2-dichloroethene	100	Not Listed	100	Not Listed
1,1-dichloroethene	7	7	7	Not Listed
Benzene	1	5	1	100
Trichloroethene	3	5	3	300
Vinyl chloride	1	2	1	100
Ethylbenzene	30	700	30	300
Toluene	40	1,000	40	400
Xylenes (Total)	20	10,000	20	200
Naphthalene	20	Not Listed	20	200

6.3.2 Remedy Selection

The remedy selected in the ROD consisted of the following components: (1) institutional controls, (2) natural attenuation, and (3) groundwater and surface water monitoring and reporting.

Institutional Controls

The selected remedy for soil contamination restricts land use and site access through institutional controls to prevent exposure to soil that contains metals. Concentrations of COCs remaining in soil above FDEP Residential SCTLs or NAS Jacksonville Background Concentrations do not present an unacceptable threat to human health or the environment under the current and planned future industrial use of PSC 51.

Natural Attenuation and Long-Term Groundwater and Surface Water Monitoring

Natural attenuation evaluated during the RI/FS was determined to be effective. The results indicated that (1) anaerobic conditions prevailed in the co-mingled benzene and chlorinated solvent plume, and (2) ongoing monitoring would be imperative to evaluate any increases in concentrations of the breakdown products and to determine whether it was necessary to consider localized introduction of oxygen in the downgradient portion of the plume. Groundwater monitoring for COCs and natural attenuation parameters would continue to assess the effectiveness of natural attenuation as a treatment for the surficial aquifer at PSC 51.

Groundwater and surface water monitoring reports will be prepared after each monitoring event to document the plume concentrations and natural attenuation conditions. If deemed necessary based on monitoring, groundwater modeling may be performed to estimate the duration of the natural attenuation.

Contingent Remedy

The ROD also provided contingent actions for the following conditions: (1) groundwater discharges to the unnamed creek at levels exceeding the surface water remedial goals and (2) if natural attenuation does not effectively reduce groundwater contaminants within the required timeframe. Milestone objectives were established for groundwater COCs to attain remedial goals within 10 years for non-chlorinated VOCs and 15 years for chlorinated VOCs. The annual milestone objectives will be reviewed during the five-year reviews to determine if contingency actions should be considered. In the event that natural attenuation is not effectively remediating the groundwater, in-situ enhanced bioremediation will be considered as a contingent remedy to increase the degradation of COCs in groundwater.

6.3.3 Remedy Implementation

Institutional Controls/Land Use Controls

The LUC RD lists the following performance objectives for PSC 51 (TtNUS 2006).

- Prohibit agricultural or residential reuse of the site.
- Restrict future use to non-residential activities involving less than full-time human contact by onsite workers with 8-hour-per-day (average) exposures to surface and subsurface soil.
- Ensure no construction or excavation of contaminated soil without special handling and disposal procedures.
- Prohibit withdrawal or use of the groundwater from the surficial aquifer for commercial/industrial purposes and human consumption.
- Maintain the integrity of any existing or future monitoring or remediation system(s).

The LUC Boundary covers 4.7 acres of mostly unpaved (grassy field) land, as shown on Figure 6-3. Under NAS Jacksonville's LUCIP, the Navy is responsible for implementing, monitoring, maintaining, reporting on, and enforcing the LUC element of the remedy. The Navy has a procedure in place where all construction projects air-station-wide must be reviewed by the Environmental Division to determine whether contaminated groundwater will be encountered or used. PSC 51 is inspected and warning signs (identifying the area as contaminated, instructing the reader to avoid contact with soil or groundwater, and providing a contact number for further information) are posted at regular intervals along the PSC 51 boundary. Restrictions will be removed when a determination of UU/UE has been made.

Long-Term Groundwater and Surface Water Monitoring

Groundwater monitoring at prescribed intervals began in October 2003. Seven monitoring wells (PSC51-MW-04, PSC51-MW-06, PSC51-MW-08S, PSC51-MW-10D, PSC51-MW-15S, PSC51-DPT-03, and PSC51-DPT-04) sampled as part of the annual monitoring program are shown on Figure 6-4. Field and laboratory natural attenuation parameters are analyzed to monitor the biodegradation of petroleum hydrocarbons and chlorinated solvents. Laboratory parameters analyzed include nitrogen species (i.e., nitrate, nitrite, and ammonia), orthophosphate, alkalinity, TOC, chloride, dissolved sulfide, sulfate, dissolved manganese, and dissolved gases (i.e., MEE). Natural attenuation field parameters include pH, temperature, specific conductivity, oxygen reduction potential (ORP), dissolved oxygen (DO), carbon dioxide, ferrous iron, and hydrogen sulfide.

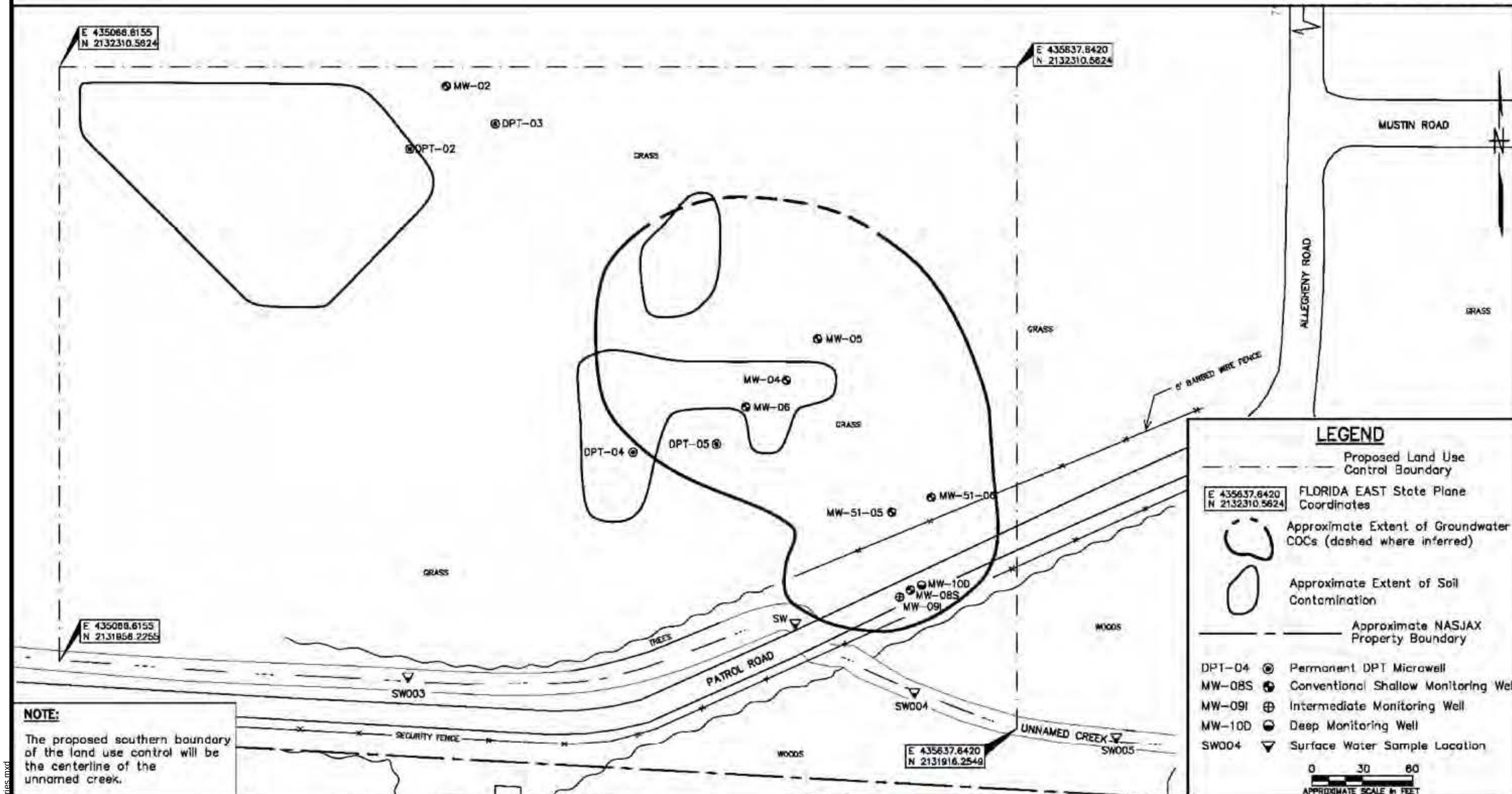

Figure 6-3
Operable Unit 5 - Land Use Control Boundaries
Potential Source of Contamination 51 - Former FFTA and ODA
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

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DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

Source:
- Map was acquired from Naval Air Station Jacksonville Land Use Control Remedial Design Potential Source of Contamination (PSC) 51 Former Fire Fighting Training Area and Oil Disposal Area by Tetra Tech NUS, Inc. December 2006.

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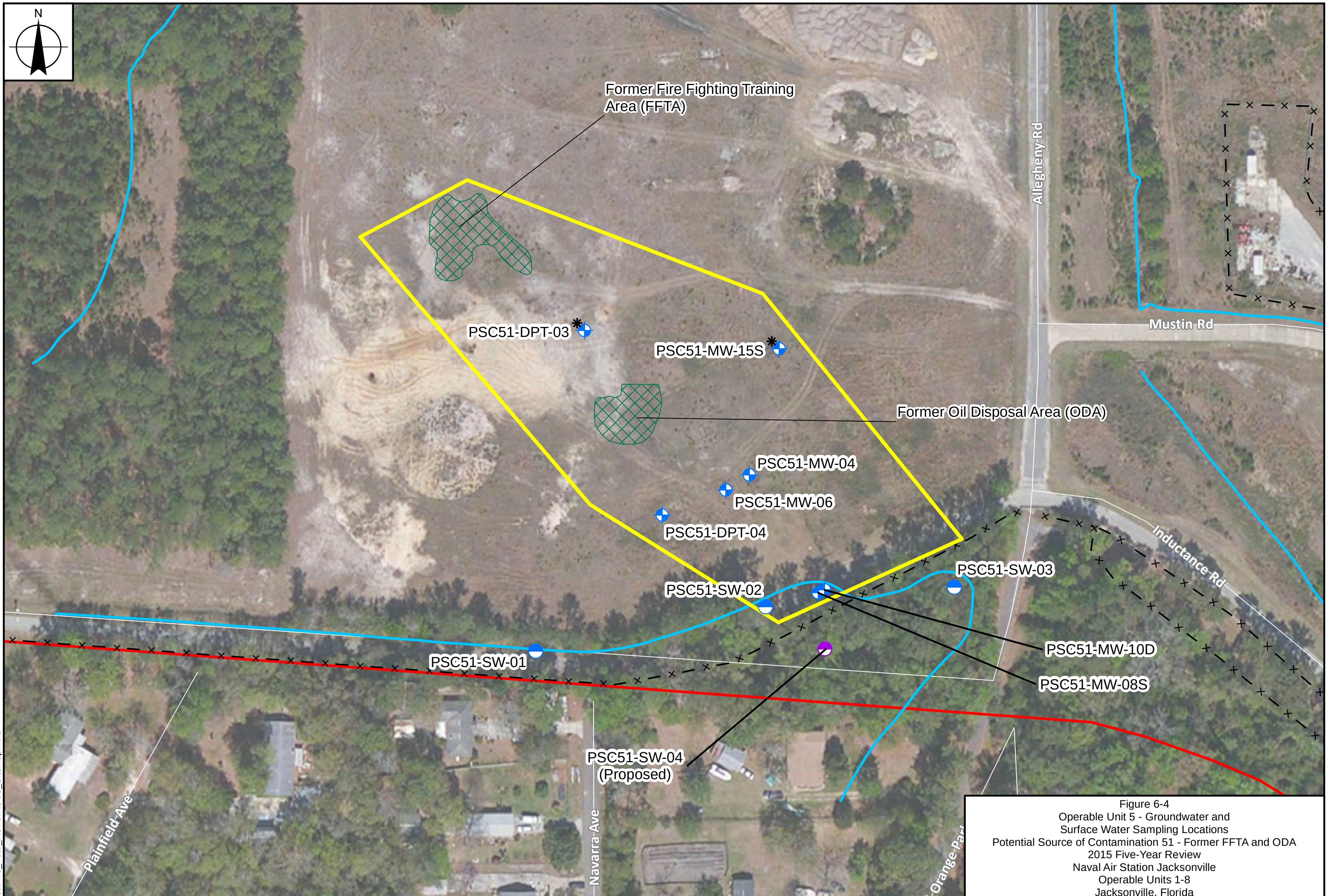

Figure 6-4
Operable Unit 5 - Groundwater and
Surface Water Sampling Locations
Potential Source of Contamination 51 - Former FFTA and ODA
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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REQUESTED BY: H. Brauer	DATE: 10/14/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Since the unnamed creek south of PSC 51 is the ultimate receptor of the groundwater contamination, surface water is monitored at the point of expected intersection to verify that groundwater discharges to the creek do not cause COC concentrations in surface water to exceed surface water ARARs. Three surface water samples collected at locations shown on Figure 6-4 during each groundwater monitoring event are analyzed for VOCs and PAHs.

Groundwater and surface water data are evaluated in Section 6.5.2.

6.4 Progress Since the Last Five-Year Review

6.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review, which was the first five-year review since the ROD was signed, made the following protectiveness statement.

> *The remedy at OU 5 (PSC 51) is protective of human health and the environment. The MNA effectiveness determination after collection of five years of data has been completed at this site and MNA was found to be meeting the RAOs, therefore the remedy for the short and long terms are protective. The institutional controls, groundwater monitoring, and surface water monitoring at PSC 51 provide an acceptable degree of protection of human health and the environment as long as they are conducted as required.*

6.4.2 Status of Recommendations and Follow-Up Actions from Last Review

The 2011 Five-Year Review concluded that (1) results of groundwater monitoring over the first five years showed an overall decrease of COCs, (2) conditions were present to support both aerobic and anaerobic biodegradation processes, and (3) the most recent sampling event

(2009) did not detect COCs above remedial goals in surface water. The 2011 Five-Year Review did not identify any issues requiring follow-up action, but noted the following.

- The naphthalene GCTL (chemical-specific ARAR) had changed from 20 to 14 µg/L; groundwater data were screened against the new value with no exceedances.

- FDEP had established SWCTLs for several COCs that were not promulgated at the time the OU 5 ROD were issued. Results were screened against new standards and there were no exceedances.

6.5 2015 Five-Year Review Process

6.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the ROD, LUC RD, and annual groundwater and surface water monitoring reports. This five-year review also included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Checklists for 2010 through 2014.

6.5.2 Data Review

Data for this five-year review was obtained from annual groundwater, surface water, and natural attenuation monitoring reports for Years 6 (2010) through 9 (2013).[5] Table 6-3 summarizes groundwater analytical results since monitoring began in 2004 and compares the results to U.S. EPA MCLs, FDEP GCTLs, NADCs, and Milestone objectives.

Source Area Wells

Data from 2004 through 2013 suggest COC concentrations detected within source area wells PSC51-MW-04, PSC51-MW-06, and PSC51-DPT-04 have been decreasing, and that natural attention is occurring. Data review suggests that the historically low COC results detected during the 2012 sampling event may be anomalous because concentrations detected in 2013 rebounded and were consistent with prior data trends in all wells except PSC51-DPT-04.[6]

COC concentrations detected in 2013 compared to historical values reveals that most have decreased between one to several orders of magnitude. COCs such as vinyl chloride, which have sustained elevated concentrations, may be related to natural attenuation processes. LTM is continuing to evaluate the 2012 anomaly further, and COC concentrations are expected to continue decreasing through natural attenuation.

Downgradient Wells

COC concentrations detected in PSC51-MW-08S have been decreasing over time, except for vinyl chloride, which slightly exceeded the 1 µg/L GCTL (at 1.7 µg/L) in June 2013. Benzene concentrations have been fluctuating near its 1 µg/L GCTL since 2011.

[5] Results for Year 10 groundwater and surface water monitoring, conducted in the summer of 2014, were not available for this five-year review.

[6] Concentrations of benzene, total xylenes, and vinyl chloride exceeding GCTLs in PSC51-DPT-04 were the highest concentrations detected to date since 2004.

Table 6-3
Groundwater Monitoring Results
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

Parameter	Remedial Goals and Contingency Action Levels					Monitoring Well ID (PSC51-)				
						Source Area (Downgradient of ODA)			Downgradient (South Border)	
	FDEP GCTL	U.S. EPA MCL	FDEP NADC	LTM Year	RI/FS Milestone Objective	MW-04	MW-06	DPT-04	MW-08S	MW-10D
Benzene	1	5	100	0 (2004)	240	73	52	0.7	9.6	0.9 I
				1 (2005)	216	38	31	<1	7	<1
				2 (2006)	192	52.1	**176**	0.7	4.4	<0.2
				3 (2007)	168	58.6	84.4	66.3	1.4	0.4 I
				4 (2008)	144	36	**140**	1.3	2.3	<0.23
				5 (2009)	120	30	61	42	2.8	<0.35
				6 (2010)	97	40	5.1	4.2	2.9	<0.27
				7 (2011)	73	33	37	6.4	<0.27	<0.27
				8 (2012)	49	0.76 I	0.61 I	1.9	1.3	<0.20
				9 (2013)	25	13.8	*72.9*	*88.5*	0.72 I	<0.21
				10 (2014)	1					
Ethylbenzene	30	700	300	0 (2004)	85	4.2	7.5	<0.3	<0.3	<0.3
				1 (2005)	80	2	4	<1	<1	<1
				2 (2006)	74	2.9	21.8	<0.3	<0.3	<0.3
				3 (2007)	69	1	6.4	3.1	<0.3	<0.3
				4 (2008)	63	0.48 I	14	<0.34	<0.34	<0.34
				5 (2009)	58	0.53 I	6.3	1.7	<0.43	<0.43
				6 (2010)	52	0.69 I	<0.26	<0.26	<0.26	<0.26
				7 (2011)	47	<0.26	<0.52	<0.26	<0.26	<0.26
				8 (2012)	41	<0.20	<0.20	<0.20	<0.20	<0.20
				9 (2013)	36	<0.29	3.4	9.9	<0.29	<0.29
				10 (2014)	30					

Table 6-3
Groundwater Monitoring Results
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

Parameter	Remedial Goals and Contingency Action Levels					Monitoring Well ID (PSC51-)				
						Source Area (Downgradient of ODA)			Downgradient (South Border)	
	FDEP GCTL	U.S. EPA MCL	FDEP NADC	LTM Year	RI/FS Milestone Objective	MW-04	MW-06	DPT-04	MW-08S	MW-10D
Toluene	40	1,000	400	0 (2004)	470	0.4 I	1.5	<0.2	<0.2	<0.2
				1 (2005)	427	<1	2	<1	<1	<1
				2 (2006)	384	0.5 I	5.8	<0.2	<0.2	<0.2
				3 (2007)	341	0.4 I	2.5	1.2	0.5 I	1 I
				4 (2008)	298	<0.28	6.1	<0.28	<0.28	<0.28
				5 (2009)	255	<0.43	4.4	0.53	<0.43	<0.43
				6 (2010)	212	<0.30	<0.30	<0.30	<0.30	<0.30
				7 (2011)	169	0.38 I	<0.60	<0.30	<0.30	<0.30
				8 (2012)	126	<0.20	<0.20	<0.20	<0.20	<0.20
				9 (2013)	83	<0.20	1.7	2.5	<0.20	<0.20
				10 (2014)	40					
Xylenes, Total	20	10,000	200	0 (2004)	380	3.6	21.7	<0.5	<0.5	<0.5
				1 (2005)	344	<3	9	<3	<3	<3
				2 (2006)	308	5.1	***1,044***	<0.5	<0.5	<0.5
				3 (2007)	272	0.8 I	23.5	4.9	0.6 I	0.7 I
				4 (2008)	236	0.48 I	92	<0.38	<0.38	<0.38
				5 (2009)	200	<0.85	21	<0.85	<0.85	<0.85
				6 (2010)	164	1	<0.50	<0.50	<0.50	<0.50
				7 (2011)	128	<0.50	<1	<0.50	<0.50	<0.50
				8 (2012)	92	<0.52	<0.52	<0.52	<0.52	<0.52
				9 (2013)	56	<0.50	5.2	21.2	<0.50	<0.50
				10 (2014)	20					

Table 6-3
Groundwater Monitoring Results
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

Parameter	Remedial Goals and Contingency Action Levels					Monitoring Well ID (PSC51-)				
	FDEP GCTL	U.S. EPA MCL	FDEP NADC	LTM Year	RI/FS Milestone Objective	Source Area (Downgradient of ODA)			Downgradient (South Border)	
						MW-04	MW-06	DPT-04	MW-08S	MW-10D
Trichloroethene	3	5	300	0 (2004)	78	18	1.1	<0.3	1.7	<0.3
				1 (2005)	73	16	<1	<1	2	<1
				2 (2006)	68	23.6	4.6	<0.3	1.7	<0.3
				3 (2007)	63	22.6	1.4	0.8 I	0.8 I	<0.3
				4 (2008)	58	20	2.9	<0.26	1	<0.26
				5 (2009)	53	14	2.3	<0.39	1.2	<0.39
				6 (2010)	48	15	<0.24	<0.24	1.1	<0.24
				7 (2011)	43	13	<0.48	<0.24	<0.24	<0.24
				8 (2012)	38	<0.26	<0.26	<0.26	<0.26	<0.26
				9 (2013)	33	6.0	0.65 I	1.2	<0.31	<0.31
				10 (2014)	28					
Vinyl Chloride	1	2	100	0 (2004)	37	0.8 I	3.6	<0.4	3.1	<0.4
				1 (2005)	35	2	2	<1	3	<1
				2 (2006)	32	2.8	9.2	0.4 I	4.8	<0.4
				3 (2007)	30	4	6	18.2	3.3	<0.4
				4 (2008)	28	2.2	6	0.84 I	2.2	0.52
				5 (2009)	25	2.2	2.6	4.6	2.4	<0.48
				6 (2010)	23	7.8	1.9	3.2	4.2	<0.33
				7 (2011)	20	6.9	2	3.4	<0.33	<0.33
				8 (2012)	18	<0.22	<0.22	<0.22	0.60 I	<0.22
				9 (2013)	16	5.3	13.6	7.1	1.7	<0.44
				10 (2014)	13					

Table 6-3
Groundwater Monitoring Results
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

	Remedial Goals and Contingency Action Levels					Monitoring Well ID (PSC51-)				
						Source Area (Downgradient of ODA)			Downgradient (South Border)	
Parameter	**FDEP GCTL**	**U.S. EPA MCL**	**FDEP NADC**	**LTM Year**	**RI/FS Milestone Objective**	**MW-04**	**MW-06**	**DPT-04**	**MW-08S**	**MW-10D**
trans-1,2-dichloroethene	100	100		0 (2004)	NE	0.2 I	0.2 I	<0.2	<0.2	<0.2
				1 (2005)		<1	<1	<1	<1	<1
				2 (2006)		0.2 I	0.5 I	<0.2	<0.2	<0.2
				3 (2007)		<0.2	<0.2	<0.2	<0.2	<0.2
				4 (2008)		<0.41	<0.82	<0.41	<0.41	<0.41
				5 (2009)		<0.47	<0.47	<0.47	<0.47	<0.47
				6 (2010)		<0.30	<0.30	<0.30	<0.30	<0.30
				7 (2011)		<0.30	<0.60	<0.30	<0.30	<0.30
				8 (2012)		<0.35	<0.35	<0.35	<0.35	<0.35
				9 (2013)		<0.23	<0.23	<0.23	<0.23	<0.23
				10 (2014)						
1,1-dichloroethene	7	7		0 (2004)	NE	1.1	0.7 I	<0.3	0.5 I	<0.3
				1 (2005)		<1	<1	<1	<1	<1
				2 (2006)		0.9 I	2.3	<0.2	0.4 I	<0.2
				3 (2007)		0.9 I	0.9 I	0.5 I	<0.2	<0.2
				4 (2008)		0.55 I	1 I	<0.36	<0.36	<0.36
				5 (2009)		0.52 I	<0.5	0.55 I	<0.5	NA
				6 (2010)		<0.21	<0.21	<0.21	<0.21	<0.21
				7 (2011)		0.92 I	<0.42	<0.21	<0.21	<0.21
				8 (2012)		<0.23	<0.23	<0.23	<0.23	<0.23
				9 (2013)		<0.20	<0.20	0.87 I	<0.20	<0.20
				10 (2014)						

Notes:

FDEP = Florida Department of Environmental Protection
GCTL = Groundwater Cleanup Target Level
U.S. EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
NADC = Natural Attenuation Default Concentration
LTM = Long-Term Monitoring
RI/FS = Remedial Investigation/Feasibility Study
ODA = Oil Disposal Area
I = Concentration estimated by the laboratory
Concentrations shaded exceed the lesser of Groundwater Cleanup Target Level and Maximum Contaminant Level
Concentrations in **bold** font exceed Natural Attenuation Default Concentration
Concentrations in *italic* font exceed Milestone Objective

Given the difference in COC concentrations from the same sampling event between source area well PSC51-MW-06 and the directly downgradient well PSC51-MW-08S, spatial attenuation processes appear to be actively reducing COC concentrations within the surficial aquifer.

COCs have not been detected in deep well PSC51-MW-10D since 2009 and have never been detected above FDEP GCTLs. This downgradient well, screened between 44.9 and 49.8 feet bgs, serves as the vertical plume delineation point.

Geochemical Data

Geochemical parameters suggest that natural attenuation of COCs has been occurring within the source and downgradient areas at OU 5. Source area TOC concentrations are indicative of residual hydrocarbon contamination and methane concentrations suggest that methanogenesis is breaking down BTEX within the aquifer. Furthermore, anaerobic reducing conditions within the aquifer may promote iron- and sulfate-mediated degradation of COCs.

Surface Water

Table 6-4 lists VOCs detected in surface water since monitoring began in 2004 and compares the results to ARARs. To date, all detections at surface water sampling points PSC51-SW-01, PSC51-SW-02, and PSC51-SW-03 have been below their respective FDEP SWCTLs, which indicates that the elevated COC concentrations detected in groundwater are not reaching the unnamed creek to the south and confirms ongoing natural attenuation processes. PSC51-SW-04 had not been added to the surface water monitoring reports reviewed for this five-year review. The proposed location is southeast of PSC51-SW-02, beyond (south of) Patrol Road. Benzene, 1,1-DCE, trans-1,2-DCE, ethylbenzene, TCE, vinyl chloride, and xylenes have not been detected in surface water since monitoring began in 2004.

Table 6-4
Surface Water Monitoring Results (Detections Only)
Operable Unit 5 — Potential Source of Contamination 51
(all concentrations presented in micrograms per liter)

Parameter	Florida Surface Water Standards	Surface Water Cleanup Target Levels	Year	PSC51-SW-01	PSC51-SW-02	PSC51-SW-03
cis-1,2-dichloroethene	Not Established	Not Established	2006	Not Detected	**0.2** J	Not Detected
Toluene	475	480	2006 2009 2012 2013	Not Detected Not Detected **1.0** **1.3**	**0.51** J **0.28** **8.2** Not Detected	**1.5** Not Detected **0.63** **7.0**

6.5.3 Site Inspection and Interviews

Resolution Consultants drove around OU 5 and along nearby Allegheny Road and the southeast border (Patrol Road), accompanied by Mr. Curtin and Ms. Wilson, on 1 October 2014. The mostly grassy field was mowed. Access to the OU 5 boundary is unsecured (not fenced) and indistinguishable from the surrounding fields; the south boundary of OU 5 beyond Patrol Road, the south border of NAS Jacksonville, is fenced with access strictly limited to air station personnel.

6.6 Technical Assessment

6.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

The major components of the remedy presented in the ROD are LUCs, MNA, and groundwater and surface water monitoring and reporting.

Remedial Action Performance

LTM has defined the horizontal and vertical extent of groundwater contamination and has revealed decreasing COC concentrations over time in source area wells. Surface water monitoring indicates that COCs in groundwater are not reaching the unnamed creek to the south at concentrations above FDEP SWCTLs. To date, LUCs and groundwater/surface water monitoring have met the intent of the decision documents, natural attenuation remains an effective remedy for groundwater, and a contingency remedy has not been required.

System Operation/Operations & Maintenance

Monitoring wells are inspected annually during LTM events. Routine O&M conducted as a result of observations made during the inspections involved replacing a well cap on PSC51-MW-08S in 2012, and installing locks on PSC51-MW-08S and PSC51-MW-10D in 2013.

Opportunities for Optimization

Opportunities for optimization of the LTM program are considered annually by the NAS Jacksonville Partnering Team. Optimization alternatives evaluated to date include adding or removing wells and surface water sample locations, individual COCs, and natural attenuation parameters.

Implementation of LUCs and Institutional/Engineering Controls

LUCs have been implemented and an approved LUC RD is in place. NAS Jacksonville IRP personnel conduct LUCIP inspections quarterly and submit inspections to the U.S. EPA and FDEP annually. The first quarter 2014 LUCIP inspection sheet noted that the culvert at PSC 51 was plugged and needed to be cleared; inspections have not identified issues that would affect protectiveness.

Early Indicators of Potential Remedy Problems

This five-year review identified no early indicators of potential remedy problems, and contingency actions have not been necessary to date.

6.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

Location- and action-specific ARARs are discussed in Section 1.7. Chemical-specific ARARs considered applicable during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The ROD stipulated use of the lower of MCLs or FDEP GCTLs for the groundwater remedy. Florida groundwater regulations (FAC Chapters 62-550 and 62-777) have performance criteria that are equal to or lower than U.S. EPA MCLs and are adequate to assess whether the remedy is functioning as intended because the lower of the state or federal performance criteria are being used.

Florida SWCTLs for PSC 51 COCs have not changed since the 2011 Five-Year Review or since the ROD was signed. The most recent update to CTLs was made in April 2005.[7]

Expected Progress towards Meeting RAOs

Milestone objectives were established for groundwater COCs to attain remedial goals within 10 years for non-chlorinated VOCs and 15 years for chlorinated VOCs. Benzene is the only COC with a detected concentration that exceeded its milestone objective.[8]

Changes in Exposure Pathways

The exposure pathways have not changed, and there have been no changes in the physical conditions of OU 5 that would affect the protectiveness of the remedy.

Changes in Land Use

The Navy's plans for OU 5 provide for continued non-residential use of the site and LUCs prohibit unauthorized construction or excavation.

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[7] www.dep.state.fl.us/wastequick_topics/rules/default.htm#62-777
[8] The benzene concentration was detected during the 2013 sampling event and 2014 data was not available for this five-year review.

New/Emerging Contaminants and Contaminant Sources

PFCs are emerging contaminants commonly associated with FFTAs. Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were the two most commonly produced perfluorinated chemicals in the United States (U.S. EPA 2014). Both are fully fluorinated organic compounds used in the manufacture of Aqueous Film Forming Foam (AFFF) from the 1960s to 2001.[9] PFOS-based AFFF was used by the Navy to extinguish flammable liquid fires (e.g., hydrocarbon fueled) such as those encountered on airplanes. The Navy also used AFFF for fire-fighter training and, as such, it is an emerging contaminant that is being investigated at Navy-owned properties with FFTAs. Because FFTA activities at OU 5 ceased in 1952, prior to the reported dates (1960s) when PFCs were AFFF additives, PFOS/PFOA are not considered emerging contaminants at this PSC.

No remedy byproducts or degradation products have been identified which would be considered new or emerging contaminants.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The BRA and other risk assessment documents in the RI/FS were developed using RAGS for Superfund, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992). The basis for remedial action is discussed in Section 6.2.5. The risk assessment changes discussed in Section 1.8 are applicable to OU 5 because RAD wastes were COCs. In September 2014, U.S. EPA changed its approach for evaluating risk at sites with RAD waste. The new, more conservative guidance states that exposure rates above 12 millirems per year are presumptively not protective. RAD wastes were left in place at OU 5 but LUCs prevent unauthorized access, use, and exposure. The change in U.S. EPA guidance for RAD waste is not expected to affect protectiveness based on a lack of exposure pathways and current LUC enforcement practices, but should be considered if changes to land use, alterations to LUCs, or modifications to existing barriers (clean fill) are considered.

Vapor Intrusion

VI was not considered a potential pathway at OU 5 as there are no structures onsite. If land use should change, it may be necessary to evaluate VI as a potential pathway.

Summary

In summary, risk assessment findings at OU 5 were based on current and proposed future industrial land use. LUCs have been implemented to prevent future residential land use, groundwater

[9] http://www.nrl.navy.mil/accomplishments/materials/aqueous-film-foam/

use, and construction. ARARs were used to design the groundwater remedy. This five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the ARAR-based remedy because LUCs are in place to prevent exposure.

6.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

6.7 Issues

The five-year review identified no issues requiring recommendations or follow-up actions at OU 5.

6.8 Protectiveness Statement

The remedy at OU 5 is protective of human health and the environment because LTM data indicate contaminants are naturally attenuating. Groundwater and surface water monitoring ensure contamination is not migrating offsite or to the unnamed creek, and that the natural attenuation portion of the remedy is effective. LUCs eliminate risk from exposure to soil and groundwater.

7.0 OPERABLE UNIT 6

OU 6 includes Hangar 1000 (PSC 52) and is the location of two former underground storage tanks (USTs), referred to as Tanks A and B, installed in the late 1960s and removed in 1994. Hangar 1000 is now part of FRCSE, which performs various support functions for Navy aircraft, designated weapons systems, accessories, and equipment. OU 6 and Hangar 1000 are southwest of the John Towers Field flight line and north of Yorktown Avenue (Figure 7-1). Investigation reports, decision documents, and the LUC RD interchangeably use OU 6 and Hangar 1000 to describe groundwater contamination at this location.

7.1 Site Chronology

Historical events and relevant dates in the OU 6 chronology are listed in Table 7-1.

Table 7-1
Chronology of Site Events at Operable Unit 6
Potential Source of Contamination 52 — Hangar 1000

Event	Date
Resource Conservation and Recovery Act (RCRA) inspection noted that Tanks A and B were used to process Hangar 1000 discharges	1988
Site listed on the National Priorities List	November 1989
Initial assessment activities discovered volatile organic compounds (VOCs) in soil and groundwater	1991 to 1992
Various assessments conducted to define extent of VOC groundwater plume	1995 to 1999
Tanks A and B, piping, and surrounding soil excavated	1994
Hangar 1000 tank system closure certification approved by Florida Department of Environmental Protection	October 1997
RCRA Post-Closure Permit issued for Naval Air Station (NAS) Jacksonville includes Hangar 1000	2000
Interim Remedial Actions (chemical oxidation treatments)	2000 to 2001
Remedial Investigation/Focused Feasibility Study	March 2004
Nanoscale Particle Iron Injection Demonstration	2004 to 2005
Post-Closure Permit deferred all remedial action to the NAS Jacksonville Installation Restoration Program	2006
Record of Decision signed	20 March 2007
Land Use Control Remedial Design	October 2007
Semi-Annual Performance Monitoring	July 2009 to June 2014
Previous Five-Year Review	2011

Figure 7-1
Operable Unit 6 - Location
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

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REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

Operable Unit 6 Boundary

NAS Jacksonville Boundary

0 500 1,000 Feet

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

7.2 Background

7.2.1 Physical Characteristics

Hangar 1000 is a hexagonal structure with an open rectangular area in the south side, which creates a keyway that functions as the main entrance (Figure 7-2). The remaining sides of Hangar 1000 have sliding bay doors for aircraft entry. Tanks A and B, formerly under the northeast portion of the keyway (Figure 7-2), received waste solvents and other substances from a wash rack, drain lines, and other Hangar 1000 shop operations. A concrete flight line apron and a taxiway adjoin Hangar 1000 to the north. The remainder of the area surrounding the hangar is paved with open tarmacs to facilitate moving and staging aircraft.

The area surrounding Hangar 1000 is topographically flat with surface runoff diverted via grated drains to the NAS Jacksonville storm water drainage system. Storm drains discharge to a 5-foot-diameter underground storm sewer buried approximately 8 feet bgs on the south side of Yorktown Avenue (Figure 7-2). Groundwater begins to infiltrate the storm sewer slightly upgradient of OU 6 (USGS 2003). The storm sewer drains east and empties into an unnamed concrete-lined drainage ditch that flows south to the St. Johns River, located approximately 2,000 feet southeast of Hangar 1000. The drainage ditch is PSC 44 (Drainage Ditch West of Ajax Street) and, based on a separate investigation, the site achieved NFA under the CERCLA IRP.

7.2.2 Land and Resource Use

The land use at Hangar 1000 is industrial and there are no plans to discontinue military operations involving aircraft services at this location. The keyway entrance has a tall, locked gate so that only permitted air station personnel are allowed access. Under a reasonable future land use, the area is expected to remain industrial and future receptors will continue to be air station personnel assigned to activities within Hangar 1000.

The nearest residential development is Patriot's Point single-family and townhome-style air station housing approximately 1,000 feet southwest of Hangar 1000 and 800 feet southwest of the nearest plume boundary. Investigations conducted since the early to mid-1990s have determined shallow groundwater flows southeast.

The surficial aquifer at OU 6 is not used for domestic, industrial, or potable purposes, and NAS Jacksonville does not anticipate such future uses. The LUC remedy implemented at Hangar 1000 prohibits unauthorized withdrawal or use of surficial aquifer groundwater for any purpose except assessing groundwater quality or remediating groundwater contamination.

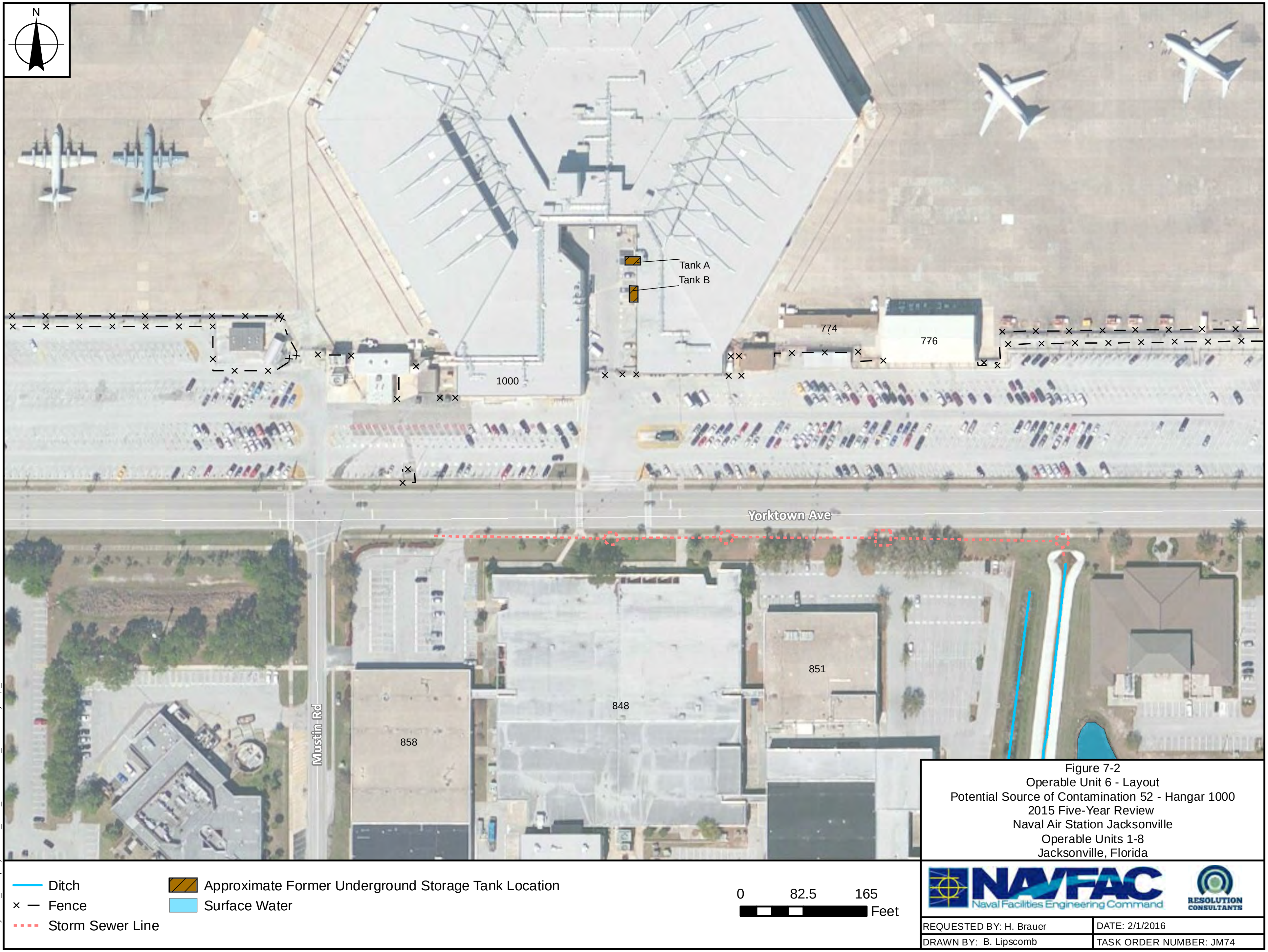

Figure 7-2
Operable Unit 6 - Layout
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command
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DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road names are from the United States Census Bureau.

Environmental receptors are not expected to be present in the vicinity as there are no surface water bodies, exposed soil, or vegetated areas at OU 6 (ABB-ES 1992).

7.2.3 History of Contamination

Tanks A and B were constructed in the late 1960s/early 1970s to receive wastewater discharges associated with cleaning operations performed at the interior Hangar 1000 wash rack. Concrete Tank A, with a 750-gallon capacity, was used as an oil-water separator (OWS). Tank B was a 2,000-gallon steel UST that received overflow from the second chamber of Tank A, in addition to waste oils and solvents discharged from other operations at Hangar 1000. Tank A was approximately 20 feet north of Tank B.

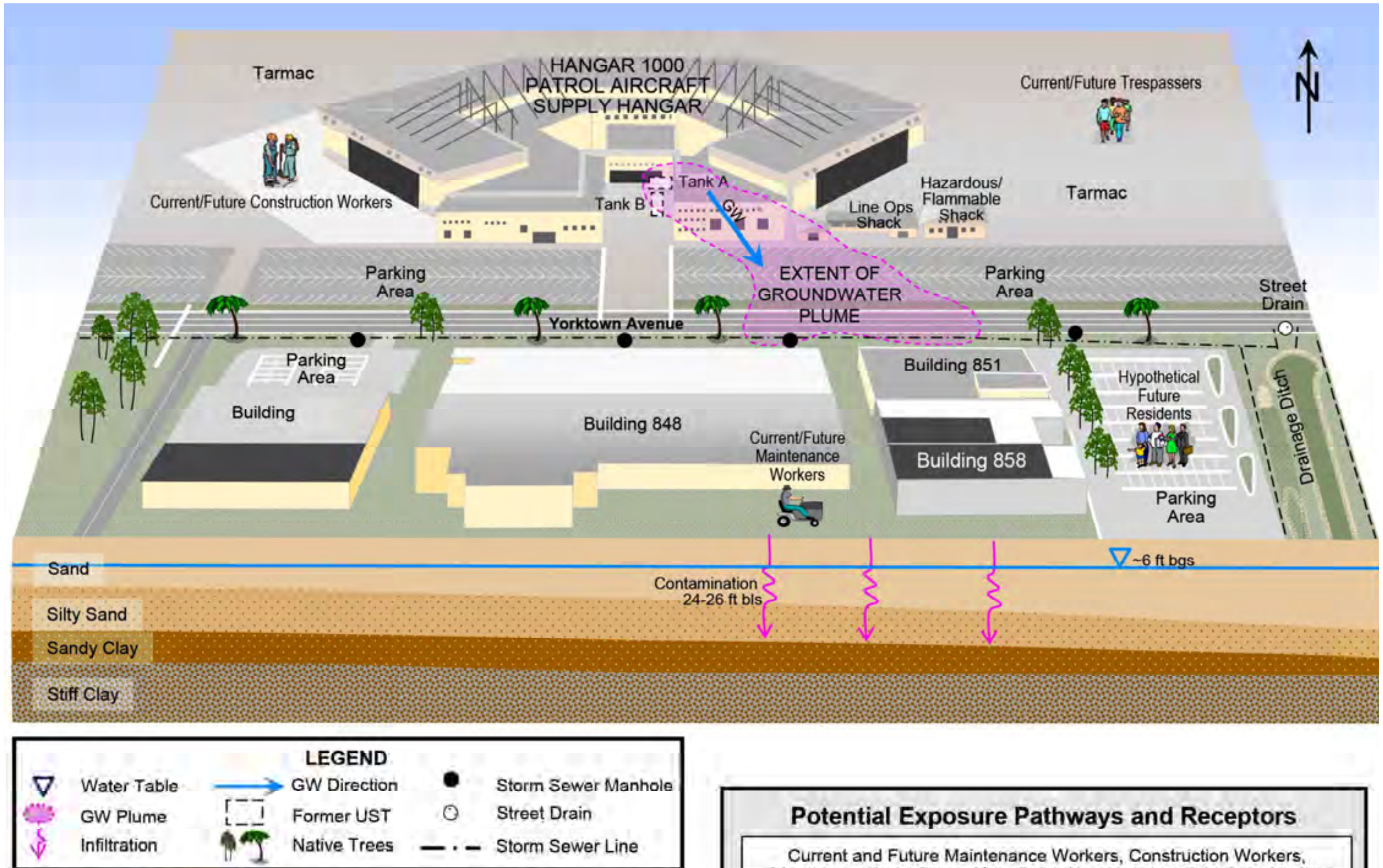
Use of the tanks ceased in November 1987, when drain lines to the tanks from Hangar 1000 were plugged. The OWS was not designed to prevent backflow so rainwater accumulated in Tank A during periods of heavy rainfall. The backflow resulted in releases of waste organic solvents and other liquids to the environment which are considered the primary sources of groundwater contamination at OU 6. Additional sources include potential releases of waste liquids stored in Tank B and contributions from historical spills that may have migrated into the storm sewer from other operational areas at Hangar 1000. Portions of the tank system were located below the water table, which may have caused leaks to directly discharge to groundwater at approximately 6 feet below paved surfaces.

The contaminant source area of the groundwater plume was determined to be centered on the former Tank A location. Contamination extends to approximately 29 feet bgs where a clay layer acts as an aquitard (Tetra Tech 2011). Figure 7-3 presents the CSM showing potential exposure pathways and receptors.

7.2.4 Initial Response

A 1988 hazardous waste inspection identified the tanks as a RCRA-regulated unit (TtNUS 2004). NAS Jacksonville subsequently removed contaminated soil, closed the tank system, and performed post-closure activities during which evidence of groundwater contamination was discovered. Tanks A and B and most of the associated piping were removed in March 1994. Soil containing COC concentrations above site-specific target concentrations was excavated and transported offsite for disposal.[1]

[1] A December 1992 *Health and Environmental Assessment* established risk-based clean closure target concentrations for an industrial land-use scenario.



Potential Exposure Pathways and Receptors

Current and Future Maintenance Workers, Construction Workers, Trespassers/ and Future Hypothetical Future Recreational Residents
• Dermal Contact, ingestion, inhalation, or vapor intrusion

Figure 7-3
Operable Unit 6 - Conceptual Site Model
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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Source:
- CSM was aquired from TIER 2 SAMPLING AND ANALYSIS PLAN FOR MONITORED NATURAL ATTENUATION AT OPERABLE UNIT 6 (OU 6) NAS JACKSONVILLE FL by Tetra Tech NUS, Inc. March 2012.

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Groundwater assessments conducted between 1994 and 1999 delineated a dissolved chlorinated solvent plume extending from former tank locations, with the source area around Tank A defined by elevated groundwater concentrations of TCE and 1,1,1-TCA. The total concentrations and types of VOCs detected in saturated soil and groundwater were indicative of DNAPL (U.S. EPA 1992). IRAs consisting of chemical oxidation treatment of suspected source areas were conducted in 2000 and 2001. Although contaminant concentrations were reduced initially, dissolved-phase concentrations rebounded following each source area treatment.

Additional soil and groundwater data were obtained from site characterization sampling in March and October 2002. As shown on Figure 7-4, 25 wells were installed at three intervals within the surficial aquifer and one well was installed to 58 feet bgs in the second sand unit beneath the surficial aquifer at OU 6.

7.2.5 Basis for Taking Action

Soil contaminated above site-specific risk-based action levels was removed during the RCRA-regulated tank closure (ABB-ES 1992). Subsequent review of closure soil sample data indicated no exceedances of FDEP Residential SCTLs (TtNUS 2007). The ROD documented the NAS Jacksonville Partnering Team agreement for soil NFA under CERCLA.

When NAS Jacksonville's RCRA Permit was renewed in 2006, all post-closure requirements for Hangar 1000 were deferred to the CERCLA IRP, with concurrence from the NAS Jacksonville Partnering Team. RCRA Permit GWPS in 40 CFR Part 264 Subpart G are ARARs equivalent to GCTLs and were adopted to establish COCs in the RI/Focused FS.

According to the ROD, the basis for action was the presence of VOCs and SVOCs in surficial groundwater (7 to 24 feet bgs) at concentrations exceeding established remedial goals. The maximum detected concentrations of COCs 1,1-DCA, 1,2-DCA, 1,2-DCE (total), TCE, 1,1,1-TCA, PCE, vinyl chloride, 3-methylphenol, and 4-methylphenol exceeded their respective FDEP GCTLs.

The concentrations of VOCs in the source area suggested that a continuing source (remnant DNAPL) was present in a sandy clay horizon at 10 to 12 feet bgs and in a sandy clay at 24 feet bgs near the former Tank A location. Groundwater data interpretation indicated that impact was limited to the shallow unit of the surficial aquifer; analysis of samples collected from the middle interval of the shallow aquifer did not detect COCs. The lateral extent of the surficial aquifer plume was defined to the north by monitoring well MW-10 and to the south by the storm sewer that parallels Yorktown Avenue. The storm sewer serves as the primary receptor for groundwater from Hangar 1000 but has not exhibited VOC impacts to date.

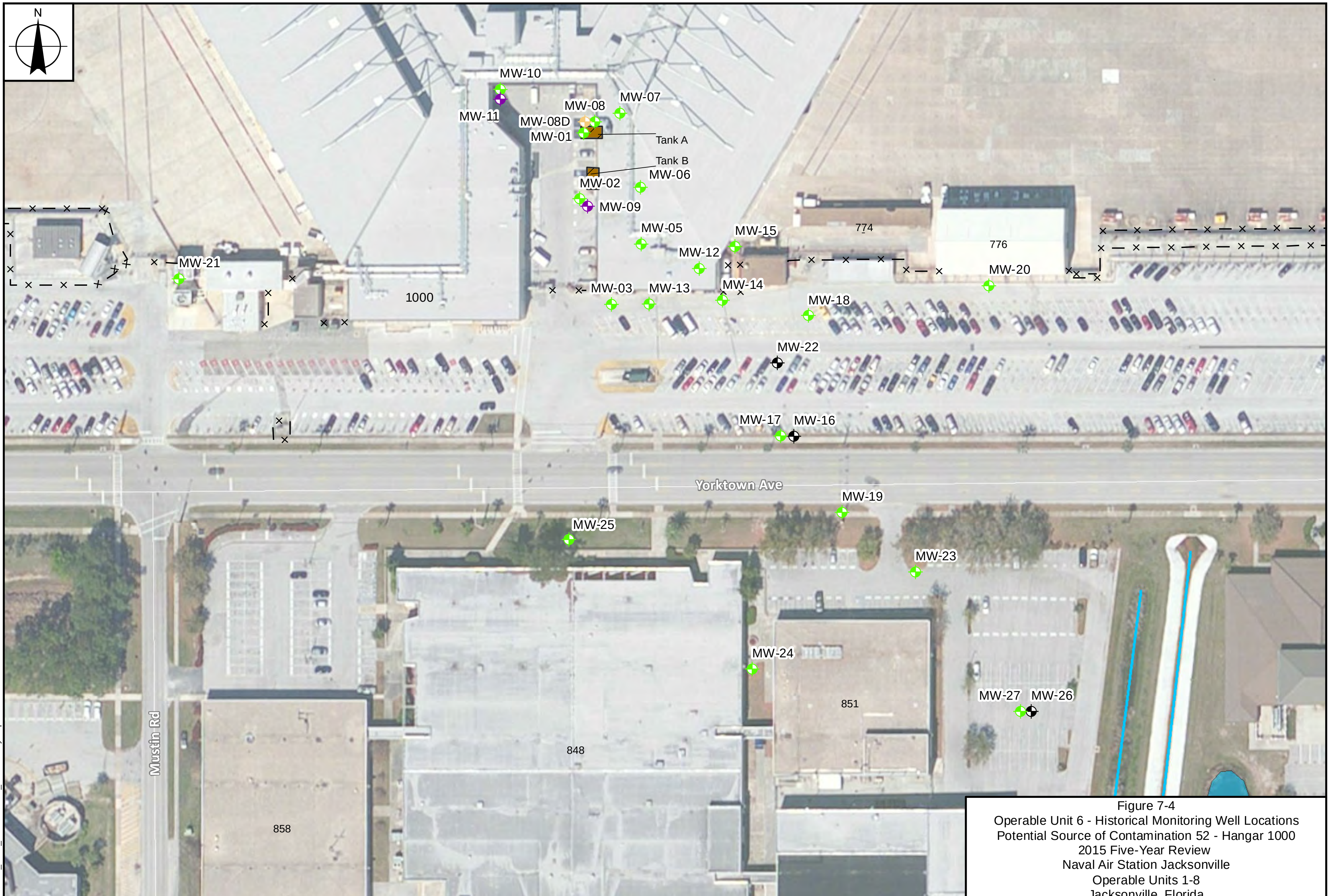

Figure 7-4
Operable Unit 6 - Historical Monitoring Well Locations
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

- Deep Interval Monitoring Well
- Middle Interval Monitoring Well
- Second Sand Unit Monitoring Well
- Shallow Interval Monitoring Well
- Ditch
- Fence
- Surface Water
- Approximate Former Underground Storage Tank Location

0 62.5 125 Feet

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REQUESTED BY: H. Brauer	DATE: 2/1/2016
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

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Human Health Preliminary Risk Evaluation

The Human Health Preliminary Risk Evaluation (HHPRE) for Hangar 1000 calculated potential cancer risks and HIs for direct contact exposures to groundwater under a residential use scenario. Based on maximum detected concentrations used in the HHPRE, the ILCR exceeded U.S. EPA's target risk range of 1.0E-06 to 1.0E-04 and FDEP's target risk level of 1.0E-06. Chemical-specific ILCRs for benzene, 1,2-DCA, 1,1-DCE, TCE, PCE, and vinyl chloride were greater than 1.0E-06. The ILCR of 6.4E-03 based on upper confidence limits also exceeded U.S. EPA's target risk range and FDEP's target risk level. Chemical-specific ILCRs for benzene, 1,2-DCA, 1,1-DCE, TCE, 1,1,2-TCA, PCE, and vinyl chloride were greater than 1.0E-06.

Screening Level Ecological Risk Assessment

The results of the SLERA performed as part of the RI showed that contamination in groundwater/surface water should not pose a significant risk to wildlife or other ecological receptors. Sediment samples were collected from the drainage ditch south of Yorktown Avenue at the outfall of the storm sewer downgradient (southeast) of Hangar 1000 in 1999. Metals and PAHs detected in those samples were attributed to storm water runoff from adjacent roads and parking lots and not to groundwater originating from Hangar 1000 source area. No site-related constituents (VOCs) were detected in surface water samples collected in June 2001 from the ditch, indicating an incomplete pathway to ecological receptors (TtNUS 2004).

7.3 Remedial Actions

The OU 6 ROD was signed on 20 March 2007.

7.3.1 Remedial Action Objectives

The ROD established RAOs for groundwater and surface water at Hangar 1000 to prevent (1) unacceptable risks from human exposure to groundwater COCs and (2) contaminant migration from groundwater to surface water (drainage ditch) above surface water remedial goals. Table 7-2 presents COCs, groundwater remedial goals, NADCs, and milestone objectives, and surface water remedial goals as listed in the OU 6 ROD.

Table 7-2
Contaminant of Concern Groundwater Criteria at Operable Unit 6
Potential Source of Contamination 52 — Hangar 1000
(All concentrations presented in micrograms per liter)

Contaminant of Concern	FSWS[1]	Groundwater							
		GCTL (2005)	NADC (2005)	Milestone Objectives					
				Year 0	Year 1	Year 3[2]	Year 4	Year 5	Year 18
Benzene	71.28	1	100	1	not estimated	not estimated	not estimated	not estimated	not estimated
1,1-DCA	not listed	70	700	627	596	534	503	472	69
1,2-DCA	37	3	300	9.4	9	8.2	7.8	7.4	NE
1,1-DCE	3.2	7	700	1,500	1,417	1,251	1,168	1,085	6
1,2-DCE (total)	7,000	63	630	2,780	2,629	2,327	2,176	2,025	62
1,1,1-TCA	270	200	2,000	7,330	6,933	6,139	5,742	5,345	184
1,1,2-TCA	16	5	500	2	not estimated	not estimated	not estimated	not estimated	not estimated
TCE	80.7	3	300	8,710	8.226	7,259	6,775	6,291	3
PCE	8.85	3	300	33.7	31.9	28.5	26.8	25.1	3
Vinyl Chloride	2.4	1	100	15.9	15	13.3	12.5	11.6	0.6
3-methylphenol	450	35	350	5.2	not estimated	not estimated	not estimated	not estimated	not estimated
4-methylphenol	70	3.5	35	5.2	3.5	not estimated	not estimated	not estimated	not estimated
Naphthalene	26	14	140	11.8	not estimated	not estimated	not estimated	not estimated	not estimated

Notes:
(1) Florida Surface Water Standards (FAC Chapter 62-302, 2005) applicable to 1,1-DCE, TCE, PCE, and benzene
(2) No sampling was conducted in 2011 (Year 2) so milestone objectives are not included.

7.3.2 Remedy Selection

The final remedy selected in the ROD was based upon the HHPRE and SLERA (TtNUS 2004), Nanoscale Particle (NP) Iron Injection Demonstration Report (2005), and Proposed Plan (2006). The selected remedy included the following components.

- In-situ treatment by NP injection to effect reductive dechlorination of the main DNAPL constituents (chlorinated VOCs) at OU 6.
- Natural attenuation to reduce remaining contamination levels over time through biological and other natural process. MNA evaluations gauge contamination breakdown to assess the effectiveness of remedial action and the progress of natural attenuation by detecting potential migration of contaminated groundwater so that appropriate actions (e.g., contingent remedies) can be taken.

- Surface water sampling from the drainage ditch south of Yorktown Avenue and in the storm sewer along the south side of Yorktown Avenue.

- Groundwater sampling from selected wells for COCs to compare to remedial goals, NADCs, and milestone objectives to evaluate if natural attenuation is occurring at the projected rate. Chemical concentrations and movement of the groundwater will be monitored until cleanup is complete or unless site conditions identified in an annual or five-year review of monitoring data suggest that a different cleanup method should be considered.

- Hangar 1000 will be maintained in the NAS Jacksonville LUCIP Program until concentrations of COCs in groundwater allow for UU/UE.

The ROD also identified a contingency remedy (additional NP injections or other treatment technologies to increase COC degradation) in the event that MNA does not occur at an acceptable rate or if groundwater COCs migrate to the monitored drainage ditch at concentrations exceeding surface water remedial goals.

7.3.3 Remedy Implementation

Treatment with NP Injections

An NP treatability study included injection of 300 pounds of an emulsion of catalyst-coated ultra-fine-grained iron particles using DPT and a closed-loop recirculation process involving three extraction wells and four injection wells. Based on samples collected one year after injection, the iron recirculation process fostered favorable mass transfer from the sorbed and potential immiscible phases into the dissolved phase. Following short-term reductions in parent products and sequential degradation (through ethene/ethane), groundwater samples collected one year after injection showed parent and degradation product concentrations returned to and persisted at elevated concentrations comparable to those previously detected.

Comparison of pre- and post-injection saturated soil samples confirmed that significant mass reduction was achieved as a result of the NP injection (TtNUS 2005). The NAS Jacksonville Partnering Team determined the remedial goal of contaminant mass reduction between 40 and 50 percent was achieved at completion of the demonstration and no further injection was necessary.

MNA and Groundwater and Surface Water Monitoring

The LTM program consists of collecting and analyzing groundwater samples for degradation products to assess the effectiveness of the attenuation process, and collecting surface water samples to verify that groundwater COCs originating from the Hangar 1000 source area are not discharging to the drainage ditch. Semi-annual groundwater monitoring of six wells began in July 2009.[2] Figure 7-5 shows monitoring well locations.

One surface water sample (H10SW01) is collected from the drainage ditch and one storm sewer sample (H10SW02) is collected from a Yorkstown Avenue manhole; surface water and storm sewer water sample locations are also shown on Figure 7-5.

Between January 2006 (the post-injection sampling event) and August 2010, concentrations of VOCs decreased overall, with the most significant reductions at source area wells (see Table 7-3).

Table 7-3
Post-Remedy Reduction of Select Volatile Organic Compounds in Source Area Wells
Operable Unit 6 — Potential Source of Contamination 52 — Hangar 1000
(all concentrations reported in micrograms per liter)

Well ID	Volatile Organic Compound	January 2006	August 2010	Percent Reduction
H10MW08	1,1,1-trichloroethane 1,1-dichloroethene	10,000 16,000	353 3,913	96 76
H10MW14	Trichloroethene 1,1-dichloroethane	84 260	4.82 35.1	94 87
H10MW19	Trichloroethene 1,1-dichloroethane	32 72	14.9 19.9	53 72
H10MW22	1,1-dichloroethene 1,1-dichloroethane	690 390	137 97	80 75

Significant findings, conclusions, and recommendations from semi-annual and other groundwater monitoring reports generated since 2009 are discussed in Section 7.5.2.

Land Use Controls

The objectives of LUCs are to prohibit withdrawal or use of groundwater until the remedial goals have been achieved, prevent disturbing or interfering with current or future groundwater monitoring systems, and ensure workers potentially exposed to groundwater at the site are protected. Specific performance objectives and requirements are in the approved LUC RD document (NAVFAC 2007). Hangar 1000 and the corresponding OU 6 LUC area cover approximately 3.4 acres. The areal extent of contaminated groundwater is 147,517 square feet (Figure 7-6) to 29 feet bgs (TtNUS 2007).

[2] Well H10MW10 is considered upgradient (background), H10MW23 is downgradient, and wells H10MW08, H10MW14, H10MW19, and H10MW22 are designated as source area wells located in the areas of highest groundwater contamination.

Figure 7-5
Operable Unit 6 - Groundwater and Surface Water Sampling Locations
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 2/1/2016
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

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Figure 7-6
Operable Unit 6 - Land Use Control Boundaries
Potential Source of Contamination 52 - Hangar 1000
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

Source:
- Map was acquired from Naval Air Station Jacksonville Land Use Control Remedial Design Hangar 1000by Tetra Tech NUS, Inc. October 2007.

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7.4 Progress Since the Last Five-Year Review

7.4.1 Protectiveness Statement from the Last Review

The 2011 Five-Year Review included the following protectiveness statement.

> *The remedy at OU 6 is protective for short term and for long term it is expected to be protective and will be determined when we have reviewed 5 years of groundwater monitoring data. The institutional controls, groundwater monitoring, and surface water monitoring at OU 6 provide an acceptable degree of protection of human health and the environment as long as they are conducted as required.*

7.4.2 Status of Recommendations and Follow-Up Actions from Last Review

The 2011 Five-Year Review was the first since the ROD was signed. The 2011 Five-Year Review stated that performance of the remedial action and optimization of groundwater monitoring efforts would be evaluated at the completion of one year of monitoring.[3] The 2011 Five-Year Review did not identify any issues requiring follow-up action.

7.5 2015 Five-Year Review Process

7.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the RI/Focused FS, ROD, and semi-annual groundwater monitoring reports. This five-year review also included review of NAS Jacksonville Partnering Team Meeting minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Checklists for 2010 through 2014.

LUCIP Inspection Checklists were complete and noted one issue potentially related to Hangar 1000 during the August 2010 inspection: many of the LUC signs on the flight line had been removed in order to comply with Federal Aviation Administration requirements and the IRP Manager was working to bring signage into compliance. The February 2011 site inspection noted new signs were being installed at many sites, which would be finished before the next inspection; these were completed, as noted in Section 7.5.3. No other issues were noted.

[3] The 2011 Five-Year Review did not include review of analytical data because comprehensive reports had not been completed.

7.5.2 Data Review

Data reviewed for this five-year review was obtained from semi-annual groundwater and surface water monitoring conducted between 2009 and June 2014. Table 7-4 summarizes groundwater analytical results since monitoring began in 2009 and compares the results to current GCTLs, NADCs, and established milestone objectives.

Source Area Wells

Since LTM began in 2009, most COC concentrations have attenuated below their respective FDEP GCTLs, with the following exceptions:

- 1,1-DCE was detected above its 7 µg/L FDEP GCTL in JAX-H10MW14 (14.9 µg/L), JAX-H10MW19 (16.7 µg/L), and JAX-H10MW22 (186 µg/L).
- 1,2-DCE was detected above its 63 µg/L FDEP GCTL in JAX-H10MW08 (132 µg/L), JAX-H10MW14 (320 µg/L), and JAX-H10MW22 (1,660 µg/L).
- TCE was detected above its 3 µg/L FDEP GCTL in JAX-H10MW19 (11.8 µg/L) and JAX-H10MW22 (170 µg/L).
- Naphthalene was detected above its 14 µg/L FDEP GCTL in JAX-H10MW08 (17.9 µg/L).

Of those, the only constituents that exceeded FDEP NADCs were 1,2-DCE in JAX-H10MW22 (June 2014) and 1,1-DCA in JAX-H10MW08 (in October 2012).[4] Milestone objectives were not exceeded in 2013 or 2014.

COC concentration trends over time for each of the source area wells were evaluated using Mann-Kendall analysis to gauge MNA effectiveness (Tetra Tech 2013). Except for significant upward trends for 1,1-DCA in JAX-H10MW08 and total 1,2-DCE in JAX-H10MW22, COCs are stable or trending downward within source area wells, suggesting that NP injections reduced source area COC concentrations and natural attenuation processes are ongoing. In each of the source area wells, Mann-Kendall analysis indicates active degradation of TCE with daughter products (total 1,2-DCE) reaching a historical maximum in JAX-H10MW22 of 1,660 µg/L in 2014. Vinyl chloride concentrations within this well have remained stable since LTM began in 2009.

[4] The MNA parameter 1,1-DCA was detected above the FDEP GCTL (70 µg/L) in source area well JAX-H10MW08 (941 µg/L) in October 2012 (the last time analytical results were reported for this parameter).

Table 7-4
Semi-Annual Monitored Natural Attenuation Results for Volatile Organic Compounds (2009 to 2014)
Operable Unit 6 — Potential Source of Contamination 52 — Hangar 1000
(All concentrations presented in µg/L)

	Upgradient	Source Area				Downgradient			
	Wells JAX-H10-								
Parameter	**MW10 1st/2nd Event**	**MW08 1st/2nd Event**	**MW14 1st/2nd Event**	**MW19 1st/2nd Event**	**MW22 1st/2nd Event**	**MW23 1st/2nd Event**	**FDEP GCTLs**	**FDEP NADC**	**Milestone Objective[(1)]**
Benzene									
Year 0 (July/Nov. 2009)	1 U/0.11 U	**2.3** J/11 U	1 U/0.11 U	1 U/0.11 U	0.62 J/0.31 J	1 U/0.11 U	1	100	1
Year 1 (Mar./Aug. 2010)	1 U/0.14 U	20 U/3.5 U	1 U/0.186 J	1 U/0.14 U	0.389 J/1.4 U	1 U/0.14 U			not listed
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	25 U/25 U	2.5 U/5 U	0.25 U/0.25 U	2.5 U/2.5 U	0.25 U/0.25 U			not listed
Year 4 (June/Dec. 2013)	0.21 U/0.21 U	2.1 U/1.1 U	0.21 U/0.21 U	0.21 U/0.21 U	0.59/4.2 U	0.21 U/0.21 U			not listed
Year 5 (June 2014)	0.24 U	0.24 U	1.2 U	0.24 U	4.9 U	0.24 U			not listed
1,1-DCA									
Year 0 (July/Nov. 2009)	1 U/0.12 U	***2,100/850***	28/5.3	70/38	**140**/70	1 U/0.12 U	70	700	627
Year 1 (Mar./Aug. 2010)	1 U/0.24 U	**467/482**	2.76/35.1	22/19.9	**70.4/97**	1 U/0.24 U			596
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	***1,230/941***	**612/469**	27.6/15.9	**192/196**	0.25 U/0.25 U			534
1,2-DCA									
Year 0 (July/Nov. 2009)	1 U/0.1 U	20 U/10 U	0.43 J/0.1 U	0.74 J/0.55 J	1.7/0.56 J	1 U/0.1 U	3	300	9.4
Year 1 (Mar./Aug. 2010)	1 U/0.22 U	20 U/5.5 U	1 U/0.22 U	1 U/0.22 U	0.524 J/2.2 U	1 U/0.22 U			9
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	25 U/25 U	**8.8** J/**6.8** J	0.27 J/0.25 U	2.9 J/2.5 U	0.25 U/0.25 U			8.2
Year 4 (June/Dec. 2013)	0.22 U/0.22 U	2.2 U/1.1 U	**5.2**/0.22 U	1.3/0.22 U	2.7/4.4 U	0.22 U/0.22 U			7.8
Year 5 (June 2014)	0.24 U	0.24 U	1.2 U	1.0	4.8 U	0.24 U			7.4
1,1-DCE									
Year 0 (July/Nov. 2009)	1 U/0.15 U	***2,000***/**490**	**79/13**	**93/56**	**160/130**	1 U/0.15 U	7	700	1,500
Year 1 (Mar./Aug. 2010)	1 U/0.28 U	**257/126**	2.26/**47.6**	**51.7/34.8**	**139/137**	1 U/0.28 U			1,417
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	***1,310/981***	**546/601**	**54.8/28.9**	**328/378**	0.25 U/0.25 U			1,251
Year 4 (June/Dec. 2013)	0.20 U/0.20 U	**278**/5.5	**547/23.5**	**148/17.9**	**280/136**	0.20 U/0.20 U			1,168
Year 5 (June 2014)	0.25 U	5.5	**14.9**	**16.7**	**186**	0.25 U			1,085
cis-1,2-DCE									
Year 0 (July/Nov. 2009)	1 U/0.13 U	***20,000/7,200***	1.9/18	34/14	***780/820***	1 U/0.13 U	70	630	NA
Year 1 (Mar./Aug. 2010)	1 U/0.45 U	***4,510/3,900***	35.1/**445**	4.46/6.46	***714/873***	1 U/0.45 U			NA
trans-1,2-DCE									
Year 0 (July/Nov. 2009)	1 U/0.13 U	17 U/13 U	1 U/0.14 J	0.13 U	1.1 J	0.13 U	100	630	NA
Year 1 (Mar./Aug. 2010)	1 U/0.53 U	20 U/13.2 UJ	1 U/3.07	0.53 U	5.3 U	0.53 U			NA
1,2-DCE (total)									
Year 3 (Apr./Oct. 2012)	0.5 U/0.5 U	***15,800/10,800***	5 U/10 U	35.7/34.7	***863/829***	0.5 U/0.5 U	63	630	2,327
Year 4 (June/Dec. 2013)	0.46 U/0.46 U	***4,320***/**269**	2.0/12.3	**112**/12.8	***1,240/1,260***	0.46 U/0.46 U			2,176
Year 5 (June 2014)	0.67 U	**132**	**320**	2.2	***1,660***	0.67 U			2,025

Table 7-4
Semi-Annual Monitored Natural Attenuation Results for Volatile Organic Compounds (2009 to 2014)
Operable Unit 6 — Potential Source of Contamination 52 — Hangar 1000
(All concentrations presented in µg/L)

	Upgradient	Source Area				Downgradient			
	Wells JAX-H10-								
Parameter	**MW10** $1^{st}/2^{nd}$ **Event**	**MW08** $1^{st}/2^{nd}$ **Event**	**MW14** $1^{st}/2^{nd}$ **Event**	**MW19** $1^{st}/2^{nd}$ **Event**	**MW22** $1^{st}/2^{nd}$ **Event**	**MW23** $1^{st}/2^{nd}$ **Event**	**FDEP GCTLs**	**FDEP NADC**	**Milestone Objective(1)**
1,1,1-TCA									
Year 0 (July/Nov. 2009)	0.22 J/0.17 U	***6,600***/**940**	10/0.48 J	1 U/0.17 U	0.36 J/0.34 U	1 U/0.17 U	200	2,000	7,330
Year 1 (Mar./Aug. 2010)	1 U/0.29 U	**370**/**353**	1 U/0.559 J	0.406 J/0.29 U	2 U/2.9 U	1 U/0.29 U			6,933
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	*5,550* J/25 U	33.3/30.6	0.73 J/0.25 U	2.5 U/2.5 U	0.25 U/0.25 U			6,139
Year 4 (June/Dec. 2013)	0.20 U/0.20 U	**789**/1.0 U	78.5/1.3	0.20 U/0.20 U	0.20 U/4.0 U	0.20 U/0.20 U			5,742
Year 5 (June 2014)	0.34 U	0.56 I	1.7 U	0.34 U	6.7 U	0.34 U			5,345
1,1,2-TCA									
Year 0 (July/Nov. 2009)	1 U/0.1 U	20 U/10 U	1 U/0.1 U	0.54 J/0.26 J	1 U/0.2 U	1 U/0.1 U	5	500	2
Year 1 (Mar./Aug. 2010)	1 U/0.26 U	20 U/6.5 U	1 U/0.26 U	0.718 J/0.26 U	2 U/2.6 U	1 U/0.26 U			not listed
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	25 U/25 U	2.5 U/5 U	0.64 J/0.31 J	2.5 U/2.5 U	0.25 U/0.25 U			not listed
Year 4 (June/Dec. 2013)	0.20 U/0.20 U	2.0 U/1.0 U	0.20 U/0.20 U	0.20 U/0.20 U	0.20 U/4.0 U	0.20 U/0.20 U			not listed
Year 5 (June 2014)	0.32 U	0.32 U	1.6 U	0.32 U	6.3 U	0.32 U			not listed
TCE									
Year 0 (July/Nov. 2009)	0.22 J/0.23 J	**22**/**46** J	**11**/**6.9**	**35**/**32**	**170**/*320*	1 U/0.13 U	3	300	8,710
Year 1 (Mar./Aug. 2010)	1 U/0.50 U	20 U/12.5 U	**4.9**/**4.82**	**38.7**/**14.9**	*382*/*380*	1 U/0.50 U			8,226
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	25 U/25 U	**45.5**/**28**	**32.3**/**14.2**	**19.6**/**31.2**	0.25 U/0.25 U			7,259
Year 4 (June/Dec. 2013)	0.31 U/0.31 U	**3.4**/2.5	**40.7**/3.0	**17.9**/**11.9**	**75.2**/**238**	0.31 U/0.31 U			6,775
Year 5 (June 2014)	0.30 U	**3.1**	1.5 U	**11.8**	**170**	0.30 U			6,291
PCE									
Year 0 (July/Nov. 2009)	1 U/0.15 U	**39**/15 U	0.23 J/0.19 J	0.28 J/0.2 J	2.7/2.4	1 U/0.15 U	3	300	33.7
Year 1 (Mar./Aug. 2010)	1 U/0.17 U	20 U/4.25 U	0.258 J/0.17 U	0.418 J/0.295 J	2.55/2.41 J	1 U/0.17 U			31.9
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	**30** J/25 U	2.5 U/5 U	0.58 J/0.44 J	2.5 U/2.5 U	0.25 U/0.25 U			28.5
Year 4 (June/Dec. 2013)	0.32 U/0.32 U	**4.4**/1.6 U	0.32 U/0.32 U	0.32 U/0.32 U	0.32 U/6.4 U	0.32 U/0.32 U			26.8
Year 5 (June 2014)	0.26 U	1.1	1.3 U	0.30 I	5.1 U	0.26 U			25.1
Vinyl Chloride									
Year 0 (July/Nov. 2009)	1 U/0.18 U	20 U/18 U	1 U/0.18 U	**2.6**/**2.1**	**1.5**/**1.3** J	1 U/0.18 U	1	100	15.9
Year 1 (Mar./Aug. 2010)	1 U/0.20 U	20 U/5 U	1 U/**1.01**	0.627 J/0.347 J	**1.33** J/2 U	1 U/0.20 U			15
Year 3 (Apr./Oct. 2012)	0.25 U/0.25 U	25 U/25 U	2.5 U/5 U	0.64 J/0.82 J	2.5 U/2.5 U	0.25 U/0.25 U			13.3
Year 4 (June/Dec. 2013)	0.44 U/0.44 U	4.4 U/2.2 U	0.79/0.44 U	**2.4**/1.0	**2.6**/8.8 U	0.44 U/0.44 U			12.5
Year 5 (June 2014)	0.33 U	0.33 U	1.6 U	0.33 U	6.5 U	0.33 U			11.6

Table 7-4
Semi-Annual Monitored Natural Attenuation Results for Volatile Organic Compounds (2009 to 2014)
Operable Unit 6 — Potential Source of Contamination 52 — Hangar 1000
(All concentrations presented in µg/L)

	Upgradient	Source Area				Downgradient			
	Wells JAX-H10-								
Parameter	**MW10 1st/2nd Event**	**MW08 1st/2nd Event**	**MW14 1st/2nd Event**	**MW19 1st/2nd Event**	**MW22 1st/2nd Event**	**MW23 1st/2nd Event**	**FDEP GCTLs**	**FDEP NADC**	**Milestone Objective[(1)]**
3&4-Methylphenol									
Year 0 (July/Nov. 2009)	3.2 U/NA	270/NA	3.5 U/NA	3.5 U/NA	3.5 U/NA	3.3 U/NA	not exceeded	not exceeded	not listed
Year 1 (Mar./Aug. 2010)	3.5 U/NA	24/NA	3.24 U/NA	3.24 U/NA	3.24 U/NA	3.27 U/NA			not listed
Year 3 (Apr./Oct. 2012)	1.16 U/NA	151/NA	12.6/NA	1.18 U/NA	1.18 U/NA	1.16 U/NA			not listed
Year 4 (June/Dec. 2013)	1.3 U/1.3 U	21.1/1.4 U	50.1/1.3 U	1.3 U/1.3 U	1.3 U/1.3 U	1.3 U/1.3 U			not listed
Year 5 (June 2014)	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U			not listed
3-Methylphenol									
Year 0 (July/Nov. 2009)	NA/0.71 U	NA/**64**	NA/0.71 U	NA/0.75 U	NA/0.75 U	NA/0.71 U	35	350	5.2
Year 1 (Mar./Aug. 2010)	NA/0.713 U	NA/8.65	NA/0.713 U	NA/0.713 U	NA/0.713 U	NA/0.713 U			not listed
4-Methylphenol									
Year 0 (July/Nov. 2009)	NA/0.71 U	NA/***64***	NA/0.71 U	NA/0.75 U	NA/0.75 U	NA/0.71 U	3.5	35	5.2
Year 1 (Mar./Aug. 2010)	NA/0.713 U	NA/**8.65**	NA/0.713 U	NA/0.713 U	NA/0.713 U	NA/0.713 U			3.5
Year 3 (Apr./Oct. 2012)	NA/1.16 U	NA/***149***	NA/**11.6**	NA/1.16 U	NA/1.16 U	NA/1.16 U			not listed
Naphthalene									
Year 0 (July/Nov. 2009)	4.6 U/0.42 U	***620***/**140**	0.86 J/0.42 U	5 U/0.44 U	2.3 J/2.3 J	4.7 U/0.42 U	14	140	11.8
Year 1 (Mar./Aug. 2010)	5 U/0.417 U	**92.2**/***188***	4.63 U/0.417 U	4.63 U/0.417 U	1.81 J/2.27 J	4.67 U/0.417 U			not listed
Year 3 (Apr./Oct. 2012)	1.16 U/1.16 U	***397***/***545***	1.18 U/1.16 U	1.18 U/1.16 U	2.21 J/2.34 J	1.16 U/1.16 U			not listed
Year 4 (June/Dec. 2013)	0.61 U/0.61 U	***292***/14.0	0.85/0.62 U	0.61 U/0.61 U	1.7/0.61 U	0.61 U/0.59 U			not listed
Year 5 (June 2014)	0.48 U	**17.9**	0.48 U	0.48 U	0.98 J	0.48 U			not listed

Notes:

(1) Initial concentrations based on the highest detection of contaminant during the Remedial Investigation/Focused Feasibility Study

U = Not detected above laboratory detection limits

J = Concentration between the laboratory detection limits and method detection limit; estimated by the laboratory

Concentrations in **bold** font exceed FDEP GCTL

Concentrations shaded exceed the corresponding year's Milestone Objective

Concentrations in *italics* exceed NADC

Concentrations underlined indicate laboratory detection limit above GCTL or Milestone Objective

NA = Not Analyzed

Concentrations of 1,1,1-TCA have decreased more than 99 percent in JAX-H10MW08 (6,600 µg/L in July 2009 to 0.56 µg/L in August 2014) while degradation product concentrations have remained stable (1,1-DCE) or are increasing (1,1-DCA), suggesting ongoing abiotic and biotic degradation of 1,1,1-TCA in the vicinity of JAX-H10MW08.[5] Since LTM began, vinyl chloride has not been detected in JAX-H10MW08.

Upgradient and Downgradient Wells

To date, all detections at upgradient monitoring well JAX-H10MW10 and downgradient monitoring well (JAX-H10MW23) have been below their respective FDEP GCTLs and NADCs.

Geochemical Data

Geochemical parameters suggest that natural attenuation of COCs has been occurring within the source area of OU 6. Within source area wells, DO and ORP readings indicate favorable conditions for anaerobic reductive metabolic processes. Elevated methane, alkalinity, and chloride concentrations within source area wells provide further evidence for reductive conditions.

Surface Water

To date, all detections at surface water sampling point JAX-H10SW01 have been below their respective FDEP SWCTLs. The storm sewer sampling location, JAX-H10SW02, has been dry during each sampling event. Historical concentrations and lack of COC detections at the surface water monitoring location indicate that the elevated COC concentrations detected in groundwater are not reaching the PSC 44 drainage ditch, suggesting that natural attenuation processes are ongoing and protective of surface water receptors.

7.5.3 Site Inspection and Interviews

Resolution Consultants walked throughout accessible portions of Hangar 1000 and the keyway, accompanied by Mr. Curtin and Ms. Wilson on 1 October 2014. Access to the keyway is restricted to air station personnel. The fence and warning sign were intact and monitoring well covers observed were closed and in good condition. Numerous monitoring well covers and pads in the area of the former USTs remain from historical remedies.

[5] SIES recommended that location of well JAX-H10MW08 be verified to ensure the correct well was sampled.

7.6 Technical Assessment

7.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

The RAOs established in the ROD are to prevent (1) unacceptable risks to human exposure to COCs in groundwater at Hangar 1000, and (2) contamination migration from groundwater to surface water above remedial goals in the drainage ditch. As specified in the ROD, the remedy components are: source reduction using NP technology, natural attenuation, groundwater and surface water monitoring, and LUCs.

Remedial Action Performance

To date, the remedial action components have met the intent of the ROD, and a contingency remedy has not been required. Groundwater monitoring has defined the horizontal and vertical extent of groundwater contamination. In general, parent VOC concentrations have been decreasing over time in source area wells. Degradation product VOC concentrations have increased, indicating ongoing biotic/abiotic degradation within the aquifer. Surface water monitoring indicates that COCs in groundwater are not reaching the drainage ditch to the southeast at concentrations above FDEP SWCTLs. MNA remains an effective remedy for groundwater at OU 6.

During the March 2013 meeting, the NAS Jacksonville Partnering Team discussed a possible correlation between groundwater elevation fluctuations and concentrations of certain COCs, and noted that seasonal variability may affect the length of time monitoring is required to achieve NFA. No changes to the monitoring program were recommended.

System Operations/Operations & Maintenance

There are no active remediation systems requiring O&M at OU 6. Wells are maintained and inspected regularly as part of the LTM program.

Opportunities for Optimization

Opportunities for optimization of the LTM program are considered annually. Optimization alternatives evaluated include adding or removing wells, surface and storm water sample points, individual COCs, and natural attenuation parameters, and determining if contingency response actions should be implemented. The NAS Jacksonville Partnering Team has approved several adjustments since 2009, documented in revisions to MNA work plans, including modifications to the well network and resurveying site wells.[6] Given its location and lack of COC detections, the NAS Jacksonville Partnering Team agreed to discontinue sampling JAX-H10MW10.

[6] Abandoning inactive/former monitoring and remediation wells around the source area may reduce confusion associated with well location during recent sampling events.

Implementation of LUCs and Institutional/Engineering Controls

LUCs have been implemented and an approved LUC RD is in place. NAS Jacksonville IRP personnel conduct LUCIP inspections quarterly and submit inspections to the U.S. EPA and FDEP annually.

Early Indicators of Potential Remedy Problems

This five-year review identified no early indicators of potential remedy problems. Contingency actions have not been implemented to date.

7.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

Location- and action-specific ARARs are discussed in Section 1.7. Chemical-specific ARARs and TBC criteria considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The ARAR-based action levels listed in the ROD (and Table 7-2 of this section) for groundwater and surface water COCs have not changed. The natural attenuation parameter 1,1-DCA, which exceeded ARARs (GCTLs), NADCs, and milestone objectives during the first three years of monitoring, has been excluded from recent LTM reports. It may be appropriate for the NAS Jacksonville Partnering Team to conduct a review to determine whether 1,1-DCA should be retained as a natural attenuation parameter or added as a COC and establish appropriate remedial goals/screening criteria, then document decisions as necessary.

Expected Progress towards Meeting RAOs

The projected timeframe for attaining cleanup goals was within 18 years of the ROD approval date per USGS modeling discussed in the RI/Focused FS. There have been no delays in implementing remedies. MNA data shows COCs are attenuating; only degradation product 1,2-DCE exceeded an NADC in the most recent (June 2014) sampling event and milestone objectives have been met since 2012.

Changes in Exposure Pathways

The exposure pathways have not changed. Hangar 1000 and the surrounding area are used for industrial purposes and access remains limited to select air station personnel.

Changes in Land Use

No changes to land use discussed in Section 7.2.2 is anticipated.

New/Emerging Contaminants and Contaminant Sources

The emerging contaminant 1,4-dioxane is associated with the use or presence of 1,1,1-TCA but was not a routinely monitored parameter during the 1990s and early 2000s. Because 1,1,1-TCA is a COC, it may be appropriate for the NAS Jacksonville Partnering Team to determine the necessity for including 1,4-dioxane as a parameter during a future sampling event.

No remedy byproducts or degradation products have been identified which would be considered new or emerging contaminants.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The baseline risk assessment and other risk assessment documents in the RI/Focused FS were developed using RAGS, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992). The basis for remedial action is summarized in Section 7.2.5. The risk assessment changes discussed in Section 1.7 are applicable to OU 6.

Vapor Intrusion

The HHPRE utilized the J&E model to estimate indoor air concentrations likely to result from VI at OU 6 using average groundwater COC concentrations from a January 2001 groundwater sampling event. Significant changes have occurred with respect to toxicological assumption of the COC TCE and the J&E model since the HHPRE was generated. In absence of indoor air data to substantiate the J&E modeling, the VISL process was used to evaluate the potential for risk from VI.

Multiple constituents (including VOCs and naphthalene) are present in groundwater beneath or adjacent to Hangar 1000 structures. Comparison of OU 6 groundwater concentrations with commercial/industrial VISL TGCs suggests the potential risk is above FDEP's 1.0E-06 risk threshold and the target cumulative HI of 1.0 (or 3.0 for a hot-spot exposure) is elevated.

As noted during the site inspection, Hangar 1000 is open to ambient air and no enclosed offices/work areas over the plume were identified; therefore, VI is unlikely to occur. Groundwater concentrations decrease away from the hangar complex, further reducing the likelihood for VI. VI screening suggests that, given building conditions and the conservatism of VISL screening values, groundwater concentrations do not affect protectiveness at this time. The VISL screening process is detailed in Appendix C of this five-year review.

Summary

In summary, risk assessment findings at OU 6 were based on current and proposed future industrial land use. LUCs have been implemented to prevent future residential land use and groundwater use and exposure. ARARs were used to design the groundwater remedy. This five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the remedy because LUCs are in place to prevent exposure. The need to conduct additional VI or other risk assessments will be evaluated prior to any land use changes.

The only findings from this risk review that may affect long-term site management or protectiveness include the emerging contaminant 1,4-dioxane. Additional sampling would be necessary to determine if 1,4-dioxane is present before determining its effect on remedy protectiveness.

7.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

7.7 Issues and Recommendations/Follow-Up Actions

Issues and recommendations for follow-up actions are in Table 7-5.

7.8 Protectiveness Statement

The remedy at OU 6 is protective of human health and the environment because NP injections have reduced source mass by more than 50 percent, and LTM data indicate COCs are naturally attenuating and not migrating to surface water. LUCs eliminate risk from exposure to groundwater. VI screening suggests that, given current building conditions, groundwater concentrations do not affect protectiveness at this time.

Table 7-5
Issues and Recommendations/Follow-Up Actions at Operable Unit 6

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	The parameter 1,1-dichloroethane (DCA) exceeded the Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Level (GCTL), Natural Attenuation Default Concentrations, and milestone objectives but was excluded from reporting after 2012 because it is a natural attenuation parameter, not a contaminant of concern (COC).	Determine whether 1,1-DCA should be retained as a natural attenuation parameter or COC, establish appropriate screening/evaluation criteria, and document decisions as necessary.	Navy	U.S. EPA, FDEP	31 March 2017	N	N
2	The emerging contaminant 1,4-dioxane is associated with 1,1,1-trichloroethane, which is an Operable Unit 6 COC, but was not an analytical parameter included in the Remedial Investigation/Focused Feasibility Study or subsequent sampling events. Protectiveness is not affected while Land Use Controls prevent groundwater use.	Determine if assessment of 1,4-dioxane in groundwater is necessary, and document decisions appropriately.	Navy	U.S. EPA, FDEP	31 March 2017	N	N

8.0 OPERABLE UNIT 7

OU 7 (PSC 46) is the Former Defense Reutilization and Marketing Office (DRMO), an 11.5-acre noncontiguous parcel southwest of NAS Jacksonville (Figure 8-1).[1] The DRMO's mission is to provide a means for disposal of surplus DoD equipment, supplies, and scrap materials stored within a fenced yard prior to transfer to other government agencies or sale to the public.

Properties north and west of the DRMO are privately owned, wooded parcels that contain no inhabited buildings. Properties south of the DRMO are Mulch & More (a commercial mulch and stone yard), CEMEX (a cement processing and loading facility), and 84 Lumber (lumber yard). A spur from the west-adjoining railroad line formerly entered the DRMO along the west-central property boundary. Figure 8-2 shows areas immediately surrounding OU 7.

8.1 Site Chronology

Historical events and relevant dates in the OU 7 chronology are listed in Table 8-1.

Table 8-1
Chronology of Site Events at Operable Unit 7
Potential Source of Contamination 46

Event		Date
Site placed on the National Priorities List		November 1989
Initial discovery of problem or contamination		
	Hazardous material storage areas drain to unlined interior ditch	1991
	Sludge from oil-water separator characterized as hazardous	1994
	Radiological Survey	June 1998
Remedial Investigation/Focused Feasibility Study		May 2003
Interim Remedial Action		2005
	Florida Department of Transportation inadvertently removed sediment from east perimeter ditch during routine Roosevelt Boulevard/Highway 17 maintenance	November 2003
	Interim Measures Soil Removal	2005
	Soil removal to facilitate concrete replacement project	2007
Record of Decision signed		9 September 2005
Remedial Action		October 2007
	Soil and sediment removal initiated	October 2007
	Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH) discovered	
	Soil and sediment excavation resumed with Unexploded Ordnance Oversight, MEC/MPPEH Processing/Demilitarization of Material Documented as Safe (MDAS) and Transfer of MDAS (Scrap Metal)	June to August 2011
	Transport and Offsite Disposal of Impacted Soil	May to October 2011
Land Use Control Remedial Design		September 2012
Post-Remedy Long-Term Groundwater Monitoring		2012 to 2013
Five-Year Review		2011

[1] The DRMO was renamed the Defense Logistics Agency, Disposition Services Jacksonville in 2011; for purposes of discussion, OU 7 is referred to as the DRMO in this five-year review.

Figure 8-1
Operable Unit 7 - Location
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Operable Unit 7 Boundary
NAS Jacksonville Boundary

0 500 1,000 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau.

Figure 8-2
Operable Unit 7 - Layout
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

x — Fence
Railroad
Storm Water Flow Direction
PSC Boundary

0 125 250 Feet

NAVFAC Naval Facilities Engineering Command
RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 2/3/2016
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Road data are from the United States Census Bureau; Some map data are from CH2MHILL Constructors, Inc.

8.2 Background

8.2.1 Physical Characteristics

The wedge-shaped parcel is oriented north to south, with an approximately 120-foot wide north border and 650-foot wide south border. The east border is a drainage ditch outside the DRMO fence that parallels Roosevelt Boulevard (Highway 17). A driveway that crosses the ditch near the approximate center of the east border provides vehicle access to the facility from Roosevelt Boulevard. The west fenced border is paralleled by a drainage ditch, beyond which is an active CSX rail line used by passenger and cargo trains. The east and west outer ditches are not hydraulically connected to each other; both discharge south toward Interstate 295. Figure 8-2 shows the OU 7 layout, site features, and buildings with identification numbers, size, and construction type, as listed in Table 8-2.

Table 8-2
Former Defense Reutilization and Marketing Office Building Summary at Operable Unit 7
Potential Source of Contamination 46

Building Number	Description/Use	Size	Construction Type
174	Warehouse and Offices	9,400 square feet	Metal
174-A	Warehouse and Shed/Hazardous Material Storage	13,060 square feet	Concrete block
174-A	Warehouse	2,700 square feet	Concrete block
174-D	Warehouse and Offices	3,3410 square feet	Wood
1900	Warehouse	2,160 square feet	Wood
1903	Offices		
225	Warehouse	550 square feet	Concrete block
238	Shipping/Receiving Warehouse and Office	8,865 square feet	Metal
238-A	Warehouse	3,760 square feet	Metal
763	Break Down Shed	266 square feet	Metal
Not numbered	Vehicle Shed	1,009 square feet	Metal
1905	Warehouse	2,171 square feet	Metal
1904	Warehouse	2,171 square feet	Metal
870	Scale House	40 square feet	Concrete Block
996	Warehouse	1,980 square feet	Metal
1898	Pump House	40 square feet	Concrete Block
Paved areas for parking, storage, and vehicle access		37,166 square yards	Asphalt and concrete

8.2.2 Land and Resource Use

OU 7 continues to be used for disposition services, which is industrial in nature. The Navy's plans provide for continued non-residential use of the site. LUCs will be required until attainment of cleanup goals for sediment/soil and groundwater allows for UU/UE. Decommissioned items not adversely affected by exposure to weather are stored in delineated aisles and sheds in the large open asphalt-covered area that comprises the north third of the property and along most of the perimeter fences in the south two-thirds of the property. An OWS is in the southeast corner of the DRMO yard.

Within OU 7 is a drainage ditch that begins near the south end of the former rail spur along the west property border. The ditch extends approximately 300 feet to the southwest corner of the facility and empties into an east-flowing drainage ditch that comprises the south property border. The south ditch empties into the Roosevelt Boulevard ditch outside the fence at the southeast corner of the DRMO yard from where storm water flows south toward Interstate 295. There are no permanent water bodies in the vicinity of OU 7.

The interior drainage ditches receive sheet flow runoff from the DRMO yard, which is paved except for approximately 6,000 square feet of soil and grass between and around Buildings 1903 and 225. Storm water runoff from a large portion of the DRMO yard drains to the OWS. Approximately 75 feet at the east end of the south-bordering interior ditch receives discharge from the OWS and is lined with concrete. During heavy rain events, storm water runoff can bypass the OWS and discharge directly into the ditch.

The shallow aquifer at OU 7 is composed of a layer of unconsolidated fine and medium sands to depths varying from 2 to 4 feet bgs, sandy clay/clayey sand from the bottom of the sand layer to depths exceeding 6 feet bgs, and very fine sands from the base of the clayey horizon to approximately 15 feet bgs. The surficial aquifer is not used as a groundwater source and LUCs prohibit current or future uses.

8.2.3 History of Contamination

In 1939, the U.S. Army developed the OU 7 parcel to decommission used aircraft. Decommissioning included segregating airplane parts (rubber, leather, metal, and glass) to be disposed of or recycled. Parts made of aluminum were melted (smelting) into aluminum ingots. Materials were shipped offsite by railroad cars from the west side of the parcel. The DRMO replaced the decommissioning operation in the late 1940s to provide a means for disposal of surplus Navy equipment, supplies, and scrap material.[2] Ammunition, explosives, and dangerous articles (e.g., empty shells, ammunition cans, range residue) were also received at the DRMO. Materials were stored within an unpaved fenced yard prior to public sale.[3] Some reconditioning and maintenance work has been performed on surplus material at the DRMO.

[2] Examples of the various surplus material dispensed to the public include vehicles, appliances, electrical devices, transformers, batteries, scrap materials, chemicals, furniture, and storage vessels.
[3] Paving began in the late 1940s (NAFVAC 2003).

Past operations at OU 7 resulted in releases containing VOCs, SVOCs, pesticides, metals, PCBs, and RAD contaminants that impacted shallow soil, surface water, and groundwater. Initial investigations in the 1990s were prompted by conditions observed including oily water on the ground near the OWS, stained soil, leaking vehicles, and chemical odors and sheen at interior and exterior ditches. The west interior ditch received runoff from hazardous material storage areas that contained containers of paint, cleaners, solvents, adhesives, sealants, corrosive acids and bases, scrap metal, and empty drums in various stages of deterioration.

8.2.4 Initial Response

Table 8-3 summarizes initial (pre-ROD) site investigations that identified chemical and RAD contamination for which the following IRAs were conducted; Figure 8-3 shows excavated areas.[4]

- Interim Measures soil removal within the confines of the DRMO. Roughly 2,653 tons of soil was disposed of as non-hazardous waste, 358 tons of soil was disposed of as a hazardous waste, and 1,171 tons of soil was disposed of as RAD-contaminated waste (WRS Infrastructure & Environment, Inc., 2005).

- *Phase II A* soil removal prior to implementation of selected remedial action activities (discussed in Section 8.3.3) to facilitate a concrete pavement replacement project (CCI 2007).

8.2.5 Basis for Taking Action

Investigations at OU 7 indicated the presence of soil, sediment, and groundwater contamination from past operating practices that necessitated response actions to protect public health, welfare, and the environment.

Human Health Preliminary Risk Evaluation

An HHPRE assessed soil, sediment, and groundwater using U.S. EPA Region 3 RBCs, and 1999 FDEP Residential and Commercial/Industrial SCTLs and GCTLs. FDEP had not developed remedial goals for sediment; therefore, the FDEP SCTLs were conservatively used to assess potential risks resulting from exposure to sediment. The HHPRE concluded the potential for unacceptable risks to human health was present in soil, sediment, and groundwater. The ROD listed arsenic, 1,1-DCE, and vinyl chloride as groundwater COCs and the following soil COCs.

[4] During routine maintenance of ditches adjacent to state-owned highways in November 2003 (six months after the RI/Focused FS was finalized), the Florida Department of Transportation inadvertently removed non-RAD contaminated sediment from the east perimeter ditch adjacent to Highway 17, as shown on Figure 8-3.

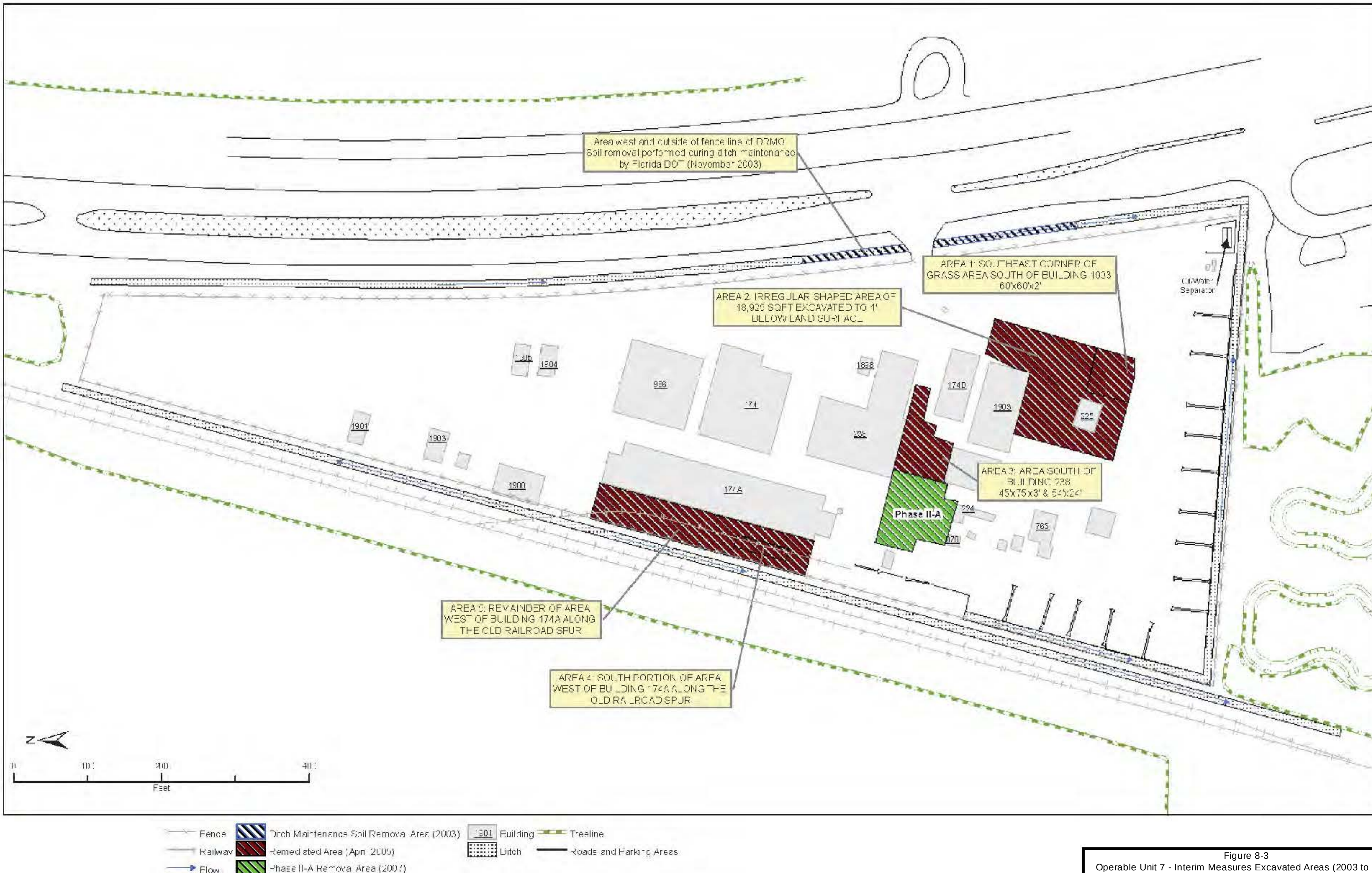

Figure 8-3
Operable Unit 7 - Interim Measures Excavated Areas (2003 to 2007)
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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REQUESTED BY: H. Brauer	DATE: 2/1/2016
DRAWN BY: NRinehart	TASK ORDER NUMBER: JM74

Source:
- Map was acquired from Remedial Action Work Plan Soil/Sediment Remediation and Groundwater Sampling OU 7, PSC 46 - Defense Reutilization and Marketing Office Naval Air Station Jacksonville Jacksonville, Florida by CH2MHILL Constructors, Inc., October 2007.

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Table 8-3
Initial (Pre-Record of Decision) Investigations at Operable Unit 7
Potential Source of Contamination 46

Date(s)	Investigation Type/Report	Media Investigated	Identified Contaminants
April to July 1997	Site Screening Investigation	Perimeter ditches	SVOCs, pesticides, PCBs, and metals exceeding regulatory screening levels
June 1998	U.S. Army Industrial Radiation Survey	Surface soil	Elevated RAD exposure readings
December 1998	Follow-Up Radiation Study	Surface areas	Confirmed three distinct areas of elevated radiation attributed to 1940s airplane disassembly operations (paint containing radium)
February to March 2001	Remedial Investigation	Soil, interior ditch sediment, surface water, and groundwater	Pesticides, PCBs, metals, VOCs, PAHs, and RAD parameters exceeding regulatory screening levels
2001	RAD Assessment	Surface areas	Radium-226 exceeding regulatory screening criteria
August to September 2003	Site-Wide RAD Characterization Survey	Surface areas and soil	RAD-impacted soil
September 2003	Nature and Extent	Soil and ditch sediment	Pesticides, PCBs, metals, VOCs, and PAHs

- Metals — aluminum, arsenic, antimony, barium, beryllium, cadmium, chromium, copper, lead, nickel, iron, manganese, and vanadium

- PAHs — benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene

- PCBs — Arochlor-1254 and -1260

- Radium — 226

Ecological Risk Assessment

The ERA was conducted to estimate the potential impacts of contaminants on the environment. The ERA focused on the unpaved perimeter (east- and west-adjoining) drainage ditches because they were the most likely for potential ecological exposure. The ERA determined that contamination in soil, sediments, and surface water should not pose a significant risk to ecological receptors due to the poor quality of habitat present and lack of connection of the storm water ditches to a surface water body. The ERA concluded that NFA was necessary for the perimeter ditches as long as site use remains industrial.

8.3 Remedial Actions

The ROD for OU 7 was signed on 9 September 2005.

8.3.1 Remedial Action Objectives

The RAOs stated in the 2005 ROD are to:

- Prevent unacceptable risk from exposure to soil and sediment with concentrations of COCs (metals, PAHs, pesticides, and PCBs) above FDEP Residential SCTLs, arsenic above NAS Jacksonville Background Concentrations, and radium-226 above 5 pCi/g.[5]

- Prevent unacceptable risk from ingestion of groundwater with concentrations of vinyl chloride, 1,1-DCE, and arsenic greater than FDEP GCTLs and NAS Jacksonville Background Concentrations.

- Reduce concentrations of vinyl chloride, 1,1-DCE, and arsenic in groundwater to less than FDEP GCTLs and NAS Jacksonville Background Concentrations.

[5] The 5 pCi/g radium action level was agreed upon by the NAS Jacksonville Partnering Team, based on site-specific RAD analysis.

8.3.2 Remedy Selection

The selected remedy included excavation and disposal of contaminated soil, LUCs, and MNA.

Excavation and Disposal

Due to the variety of contaminant types present, excavation and offsite disposal was considered the only viable soil remedy that could adequately address the risks posed at the site (NAVFAC 2005). Excavation and removal of RAD-contaminated soil eliminated the need for site controls and restrictions associated with RAD exposure considerations. Excavation and offsite disposal of soil with COCs exceeding FDEP Commercial/Industrial SCTLs eliminated unacceptable threats to human health and the environment under a future industrial land use scenario.

Land Use Controls

LUCs prevent unacceptable exposure to residual soil and groundwater contamination that remains at the site at concentrations that preclude UU/UE.

Groundwater Monitored Natural Attenuation

The ROD identified shallow soil contamination as the source of low-level VOC and arsenic contamination in groundwater, which would naturally attenuate below risk-based thresholds after source removal. COCs in groundwater at concentrations above regulatory criteria would not present an unacceptable threat to human health or the environment under groundwater use restrictions. Progress of the groundwater remedy would be annually evaluated through review of groundwater monitoring data.

Contingent Remedy

The ROD included provisions for implementing contingency actions if: (1) the implemented LUCs fail to prevent unacceptable risks from exposure to onsite soil or groundwater contamination, (2) contaminated groundwater migrates to an unacceptable degree, or (3) the COC concentrations in groundwater do not attenuate as expected.

8.3.3 Remedy Implementation

Soil and Sediment Excavation

Soon after the ROD was signed in 2005, FDEP revised SCTLs, which changed the risk-based concentrations in soil for several COCs. Soil and sediment analytical data collected prior to the Remedial Action Work Plan (RAWP), including those from the Interim Measures removals, were compared to 1999 and 2005 FDEP Commercial/Industrial SCTL criteria (CCI 2007). Based on comparison of the revised SCTLs, COCs that remained above FDEP Commercial/Industrial SCTLs were carcinogenic PAHs, PCBs, arsenic, chromium, and lead. The RAWP revised the remedial goals to the 2005 FDEP Commercial/Industrial SCTLs and redefined the areas where soil was to be excavated (CCI 2007).[6] Table 8-4 shows the comparison of 1999 and 2005 SCTLs provided in the RAWP.

Table 8-4
Comparison of 1999 and 2005 Florida Department of Environmental Protection Direct Exposure Commercial/Industrial Soil Cleanup Target Levels for Contaminants of Concern at Operable Unit 7 Potential Source of Contamination 46

Constituent	Florida Department of Environmental Protection Direct Exposure Commercial/Industrial Soil Cleanup Target Levels (all values presented in milligrams per kilogram)	
	1999	2005
Arsenic	3.7	12
Chromium	820	470
Copper	76,000	89,000
Lead	920	1,400
Polychlorinated biphenyls	2.1	2.6
Benzo(a)anthracene	1.4	(1)
Benzo(a)pyrene	0.5	0.7
Benzo(b)fluoranthene	4.8	(1)
Indeno(1,2,3-cd)pyrene	1.5	(1)
Dibenzo(a,h)anthracene	0.1	(1)

Note:
(1) Carcinogenic polynuclear aromatic hydrocarbons are converted to benzo(a)pyrene equivalents before comparison to the appropriate direct exposure Soil Cleanup Target Level in accordance with Chapter 62-777, FAC (February 2005).

To follow up on the 2003 site-wide RAD characterization survey, a second site-wide gamma walkover survey was conducted in July 2007. The site perimeter, unpaved areas, and paved areas with cracks, depressions, or cover deformities that might eliminate or reduce attenuation of source material) were surveyed to identify locations of point sources (a discrete particle with elevated radioactivity) and delineate limits of concrete replacement where there was a potential for RAD exposure.

Munitions Response

During the 2005 IRA, intact and demilitarized .50-caliber and 20-millimeter projectiles were discovered west of Building 174A and the former rail spur. After the military munitions were cleared (removed) by Explosive Ordnance Disposal (EOD) Mayport, interim measures excavation activities continued. After approval of the RAWP in October 2007, soil and sediment were mechanically

[6] The remedial actions were conducted in accordance with 2005 SCTLs but post-ROD modifications to the remedial goals were not completed.

excavated from interior ditches until Munitions and Explosives of Concern (MEC) were discovered in the southwest ditch. Work was halted while EOD Mayport responded and identified the MEC as four 2.75-inch MK64 rocket warheads.

The Navy determined that MEC safety considerations were necessary before continuing with the selected remedy. The ROD did not address discovery of MEC or Material Potentially Presenting an Explosive Hazard (MPPEH) so an Explosives Safety Submission (ESS) for Munitions Response was developed to supplement the 2007 RAWP, with procedures for screening all soil and sediment removed for offsite disposal for the presence of MEC/MPPEH. The ESS identified the Munitions Response Sites as Areas of Concern (AOCs), as shown on Figure 8-4.

The ESS was approved in March 2011 and work resumed in May. Between June and August 2011, contaminated soil and sediment were excavated and processed for MEC/MPPEH and transported offsite for disposal. All MPPEH found was demilitarized in a Control Detonation Chamber (CDC) installed in the southwest portion of the DRMO, and the demilitarized remnants were released to the DRMO as scrap metal. Between May and October 2011, non-RAD contaminated wastes (40 tons of scrap, approximately 350 tons of soil and sediment, concrete, asphalt, and CDC filter media and solids) were transported offsite for disposal. The intermodal containers in which 220 tons of RAD-contaminated soil was accumulated were staged in a secured area within the southeast portion of the DRMO until they were sent offsite for disposal in June 2012.

A RACR and a Project Completion Report (PCR) issued in March 2013 concluded that contaminated soil and sediment removal activities were successful in meeting project objectives specified in the RAWP and recommended NFA for soil or sediment. The RACR and PCR were approved by FDEP in April 2013.

Groundwater

The groundwater program in the ROD requires monitoring for COCs (1,1-DCE, vinyl chloride, and arsenic) and natural attenuation parameters until remedial goals are attained. Groundwater samples were collected prior to initial excavation activities in October 2007. As with the soil and sediment excavation portion of the remedy, the LTM program was delayed until the site was cleared for unexploded ordnance (UXO). Groundwater monitoring resumed in August 2011.

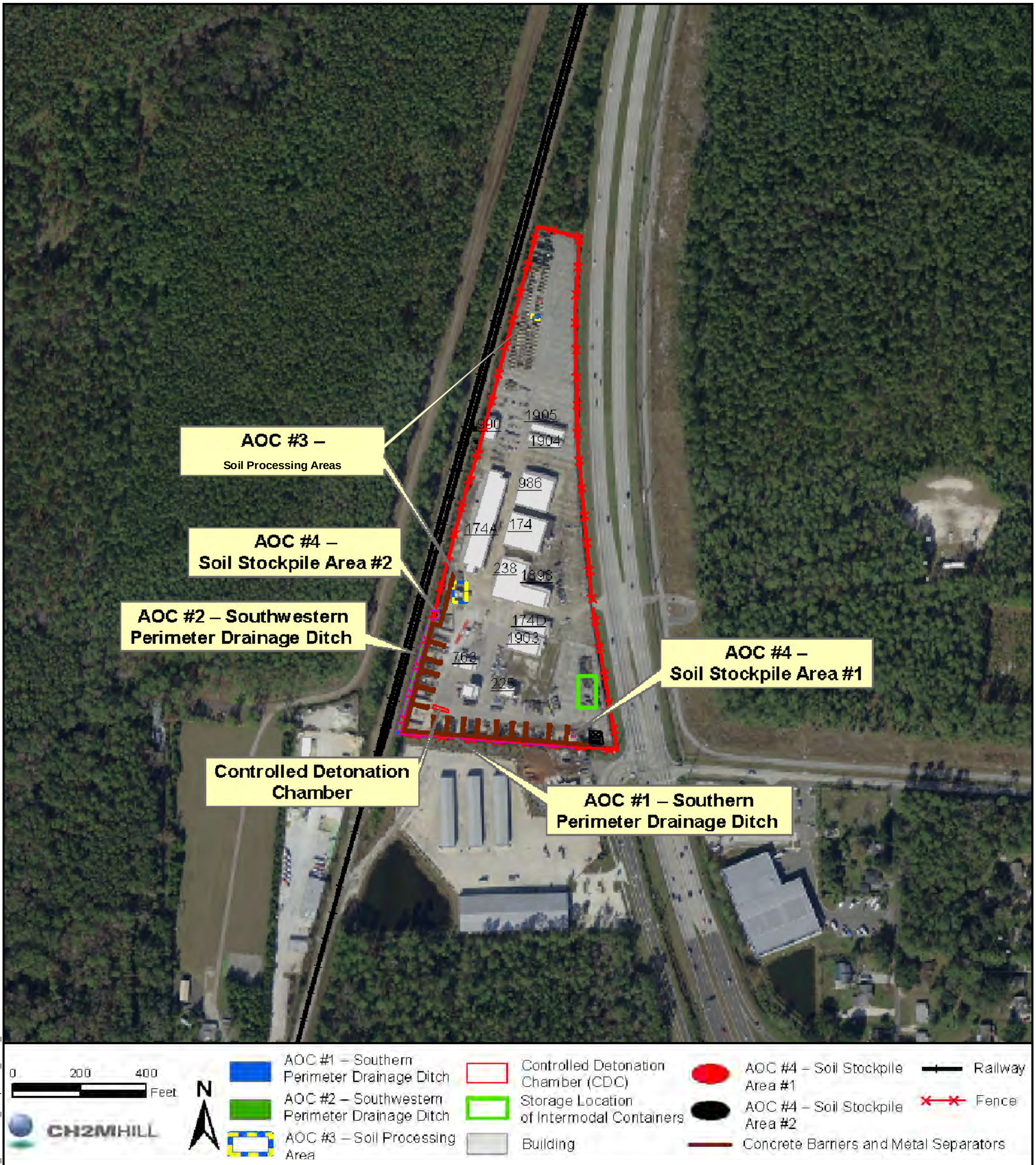

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Figure 8-4
Operable Unit 7 - Munitions Response Sites Areas of Concern
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

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REQUESTED BY: H. Brauer	DATE: 2/3/2016
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

Source:
- Map was acquired from Final Remedial Action Completion Report Soil/Sediment Remediation and Groundwater Sampling at OU 7, PSC 46 - Defense Reutilization and Marketing Office Naval Air Station Jacksonville, Jacksonville Florida by CH2MHILL Constructors, Inc., March 2013 and Final Project Completion Report Soil/Sediment Remediation and Groundwater Sampling at OU 7, PSC 46 - Defense Reutilization and Marketing Office, Naval Air Station, Jacksonville, Florida by CH2MHILL Constructors, Inc., March 2012.

Land Use Controls

The specific performance objectives for the LUC remedy in the 26 September 2012 LUC RD are to:

- Prevent unauthorized disturbance (e.g., digging, excavation/construction, drilling) of contaminated sediment and soil.
- Prohibit use of groundwater from the surficial aquifer underlying the site.
- Maintain the integrity of any existing or future monitoring or remediation systems, including paved areas.
- Maintain existing access controls to the site including fencing and warning signs.
- Prevent non-industrial development and uses.
- Ensure that all intrusive operations performed within AOCs #1 and #2 have anomaly avoidance procedures for MEC in accordance with DoD *Ammunition and Explosives Safety 25 Standards* (DoD 6055.09-STD 2008).

Figure 8-5 shows the LUC boundaries for chemical-contaminated soil, sediment, and groundwater within the DRMO, and areas where anomaly avoidance procedures for MEC are required.

8.4 Progress Since the Last Five-Year Review

8.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review provided the following protectiveness statement.

> *The remedy at OU 7 is protective [sic] is expected to be protective [sic] of human health and the environment upon completion, and in the interim exposure pathways that could result in unacceptable risks are being controlled. After implementation the protectiveness of the MNA component of the remedy will be evaluated after review of 5 years of groundwater monitoring data.*

8.4.2 Status of Recommendations and Follow-Up Actions from Last Review

The 2011 Five-Year Review was the first since the ROD was signed. Because the selected remedy had been delayed due to discovery of UXO, groundwater had not been monitored and LUCs were not in place. The 2011 Five-Year Review recommended resumption and completion of the remedies specified for OU 7 after UXO clearance was obtained. As discussed in Section 8.3.3, soil and sediment excavation was completed, and groundwater has been monitored since August 2011.

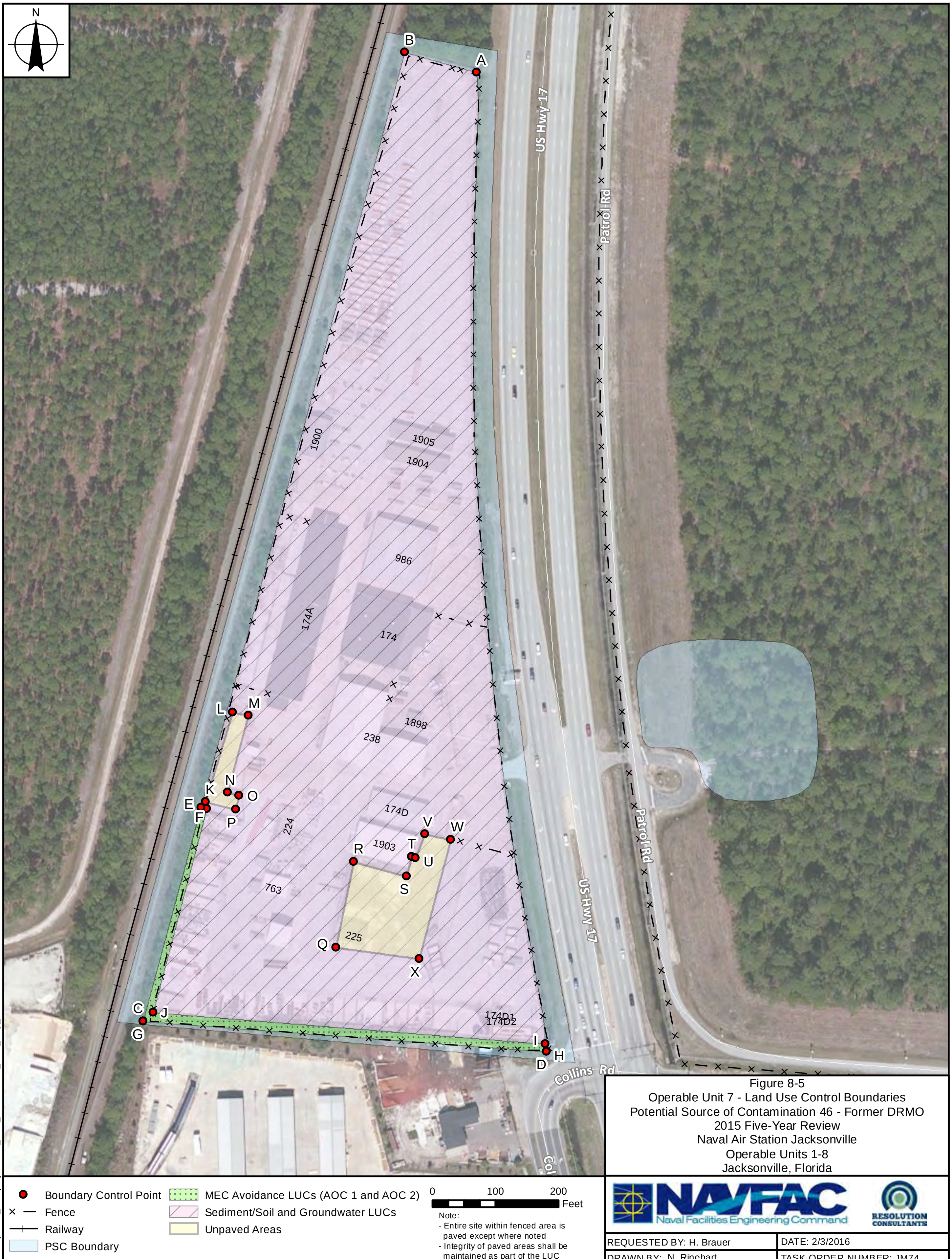

Figure 8-5
Operable Unit 7 - Land Use Control Boundaries
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 2/3/2016
DRAWN BY: N. Rinehart	TASK ORDER NUMBER: JM74

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Control points, unpaved areas, and LUCs approximated from CH2MHILL Constructors, Inc.; Road data are from the United States Census Bureau.

8.5 2015 Five-Year Review Process

8.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the RI/Focused FS, ROD, RAWP, ESS, RACR, and PCR for soil and sediment removal, and groundwater sampling reports. This Five-Year Review also included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014 and quarterly LUCIP Inspection Checklists for 2010 through 2014.

8.5.2 Data Review

Data obtained for this five-year review was obtained from one pre-remedy (October 2007) and six post-remedy sampling events conducted through September 2013 as part of the selected remedy. All detected concentrations of COCs and detections of non-COCs that exceed GCTLs are listed in Tables 8-5 (shallow interval wells) and 8-6 (deep interval wells). Because of the limited number of data points available, this review is considered a preliminary trend analysis; further groundwater monitoring will be used to assess remedial action performance.[7]

The locations of monitoring wells included in LTM are shown on Figure 8-6. Post-remedial action monitoring indicates groundwater depth range from 1.4 to 4.1 feet bgs. Potentiometric maps from February 2013 measurements indicate shallow groundwater flows north, with a localized westward flow in the southwest portion of the property (CH2MHILL 2013). Deep groundwater flows north from the south end of the property, turning slightly northeast near the center (CH2MHILL 2013).

In shallow groundwater, arsenic has exceeded its GCTL in one well (MW-4) during each sampling event, maintaining a fairly uniform range between 77.4 µg/L and 159 µg/L. Arsenic concentrations above the GCTL were also detected one time each in MW-10 (pre-remedy) and MW-11 (August 2011). Arsenic concentrations have remained below the GCTL in all other shallow wells, suggesting that the extent of the arsenic plume is limited and not expanding.

[7] U.S. EPA's Groundwater Remedy Completion Strategy (May 2014) and follow-up guidance for statistical evaluations (Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well, U.S. EPA August 2014) suggest that four data points are considered a minimum for remediation monitoring (e.g., to determine completion of remedial actions); a minimum of eight data points are recommended to analyze attainment monitoring data.

Figure 8-6
Operable Unit 7 - Monitoring Well Locations
Potential Source of Contamination 46 - Former DRMO
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER:JM74

Source:
- Map was acquired from Final September 2013 Semi-Annual Groundwater Monitoring Report Operable Unit 7 Potential Source of Contamination 46 (DRMO) Naval Air Station Jacksonville Jacksonville, Florida by Solutions-IES, Inc. September 2014.

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Table 8-5
Summary of Groundwater Analytical Results (Shallow Interval)
Operable Unit 7 — Potential Source of Contamination 46
(all results presented in micrograms per liter)

Well	Contaminant[(1)]	GCTL (2005)	Oct. 2007	Aug. 2011	May 2012	Aug. 2012	Nov. 2012	Feb. 2013	Sep. 2013
MW-1	Arsenic	10	*12.9* U	6.62 U	4.12 J	3.96 J	6.62 U	6.62 U	
	1,1-Dichloroethene	7	1.1 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	
	Vinyl chloride	1	*1.4* UJ	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	not sampled
	cis-1,2-Dichloroethene	70	1 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	
	Benzene	1	1 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	
MW-2	Arsenic	10	*12.9* U	Damaged during remedial actions (2007-2011) and not replaced.					
	1,1-Dichloroethene	7	1.1 U						
	Vinyl chloride	1	*1.4* U						
	cis-1,2-Dichloroethene	70	1 U						
	Benzene	1	1 U						
MW-3	Arsenic	10	8.97 J	3.67 J	6.02 J	5.8 J	6.62 U	6.62 U	2.5 U
	1,1-Dichloroethene	7	0.77 J	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1	**2.2**	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.44 U
	cis-1,2-Dichloroethene	70	2.7	0.38 U	0.38 U	0.19 J	0.38 U	0.38 U	NR
	Benzene	1	1 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	NR
MW-4	Arsenic	10	**130**	**122**	**129**	**126**	**105**	**77.4**	**159**
	1,1-Dichloroethene	7	1.1 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1	*1.4* UJ	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.44 U
	cis-1,2-Dichloroethene	70	1 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	NR
	Benzene	1	1 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	NR
MW-5/ MW-5S	Arsenic	10	*12.9* U	6.62 U	7.61 J	5.35 J	6.62 U	6.62 U	2.5 U
	1,1-Dichloroethene	7	1.1 U	0.38 U	0.38	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1	*1.4* UJ	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.44 U
	cis-1,2-Dichloroethene	70	1 U	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U	NR
	Benzene	1	1 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	NR
MW-10	Arsenic	10	**119**	Location not identified after remedial actions (2007-2011).					
	1,1-Dichloroethene	7	1.1 U						
	Vinyl chloride	1	*1.4* UJ						
	cis-1,2-Dichloroethene	70	1 U						
	Benzene	1	1 U						

Table 8-5
Summary of Groundwater Analytical Results (Shallow Interval)
Operable Unit 7 — Potential Source of Contamination 46
(all results presented in micrograms per liter)

Well	Contaminant[1]	GCTL (2005)	Oct. 2007	Aug. 2011	May 2012	Aug. 2012	Nov. 2012	Feb. 2013	Sep. 2013
MW-11S	Arsenic	10	not installed	not installed	6.42 J	**11.4**	4.4 J	6.62 U	2.5 U
	1,1-Dichloroethene	7			0.38 U	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1			0.36 U	1.2	1.3	1	1.3
	cis-1,2-Dichloroethene	70			1.4 U	0.88	1.2	0.74	NR
	Benzene	1			0.5	0.51	0.42 J	0.36 J	NR

Notes:

[1] Arsenic, 1,1-dichloroethene, and vinyl chloride are contaminants of concern identified in the Record of Decision; cis-1,2-dichloroethene and benzene are contaminants that have exceeded a Groundwater Cleanup Target Level in at least one well during multiple events

U = Analyte not detected above laboratory detection limit

J = Concentration estimated by the laboratory

Concentrations in **bold** font exceed the Groundwater Cleanup Target Level

NR = Not reported

Table 8-6
Summary of Groundwater Analytical Results (Deep Interval)
Operable Unit 7 — Potential Source of Contamination 46
(all results presented in micrograms per liter)

Well ID	Contaminant[1]	GCTL (2005)	Oct. 2007	Aug. 2011	May 2012	Aug. 2012	Nov. 2012	Feb. 2013	Sep. 2013
MW-5D	Arsenic	10	not installed	not installed	**10.3**	**10.1**	4.85 J	6.62 U	2.5 U
	1,1-DCE	7			0.38	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1			0.36 U	0.36 U	0.36 U	0.36 U	0.44 U
	cis-1,2-DCE	70			0.38 U	**135**	0.38 U	0.38 U	NR
	Benzene	1			0.34 U	**2.1**	0.34 U	0.34 U	NR
MW-8	Arsenic	10	*12.9* U	6.62 U	7.6 J	6.79 J	7.28 J	3.66 J	2.5 U
	1,1-DCE	7	0.43 J	2.2	1.9 U	0.55	0.45 J	0.26 J	0.20 U
	Vinyl chloride	1	**30**	**798**	**585**	**563**	**616**	**522**	**96.0**
	cis-1,2-DCE	70	**316**	**238**	**155**	**135**	**105**	**86**	NR
	Benzene	1	1 U	**2.1** J	**2.2** I	**2.1**	**2.1**	**1.9**	NR
MW-9	Arsenic	10	*12.9* U	3.88 J	8.93 J	5.64 J	7.59 J	4.62 U	2.5 U
	1,1-DCE	7	0.85 J	2.2	1	0.98	0.98	1	1.2
	Vinyl chloride	1	1.3 J	0.79 J	1.4	1.4	0.73 J	**1.7**	1.2
	cis-1,2-DCE	70	16.7	22.1	**72.2**	**33.3**	29.2	**123**	NR
	Benzene	1	1 U	0.34 U	0.34 U	0.34 U	0.34 U	0.17 J	NR
MW-11D	Arsenic	10	not installed	not installed	**12.9**	8.51 J	5.36 J	4.31 J	2.5 U
	1,1-DCE	7			0.38 U	0.38 U	0.38 U	0.38 U	0.20 U
	Vinyl chloride	1			0.36 U	0.36 U	1.3	1.7	0.98 I
	cis-1,2-DCE	70			0.38 U	0.38 U	2.4	4.1	NR
	Benzene	1			0.34 U	0.34 U	0.19 J	0.37 J	NR

Notes:

[1] Arsenic, 1,1-dichloroethene, and vinyl chloride are contaminants of concern identified in the Record of Decision; cis-1,2-dichloroethene and benzene are contaminants that have exceeded a Groundwater Cleanup Target Level in at least one well during multiple events

NI = Not installed

Concentrations in **bold** font exceed the Groundwater Cleanup Target Level

U = Analyte not detected above laboratory detection limit

J = Concentration estimated by the laboratory

NR = Not reported

Concentrations of vinyl chloride sporadically detected in MW-11S were near its GCTL.[8] The field monitoring parameter data (DO and ORP) indicate reducing conditions at MW-4 and MW-11S.

In the deep interval, arsenic, benzene, cis-1,2-DCE, and vinyl chloride have been inconsistently detected above their respective GCTLs. Vinyl chloride was the only monitored constituent that exceeded its GCTLs during the most recent (September 2013) sampling event, and has been the only parameter to exceed its FDEP NADC; vinyl chloride detections range from 30 to 616 µg/L. The September 2013 GCTL exceedance was in MW-8 where vinyl chloride concentrations had decreased from 522 (in February 2013) to 96 µg/L.

Importantly, cis-1,2-DCE concentrations have exhibited a decreasing trend throughout most of the monitoring period; the presence of vinyl chloride in the deep monitoring wells is indicative of reductive dechlorination of higher chlorinated ethenes.[9] In addition, the low DO and ORP values indicate reducing conditions conducive for reductive dechlorination. Arsenic has not exceeded its GCTL in a deep well during the last three events. Benzene has been detected consistently above the GCTL in MW-8; however, benzene concentrations in downgradient and sidegradient wells are below GCTLs, suggesting the plume is stable.

8.5.3 Site Inspection and Interviews

Resolution Consultants drove along portions of the east and south border and walked throughout OU 7, accompanied by Mr. Curtin on 2 October 2014. Vehicle and personal access to the site was restricted. A RAD-detector screens vehicles that enter and leave OU 7. The site inspection did not include observations of closed building interiors; open buildings (with roll-up bay doors or no exterior walls) were observed from outside during the walkthrough.

Former diesel fuel and gasoline aboveground storage tanks (ASTs) formerly in the southeast corner of the property, near the OWS, had been removed and new replacement ASTs installed near the center of the west property boundary. Terry Surdyke, DRMO Area Manager, was interviewed during the site inspection. Mr. Surdyke indicated a site-wide repaving project was planned to support additional usable material storage space for NAS Jacksonville.

[8] FDEP memorandum (Rounding Analytical Data for Site Rehabilitation Completion; 17 November 2011) authorizes rounding of analytical results to the same number of significant figures used to express the applicable CTL; therefore, the 1.0 µg/L, 1.2 µg/L, and 1.3 µg/L detections of vinyl chloride do not exceed its 1-µg/L GCTL.

[9] Benzene and cis-1,2-DCE were removed from the analytical suite in September 2013 although those parameters have historically been detected above their respective GCTLs in MW-8 and MW-9. The rationale for eliminating these parameters is unclear; however, future sampling events should re-evaluate the analytical suite to gauge whether COCs and ARAR exceedances are being monitored, and data are sufficient to evaluate MNA trends.

8.6 Technical Assessment

8.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

The selected remedy for soil was excavation and offsite disposal of soil and sediment contaminated with COCs above FDEP Commercial/Industrial SCTLs, followed by filling and repaving. The selected remedy for groundwater is MNA to evaluate decreases in COC concentrations and verify offsite migration does not occur. LUCs to minimize exposure to contaminants remaining above unrestricted use and unlimited exposure levels were components of soil and groundwater remedies. Information reviewed during this five-year review indicates the remedy is functioning as intended by the ROD.

Remedial Action Performance

Excavations completed in 2011 removed soil above FDEP Commercial/Industrial SCTLs. Concrete caps and paving prevent direct contact with residual soil contamination onsite and minimize leaching.

Data review suggests MNA is ongoing, particularly in the deeper interval, given preliminary cis-1,2-DCE and vinyl chloride trends. Concentrations of arsenic fluctuate within a narrow range in the shallow groundwater interval in a single well (MW-4), and do not appear to be migrating horizontally. No other constituents exceed GCTLs in the shallow zone. The deeper groundwater zone shows reductive dechlorination of higher chlorinated ethenes with a trend of decreasing levels of cis-1,2-DCE and increasing levels of vinyl chloride. The DO and ORP values support conditions necessary for continued degradation of chlorinated compounds. Benzene concentrations have been consistently above its GCTL in MW-8 but below its GCTL in downgradient wells, suggesting ongoing attenuation of benzene. Future data will support evaluation of plume dynamics and contaminant trends.

System Operation/Operations & Maintenance

Wells are maintained and inspected regularly as part of the LTM program. There are no active remediation systems requiring O&M at OU 7.

Opportunities for Optimization

Opportunities for optimization of the LTM program are considered annually. The NAS Jacksonville Partnering Team has approved several adjustments since LTM began in August 2011, as documented in semi-annual groundwater monitoring reports and revised work plans. Modifications have included abandoning damaged wells, installing new shallow and deep wells, and adding pesticide and PCB analyses.

As noted in Section 8.5.2, the proposed scope of work in the most recent SAP (SIES 2013) appears to be inconsistent with previous sampling events with respect to laboratory analyses: only 1,1-DCE, vinyl chloride, and arsenic are analyzed and reported. Although benzene and cis-1,2-DCE were not identified as COCs in the ROD, those contaminants were included in post-remedy sampling events and concentrations detected in deep wells have exceeded GCTLs since monitoring began. It may be appropriate for the NAS Jacksonville Partnering Team to consider the necessity for review to determine the appropriate analytical suite as part of the LTM program's optimization process.

Implementation of LUCs and Institutional/Engineering Controls

LUCs have been implemented and a LUC RD approved by the U.S. EPA and FDEP. Navy IRP personnel have conducted inspections quarterly since 2012 and submit inspection sheets to the U.S. EPA and FDEP annually. No issues were noted during LUCIP inspections.[10]

The fence and warning signs were intact, monitoring well covers observed were closed, and the concrete installed during the remedy appeared intact. An additional fence had been installed along the south and west borders because of vandalism issues.

Early Indicators of Potential Remedy Problems

This five-year review identified no early indication of potential remedy problems at OU 7. Contingency actions have not been implemented to date.

8.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

Location- and action-specific ARARs are discussed in Section 1.7. Chemical-specific ARARs and TBC criteria considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The RAWP recommended updating remedial goals to use the 2005 FDEP Commercial/Industrial SCTLs and redefining soil excavation areas (CH2MHILL 2007). To date, post-ROD modifications of the remedial goals have not been completed. However, no changes to FDEP SCTLs or GCTLs have occurred since 2005.

[10] Initial inspection checklists, which did not document inspections of concrete caps, have been revised to include covers and pavement at the DRMO.

Expected Progress towards Meeting RAOs

The expected outcomes of the selected remedy in the ROD included attaining GCTLs within approximately five years. Discovery of UXO delayed implementation of the remedy by almost four years. Adjusting for the delay, the approximate date that concentrations of COCs in groundwater are expected to attenuate below GCTLs is October 2016. Based on preliminary trend analysis of MNA data, COCs are attenuating but additional monitoring is needed to assess remedial performance.

Changes in Exposure Pathways

OU 7 is used as the DRMO and contains multiple buildings housing administrative and industrial operations. Implementation of the soil and groundwater remedies was delayed by discovery of potential UXO during soil removal, which required modification of excavation methods and procedures to address possible risk posed by any remaining UXO. The 2012 LUC RD addresses residual risks associated with UXO; the exposure pathways have not otherwise changed.

Changes in Land Use

No changes to land use discussed in Section 8.2.2 is anticipated. The aforementioned repaving and increased storage capacity is consistent with current land use; the plans should be reviewed by the NAS Jacksonville Partnering Team to ensure compliance with LUCs. The Navy's plans provide for continued non-residential use of the site as the DRMO facility, and LUCs in place currently prohibit residential use. Specific objectives of the LUCs are summarized in Section 8.3.3.

There are no current or future planned uses of shallow groundwater aside from extraction for monitoring in compliance with the ROD. The selected remedy includes regular site inspections to verify the continued application of LUCs for as long as soil and groundwater contaminant concentrations prohibit unrestricted use and unlimited exposure.

New / Emerging Contaminants and Contaminant Sources

The emerging contaminant 1,4-dioxane was detected at 70.7 µg/L in MW-8 during the November 2012 sampling event. The remaining analytical results could not be evaluated for 1,4-dioxane because the limits of detection (20 µg/L and 100 µg/L) exceeded the 3.2-µg/L GCTL. Further evaluation of 1,4-dioxane will be required to determine the extent of this emerging contaminant in groundwater above established ARARs.

No remedy byproducts or degradation products have been identified which would be considered new or emerging contaminants.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The baseline risk assessment and other risk assessment documents in the RI/Focused FS were developed using RAGS, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992).

The HHPRE concluded the potential for unacceptable risks to human health was present in soil, sediment, and groundwater that required remedial action to mitigate potential risks. COCs included metals, PAHs, PCBs, and radium-226 in soil, and arsenic, 1,1-DCE, and vinyl chloride in groundwater. The HHPRE determined that contamination in soil, sediments, and surface water should not pose a significant risk to ecological receptors due to the poor quality of habitat present and lack of connection of the storm water ditches to a surface water body. The HHPRE concluded that NFA was appropriate in the perimeter ditches if site use remained industrial. The basis for remedial actions is discussed in Section 8.2.5.

The risk assessment changes discussed in Section 1.8 are applicable to OU 7 because RAD wastes were COCs. In September 2014, U.S. EPA changed its approach for evaluating risk at sites with RAD waste. The new guidance states that exposure rates above 12 millirems per year are presumptively not protective, which is more conservative than prior guidance. RAD wastes left in place at OU 7 are covered with a cap (asphalt/concrete pavement) to prevent exposure and leaching, and the site is secured against unauthorized access. The change in U.S. EPA-recommended criteria for RAD waste is not expected to affect protectiveness based on a lack of exposure pathways and current LUC enforcement practices, but should be considered if changes to land use, alterations to LUCs, or modifications to existing barriers (including asphalt/concrete pavement) are considered. Planned pavement disturbances referenced in Section 8.5.3 may need to involve RAD monitoring; LUC provisions for disturbing pavement should be reviewed to assess RAD monitoring requirements.

Vapor Intrusion

The VISL screening detailed in Appendix C identified the chlorinated VOC 1,1-DCA in shallow groundwater at concentrations exceeding commercial/industrial VISLs within approximately 15 feet of Building 1903, a single-story administrative office. Based on comparison with commercial/industrial VISL TGCs, risks appear to be above FDEP's 1.0E-06 risk threshold. However, given the conservatism of VISL screening values, there is no significant VI risk from shallow groundwater at OU 7. Given that VISL screening values are at the low end of the U.S. EPA acceptable risk range (1.0E-06 to 1.0E-04), vapor risks at OU 7 are expected to be low and preliminary risk screening suggests that current groundwater concentrations do not affect protectiveness.

Summary

In summary, risk assessment findings at NAS Jacksonville were based on current and proposed future industrial land use with the potential for trespassing. LUCs have been implemented to prevent future residential land use, and ARARs were used in the groundwater remedy design. Except for VI and 1,4-dioxane (discussed previously), this five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the ARAR-based remedy because LUCs are in place to prevent exposure. The RAWP recommended using FDEP's 2005 Commercial/Industrial SCTLs to update remedial goals (CH2MHILL 2007); post-ROD documentation of remedial goal changes has not been completed. The necessity for additional VI evaluations or risk assessments will be determined prior to any land use changes.

8.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy. As noted in Section 8.5.3, the activity indicated upcoming plans to re-pave the site; re-paving activities should be implemented in accordance with LUC requirements and IRP requirements, given site restrictions.

8.7 Issues and Recommendations/Follow-Up Actions

Issues and recommendations for follow-up actions are in Table 8-7.

8.8 Protectiveness Statement

The remedy at OU 7 is protective of human health and the environment because soil removal and LUCs have eliminated risk from direct exposure to soil contaminant concentrations exceeding industrial criteria, and LUCs prevent exposure to groundwater from potable or other uses. Groundwater monitoring ensures contamination is not migrating offsite and that the natural attenuation portion of the remedy is effective. Additional investigation may be warranted for the emerging contaminant 1,4-dioxane, which was detected in groundwater at OU 7, but protectiveness is not affected while LUCs prevent groundwater use. VI screening suggests that current groundwater concentrations do not affect protectiveness at this time.

Table 8-7
Issues and Recommendations/Follow-Up Actions at Operable Unit 7

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	The 2007 Remedial Action Work Plan recommended the remedial goals (1999 Florida Department of Environmental Protection [FDEP] Commercial/Industrial Soil Cleanup Target Levels [SCTLs]) be updated to the 2005 SCTLs. The areas where soil was excavated were based on 2005 criteria. Record of Decision remedial goals have not been revised.	Revise remedial goals to reflect 2005 SCTLs as implemented during the 2007 (and subsequent) remedial actions.	Navy	U.S. EPA, FDEP	31 March 2018	N	N
2	The emerging contaminant 1,4-dioxane was detected at 70.7 micrograms per liter (µg/L) in MW-8 during the November 2012 monitoring event. The remaining analytical results could not be evaluated for 1,4-dioxane because the detection limits (20 and 100 µg/L) exceeded the 3.2 µg/L Groundwater Cleanup Target Level. Protectiveness is not affected while Land Use Controls prevent groundwater use.	Develop a Sampling and Analysis Plan to assess the current extent of 1,4-dioxane at Operable Unit 7.	Navy	U.S. EPA, FDEP	31 March 2018	N	N

9.0 OPERABLE UNIT 8

OU 8 (PSC 47) is comprised of Building 536 and Building 937, known as the Pesticide Shop and former Disease Vector Ecology and Control Center (DVECC), respectively. Building 536 was used for development of pesticide management programs, training, and pesticide mixing and storage from the 1960s until 1978, when Building 937 was dedicated for that purpose. Building 536 is now used to store and maintain grounds landscaping and lawn care equipment, and pesticides for nearby Casa Linda Oaks golf course. Now the Naval Entomology Center of Excellence (NECE), Building 937 is used for pesticide development programs, training, and research and development. OU 8 is west of Child Street, approximately 600 feet south of Birmingham Avenue at NAS Jacksonville (Figure 9-1). The site encompasses 4.2 acres of relatively flat terrain, with landscaped turf grass and mature trees on portions not covered by structures and pavement. Separated by a chain-link fence, Building 536 is north of Building 937 (Figure 9-2).

9.1 Site Chronology

Historical events and relevant dates in the OU 8 chronology are listed in Table 9-1.

Table 9-1
Chronology of Events — Operable Unit 8
Potential Source of Contamination 47

Event	Date
Disease Vector Ecology and Control Center (DVECC) Underground Storage Tank (UST) taken out of service	1989
Site placed on the National Priorities List	November 1989
55-gallon rusted drums formerly containing malathion and other pesticides removed	1991
Building 536 added to Naval Air Station Jacksonville Resource Conservation and Recovery Act (RCRA) Permit and identified as a Potential Source of Contamination	1993
DVECC UST removed	1995
Contamination delineation/site screening investigation	1996 to 1997
Interim Remedial Action (IRA) — Shallow soil excavation around Building 536	1998 to 1999
Resource Conservation and Recovery Act Facility Investigation	January 1997
Remedial Investigation (RI)/Feasibility Study (FS) Phase I	June to December 2001
RI/FS Phase II	March 2002 to July 2003
RI/FS Phase III	November 2006 to March 2007
Final RI/FS Report	February 2008
IRA — Soil Excavation and Capping around Building 536	April 2008
Record of Decision signed	26 September 2008
FS Addendum/IRA Completion Report	December 2008
Post-IRA Groundwater Monitoring	May 2008 to April 2012
Land Use Control Remedial Design	September 2009
Remedial Action Completion Report	September 2010
Previous Five-Year Review	2011
Monitored Natural Attenuation Performance Review	2011
Arsenic Natural Attenuation Evaluation	2013

Figure 9-1
Operable Unit 8 - Location
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

Operable Unit 8 Boundary

NAS Jacksonville Boundary

0 500 1,000 Feet

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

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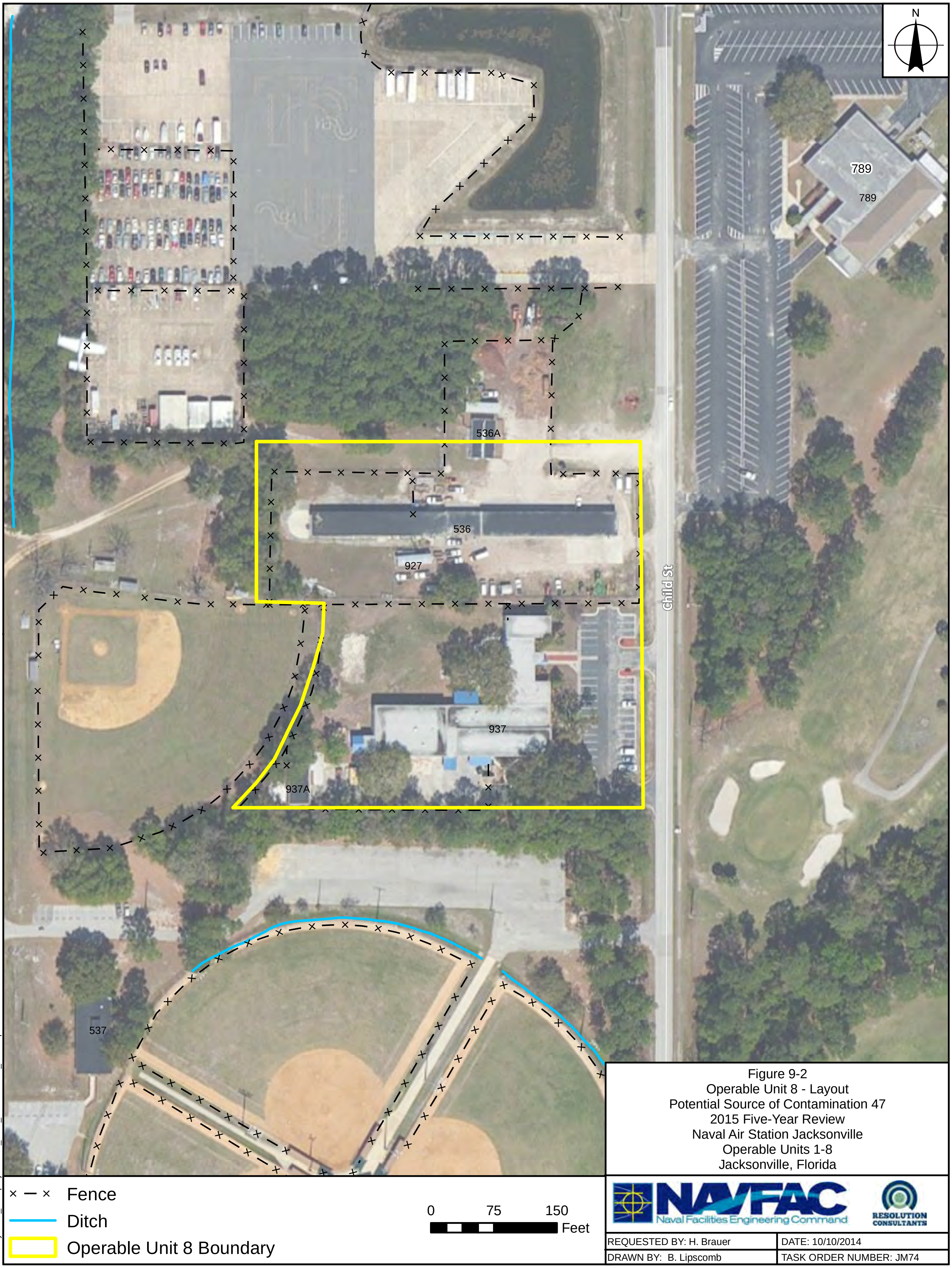

Figure 9-2
Operable Unit 8 - Layout
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

REQUESTED BY: H. Brauer	DATE: 10/10/2014
DRAWN BY: B. Lipscomb	TASK ORDER NUMBER: JM74

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9.2 Background

9.2.1 Physical Characteristics

Building 536 is a rectangular structure, approximately 360 feet long by 28 feet wide, oriented east-to-west. The interior is segmented into drive-through working bays and small enclosed offices. Asphalt pavement approximately 10 feet wide abuts the building on the north and south, with the remainder of the surrounding area unpaved and partially vegetated. The Building 536 premises are surrounded on all sides by a 6-foot-high chain-link fence offset from the building at distances ranging from 30 feet (on the north) to 75 feet (on the south). Access to the facility is from a driveway northeast of the building, off Child Street.

Building 937 is an L-shaped two-story office building with an east wing that parallels Child Street and a south wing situated east to west. The north end of the east wing is nearest to (approximately 95 feet from) Building 536. A paved parking lot between the east wing and Child Street is accessible from two driveways off Child Street. An east-to-west paved service drive provides access to the south side of Building 937.

A narrow strip of oak and pine trees is located along the south and west PSC 47 boundaries. Recreational ball fields adjoin the PSC 47 boundary to the west and south. An asphalt parking lot and narrow strip of dense vegetation and trees separate two baseball diamonds from the fence south of Building 937. A grass area approximately 15 to 20 feet wide is between the outfield fence of the west-adjoining baseball field and the chain-link fence marking the PSC 47 west property boundary. Beyond Child Street to the east is the Casa Linda Oaks golf course. Turf grass and a grove of oak trees are north of the site.

A south-flowing wet-weather conveyance that parallels Child Street along the east boundary receives most of the surface runoff from PSC 47. There are no surface water bodies onsite. The nearest surface water body is Casa Linda Lake, approximately 2,200 feet east of PSC 47.

9.2.2 Land and Resource Use

OU 8 is used for industrial purposes. At Building 937, the NECE conducts laboratory-based pesticide research and development and provides pesticide application training to DoD personnel. There is no outdoor pesticide application, mixing, or disposal; all training activities are conducted using inert (non-pesticide-containing) products. The only outside activity observed around Building 937 was a mosquito breeding tent. Access to work bays on the south side of Building 937 is protected by a security-coded chain-link fence and gate. Adjacent land use is primarily recreational (golf course and baseball fields).

Under a reasonable future land use, the area is expected to remain industrial and future receptors will continue to be NECE and NAS Jacksonville personnel. Although the baseline HHRA (discussed in Section 9.2.5) considered future land use to be the same as current land use, potential future residents were evaluated for decision-making purposes.

Soil underlying PSC 47 is composed of fine-grained sand with clay lenses, grading to clay with depth, and overlying a weathered limestone unit at 45 to 53 feet bgs. Surficial groundwater is encountered between 3 and 7 feet bgs, and flows in a northwest direction. The surficial aquifer at OU 8 is not used for domestic, industrial, or potable purposes, and NAS Jacksonville does not anticipate such future uses. The LUC remedy implemented prohibits withdrawal or use of groundwater from the surficial aquifer for any purpose except assessing groundwater quality or remediating groundwater contamination.

A closed-loop recirculating HVAC system was installed at Building 937, with U.S. EPA and FDEP approval, in 2008. Approximately 80 holes were drilled to approximately 250 feet deep (into the Hawthorn Formation, within approximately 50 feet of the Floridan Aquifer); 64 were installed in the adjoining baseball field and 16 within the PSC 47 fence line. The closed-loop system uses u-shaped tubes and does not withdraw groundwater.

9.2.3 History of Contamination

Building 536 was used to store pesticides/herbicides and to calibrate and test pesticide-application equipment from the 1960s to 1978. Chlordane was applied to and around test slabs of concrete, cinder block, and brick southeast of Building 536 during termite control training exercises. Building 536 formerly contained two 4-foot square by 3-foot deep soakage pits in its southeast and southwest corners. The southeast pit may have received drainage from interior operations and both may have been used during training exercises. One former AST and one former UST south of Building 536 reportedly contained diesel fuel and one former AST contained a mixture of diesel fuel and malathion for use as a hot fogger (sprayed from trucks) for mosquito control prior to 1972.

From 1978 to 1988, a pesticide mixing room with a sink and three floor drains was in the south-central portion of Building 937. Rinse water and excess liquids from the sink and floor drains discharged to a 1,000-gallon fiberglass UST, known as the DVECC Tank, which was taken out of service in 1989.

In 1993, Building 536 was identified as a PSC and added to the NAS Jacksonville HSWA Permit because past practices included spills and releases of pesticides, storing pesticides and herbicides, and calibrating and testing pesticide application equipment. Materials previously stored or used in the vicinity of Buildings 536 and 937 contained pesticides and herbicides, VOCs, SVOCs, and metals, as indicated by initial site investigations.

9.2.4 Initial Response

Investigations and IRAs completed between the early to late 1990s used Clean Closure Target Levels (Soil Clean-up Goals and Groundwater Guidance Concentrations), which were RCRA regulatory-based standards specified in the NAS Jacksonville RCRA Permit, until 1999 when replaced by FDEP Commercial/Industrial SCTLs and GCTLs, and NAS Jacksonville Background Concentrations. Site-specific soil leachability (SSSL) criteria determined by Synthetic Precipitate Leaching Procedure analysis in Phase I of the RI/FS were used in addition to FDEP Leachability to Groundwater SCTLs.

Between 16 October and 6 December 1995, the Building 937 DVECC UST and its contents, associated piping, concrete hold-down slab, surrounding asphalt paving, and contaminated soil were removed and disposed of offsite. Confirmation soil and groundwater samples collected contained pesticides (primarily chlordane) in soil above FDEP Leachability to Groundwater SCTLs and in groundwater exceeding GCTLs. Because clean closure was not achieved, additional subsurface investigation was performed in December 1996 to evaluate the extent of contamination.

Two phases of RI/FS conducted in 1996 and 1997 detected targeted pesticides and an herbicide exceeding regulatory criteria in Building 937 soil and groundwater (TtNUS 2008). At the conclusions of those investigations, the NAS Jacksonville Partnering Team incorporated Building 937 into PSC 47, removing it from the RCRA Permit. Between April and August 1997, surface soil and groundwater samples were collected from areas surrounding Building 536 and northwest of Building 937 (HLA 1999). Laboratory analysis of soil samples detected SVOCs and elevated concentrations of pesticides, herbicides, arsenic, and lead. Groundwater samples contained pesticides, SVOCs, VOCs, metals, and an herbicide exceeding their respective GCTLs.

The first phase of IRA activities conducted in 1999 to prevent risks to onsite workers at Building 536 included excavating and disposing of the soakage pits, excavating and disposing of approximately 1,560 tons of contaminated surface and subsurface soil, and backfilling the excavation area (BEI 1999). Land surrounding Building 937 was not included in the 1999 IRA.

A second IRA, using Florida risk-based corrective action guidance, consisted of additional excavation around Building 536 to remove contaminated soil (identified by investigation conducted after the 1999 IRA) and installation of a cap to prevent leaching of soil contaminants into groundwater. The second IRA, conducted between September 2007 and April 2008, was a component of the selected remedy, as discussed in Section 9.3.3.

9.2.5 Basis for Taking Action

The RI/FS used screening levels based on U.S. EPA Region 9 PRGs (U.S. EPA 2004) with NAS Jacksonville Background Concentrations, FDEP SCTLs and GCTLs, and other U.S. EPA criteria (MCLs and generic soil screening levels) to identify surface and subsurface soil and groundwater COPCs at PSC 47; these include soil COCs (PAHs, pesticides, and arsenic) and groundwater COCs (VOCs, SVOCs, pesticides, and arsenic).

Human Health Risk Assessment

The HHRA identified the potential for unacceptable risks to human health associated with direct contact with surface soil, subsurface soil, and groundwater. The risk characterization process retained the following as soil COCs: arsenic, benzo(a)pyrene equivalents, DDD, 4,4'-dichlorodiphenyldichloroethene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), alpha-hexachlorocyclohexane (BHC), chlordane (total), dieldrin, heptachlor, and heptachlor epoxide. The types of pesticides detected in soil at the site reflected materials historically handled for pesticide mixing, application training, and equipment cleaning and maintenance. Petroleum hydrocarbons, PAHs, and chlorinated solvents detected were consistent with former bulk tank storage of substances containing those compounds.

Pesticide concentrations were highest near the buildings, parking lots, and along Child Street and considerably lower along the north, west, and south boundaries of PSC 47. Pesticide contamination in soil appeared to be widespread while arsenic-contaminated soil appeared to be randomly distributed. One surface soil sample from the east-adjoining drainage swale contained limited elevated pesticide and PAH concentrations.[1]

The risk characterization process retained the following groundwater COCs: arsenic, 1,2-dibromo-3-chloropropane, 1,4-dichlorobenzene, benzene, cis-1,2-DCE, PCE, TCE, vinyl chloride, 2,4,5-trichlorophenol, 2,4-dichlorophenol, 2-methylnaphthalene, naphthalene, pentachlorophenol, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-BHC, beta-BHC, delta-BHC, gamma-BHC, chlordane (total), endrin ketone, heptachlor, and heptachlor epoxide.

[1] Because the drainage swale had been dry during each sampling event, samples collected were screened against soil cleanup levels.

Two distinct areas (plumes) of shallow groundwater contamination were identified in the upper portions (7 to 27 feet bgs) of the shallow saturated unit (TtNUS 2008).

- The north plume, approximately centered on Building 536, contained pesticides and a small area of VOC/SVOC contamination near the center of the north side of Building 536. The north plume contamination was attributed to former ASTs and USTs. One pesticide COC was detected in a deep well (deeper portion of the surficial aquifer) near the center of Building 536. The approximated area of the north plume is 64,600 square feet.

- The south plume, which extended north and south of the Building 937 south wing, contained pesticides, VOCs, and arsenic. One pesticide COC and four VOCs with concentrations exceeding GCTLs were detected in a deep monitoring well within this plume area. The approximated area of the south plume is 69,000 square feet.

  Arsenic contamination in the south plume was defined within an approximately 10,800-square-foot hot spot centered on the former DVECC tank location.

Ecological Risk Assessment

The ERA performed as part of the RI/FS concluded that the poor habitat, urban nature of the area, and small size of OU 8 resulted in an essentially negligible exposure pathway for wildlife species. Except for receptors such as soil invertebrates, the potential for ecological impacts from site-related contaminants was minor under existing habitat conditions. As a result, the NAS Jacksonville Partnering Team agreed that potential ecological risks were acceptable.

9.3 Remedial Actions

The ROD for OU 8 was signed on 26 September 2008.

9.3.1 Remedial Action Objectives

The RAOs stated in the ROD are as follows.

- Soil RAO 1 — Prevent unacceptable risk from exposure to surface and subsurface soil with benzo(a)pyrene equivalents, pesticides, and arsenic at concentrations above FDEP Commercial/Industrial SCTLs.

- Soil RAO 2 — Prevent migration of pesticides to groundwater from surface and subsurface soil with concentrations of those chemicals exceeding FDEP Leachability to Groundwater SCTLs or SSSLs.

Table 9-2 lists site-specific soil COCs and remedial goals identified in the ROD.

Table 9-2
Site-Specific Soil Contaminants of Concern and Remedial Goals
Operable Unit 8 — Potential Source of Contamination 47

Site-Specific Contaminant of Concern	Remedial Goal (milligrams per kilogram)
Arsenic	1.65 (1)
Benzo(a)pyrene equivalent	0.7 (1)
alpha-hexachlorocyclohexane	0.0003 (2) (3)
beta-hexachlorocyclohexane	0.001 (2) (3)
delta-hexachlorocyclohexane	0.2 (2)
Chlordane (total)	0.65 (1)
4,4’-dichlorodiphenyldichloroethane	0.58 (1)
4,4’-dichlorodiphenyldichloroethene	1.43 (1)
4,4’-dichlorodiphenyltrichloroethane	2.53 (1)
Dieldrin	0.11 (1)
Endrin	1.0 (2)
Heptachlor	0.06 (1)
Heptachlor Epoxide	0.05 (1)

Notes:
(1) Apportioned alternative CTL for industrial use calculated in accordance with Technical Report Chapter 62-777.100(2), FAC.
(2) Based on FDEP Leachability to Groundwater SCTL criteria per Chapter 62-777, Table II.
(3) The laboratory practical quantitation limit (lowest concentration that a laboratory can accurately report a chemical) should be used if less stringent than the CTL, in accordance with Chapter 62-780.680(2)(b)2.a.(III), FAC.

- Groundwater RAO 1 — Prevent unacceptable risk from exposure to groundwater with concentrations of VOCs, SVOCs, pesticides, and arsenic exceeding FDEP GCTLs and U.S. EPA MCLs.

- Groundwater RAO 2 — Prevent migration of groundwater COCs to surface water and restore groundwater quality at OU 8 to meet drinking water standards based upon FDEP classification of the aquifer as a potential source of drinking water (Class G-II).

Table 9-3 lists site-specific COCs and groundwater remedial goals identified in the ROD.

Table 9-3
Site-Specific Groundwater Contaminants of Concern and Remedial Goals
Operable Unit 8 — Potential Source of Contamination 47

Site-Specific Contaminant of Concern	Remedial Goal (1) (micrograms per liter)
Aldrin	0.002 (2)
Arsenic	10
Benzene	1
alpha-hexachlorocyclohexane	0.006 (2)
beta-hexachlorocyclohexane	0.02 (2)
delta-hexachlorocyclohexane	2.1
gamma-hexachlorocyclohexane	0.2
1,1-biphenyl	0.1
4,4'-dichlorodiphenyldichloroethane	0.1
4,4'-dichlorodiphenyldichloroethene	0.1
4,4'-dichlorodiphenyltrichloroethane	0.1 (2)
Dieldrin	0.002 (2)
1,2-dibromo-3-chloropropane	0.2
cis-1,2-dichloroethene	70
2,4-dichlorophenol	0.3 (2)
Endrin Ketone	2.0
Ethylbenzene	30
Heptachlor Epoxide	0.2
Isopropylbenzene	0.8 (2)
2-methylnaphthalene	28
Naphthalene	14
Pentachlorophenol	1.0
Tetrachloroethene	3.0
Trichloroethene	3.0
2,4,5-trichlorophenol	1.0
Vinyl Chloride	1.0
Xylenes (total)	20

Notes:
(1) Based on FDEP GCTLs and MCLs in Chapter 62-777 and 62-550.310, FAC, respectively
(2) The laboratory practical quantitation limit (lowest concentration that a laboratory can accurately report a chemical) should be used if it is less stringent than the CTL, in accordance with Chapter 62-780.680(1)(c), FAC.

9.3.2 Remedy Selection

Soil

The selected remedy for soil was excavation and offsite disposal to allow industrial use, capping to prevent leaching, LUCs, and monitoring, with the following components.

1. Excavation of contaminated soil with COC concentrations exceeding FDEP Commercial/Industrial SCTLs to prevent direct exposure under current (industrial) land use.

2. Installation of an impervious cover system (i.e., a cap) at areas with soil COC concentrations above FDEP Leachability to Groundwater SCTLs or SSSLs in areas of known groundwater contamination to prevent continued leaching of soil COCs into groundwater.

3. LUCs to prevent unacceptable exposure to residual soil contamination that will remain at the site at concentrations that preclude unrestricted use and unlimited exposure.

4. Groundwater monitoring to verify the effectiveness of the cap and to evaluate potential leaching of COCs into groundwater in both capped and uncapped areas.

As described in Section 9.3.3, the excavation and capping components were implemented as an IRA and LUCs and groundwater monitoring were implemented as part of post-ROD actions.

Groundwater

The selected remedy for groundwater was MNA and LUCs, with the following components.

1. Natural attenuation of COCs that are the most prevalent and most likely to respond (VOCs and SVOCs). Less transient COCs not likely to migrate significant distances may also be reduced over time via control/removal of overlying impacted soil. The ROD specifies evaluation of five years of groundwater monitoring data to determine if natural attenuation is effective at reducing COCs at a rate to meet RAOs within a reasonable timeframe or if contingent action is necessary.

2. Monitoring to evaluate decreases in COC concentrations in the surficial aquifer and verify offsite migration does not occur.

3. LUCs to prevent leaching to groundwater from and unacceptable exposure to residual soil contamination that will remain at the site at concentrations that preclude UU/UE.

9.3.3 Remedy Implementation

Excavation and Offsite Disposal and Capping

In October 2007, as part of the FS Addendum/IRA, 1,007 tons of soil contaminated with COCs above FDEP Commercial/Industrial SCTLs were excavated to 1 to 2 feet bgs and disposed of offsite.[2] A 2008 excavation overlapped areas previously excavated in the 1999 IRA soil removal. An additional 126 tons of soil exceeding FDEP Leachability to Groundwater SCTLs and SSSLs were excavated and disposed of offsite in preparation for the capping components of the remedy. The eight locations where soil was excavated surrounded Building 536 are shown on Figure 9-3.

The capping component was completed in April 2008 as part of the FS Addendum/IRA.[3] Permeability testing performed for a proposed asphalt cover determined that it was not acceptable to prevent leaching. As a result, 8-inch concrete slabs designed in accordance *Final Covers on Hazardous Waste Landfills and Surface Impoundments* (U.S. EPA 1989) and meeting RCRA landfill cap performance requirements were installed at two locations: approximately 2,000 square feet outside the southeast corner of Building 536 and approximately 150 square feet at the west end of Building 536 (TtNUS 2008). The locations where caps were installed are shown on Figure 9-3.

LUCs

The specific performance objectives listed in the 30 September 2009 LUC RD document are to:

- Prohibit recreational, agricultural, or residential use
- Prohibit disturbance of the caps and underlying soil at the site to prevent unacceptable occupational exposure
- Prohibit withdrawal of groundwater from the surficial aquifer underlying the site for all uses except monitoring
- Maintain the integrity of any existing or future monitoring or remediation system including monitoring wells and concrete caps

[2] Soil COCs include benzo(a)pyrene equivalents, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, total chlordane, heptachlor, heptachlor epoxide, and arsenic.
[3] The excavation and capping components of the remedy implemented as IRAs followed FDEP Chapter 62-780 risk-based corrective action criteria, which were considered as protective as CERCLA actions (TtNUS 2008).

Approximate Concrete Pavement Based on Leachability Evaluation

Approximate Surface Soil Excavation

0 50 100 Feet

Figure 9-3
Operable Unit 8 - Excavation and Capping Areas
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

NAVFAC Naval Facilities Engineering Command

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As shown on Figure 9-4, there are three areas of soil contamination at PSC 47 within the LUC RD boundary: Area 1 is approximately 107,000 square feet surrounding Building 536, Area 2 is approximately 5,500 square feet south of the west end of Building 937, and Area 3 is approximately 1,200 square feet southeast of the Building 937 paved parking lot. Figure 9-5 shows LUC boundaries for groundwater, which covers 317,152 square feet.

LTM and MNA

The LTM Program proposed regular collection and analysis of groundwater samples from the north and south plumes to assess natural attenuation, and downgradient of the leading edge of the plumes to evaluate plume stability and to detect potential offsite migration of groundwater COCs.

Laboratory analytical results from quarterly groundwater sampling, conducted at PSC 47 from May 2008 through March 2009, confirmed previous delineation of north and south contaminant plumes. The south contaminant plume is characterized on PSC 47 by six wells located on the west end of Building 937 (wells JAX47-937-MW01S through JAX47-937-MW04S, JAX47-MW14S, and JAX47-MW15S), and includes an arsenic hot spot located within the area of the former DVECC UST. The north contaminant plume is characterized by 19 monitoring wells located north, south, and west of Building 536. Figure 9-6 shows the groundwater plumes identified in the ROD (TtNUS 2008).

The shallow groundwater table is highly responsive to seasonal variations in rainfall, as evidenced by an elevation increase of more than 4 feet within the July 2008 through September 2008 period, which occurred in response to abnormally heavy rainfall. COC concentrations in shallow groundwater samples have fluctuated over time, likely as a result of seasonal climatic changes influencing the geochemistry of the groundwater. Observed increases in COC concentrations appear to be temporary and, for most wells, maximum concentrations of COCs appear stable or COCs show evidence of decreasing concentrations over time.

The north and south contaminant plumes appear stable as evidenced by (1) the absence of COCs in perimeter monitoring well samples and (2) mostly stable or decreasing COC concentrations observed during quarterly groundwater monitoring.

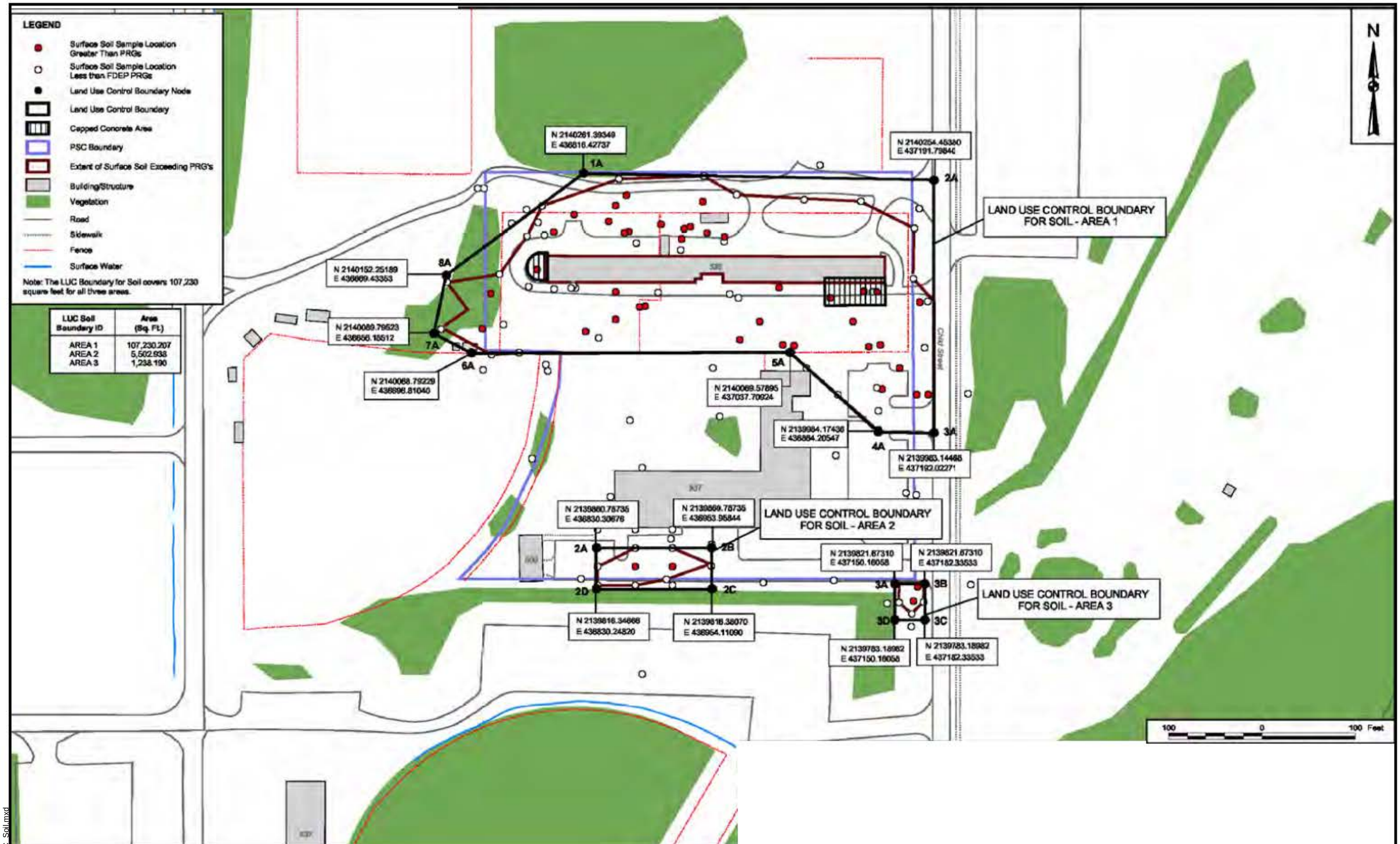

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Figure 9-4
Operable Unit 8 - Land Use Control Boundaries (Soil)
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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Source:
- Map was acquired from Record of Decision for Operable Unit 8 Potential Source of Contamination 47 Naval Air Station Jacksonville Jacksonville, Florida by Tetra Tech NUS, Inc., September 2008.

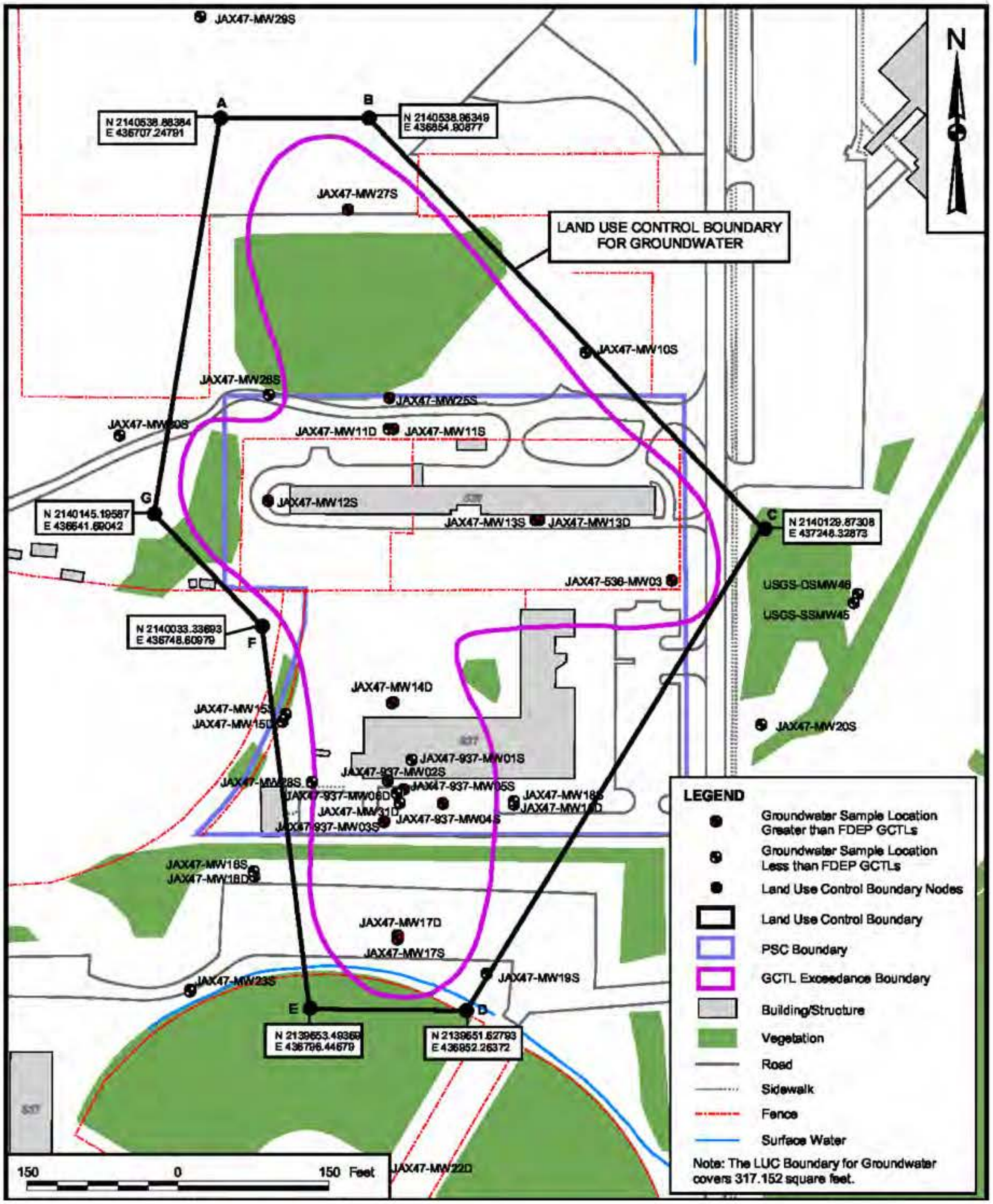

Figure 9-5
Operable Unit 8 - Land Use Control Boundaries (Groundwater)
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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Source:
- Map was acquired from Record of Decision for Operable Unit 8 Potential Source of Contamination 47 Naval Air Station Jacksonville Jacksonville, Florida by Tetra Tech NUS, Inc. September 2008.

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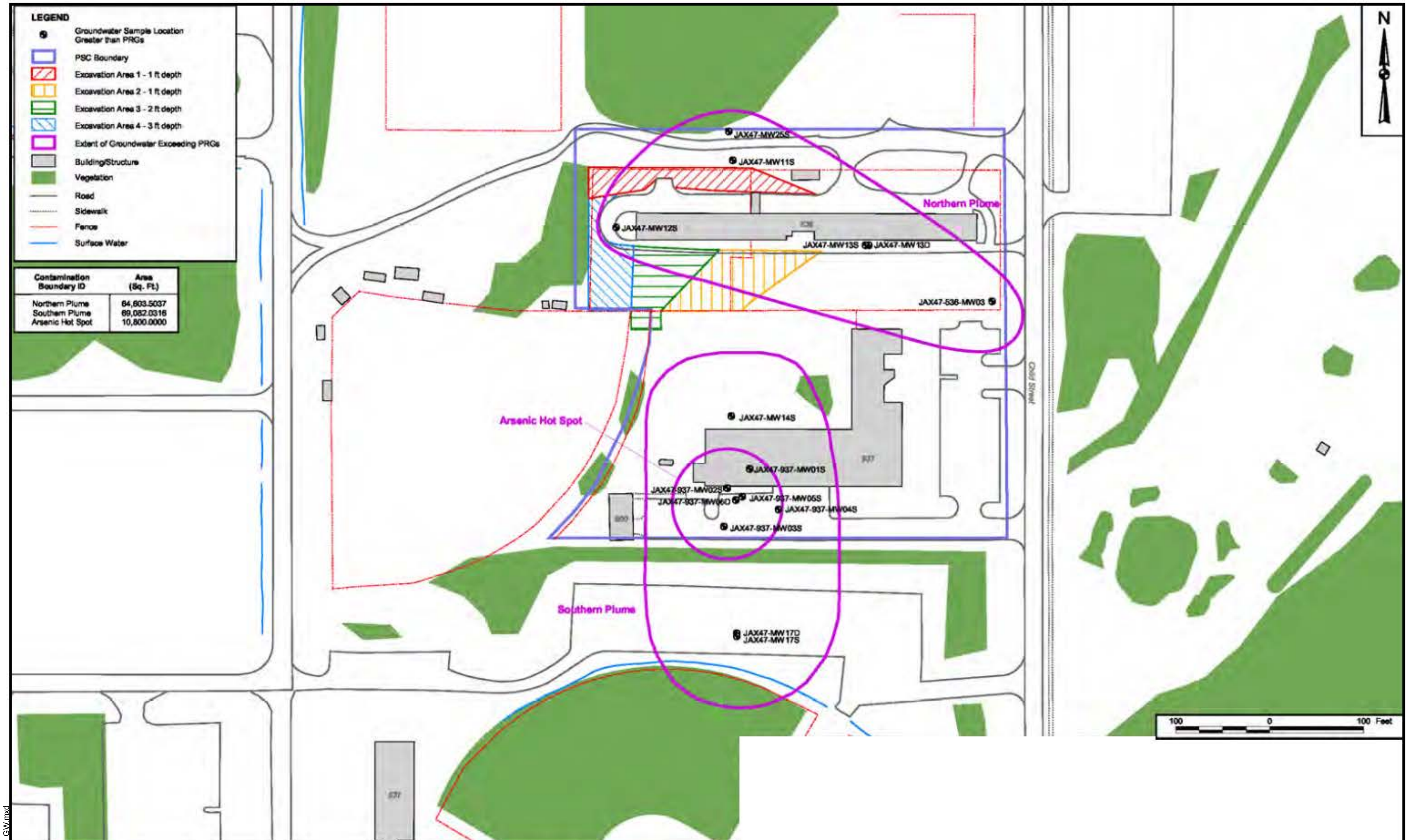

Figure 9-6
Operable Unit 8 - Groundwater Plumes
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida

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Source:
- Map was acquired from Remedial Investigation and Feasibility Study for Potential Source of Contamination 47 Naval Air Station Jacksonville, Jacksonville, Florida by Tetra Tech NUS, Inc., February 2008.

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9.4 Progress Since the Last Five-Year Review

9.4.1 Protectiveness Statements from the Last Review

The 2011 Five-Year Review provided the following protectiveness statement.

> *The remedy at OU 8 is protective for short term and for long term it is expected to be protective and will be re-evaluated after review of 5 years of groundwater monitoring data. The institutional controls, groundwater monitoring, at OU 8 provide an acceptable degree of protection of human health and the environment as long as they are conducted as required.*

9.4.2 Status of Recommendations and Follow-Up Actions from Last Review

The 2011 Five-Year Review was the first since the ROD was signed. There were no issues, recommendations, or follow-up actions for OU 8 in the 2011 Five-Year Review.

9.5 2015 Five-Year Review Process

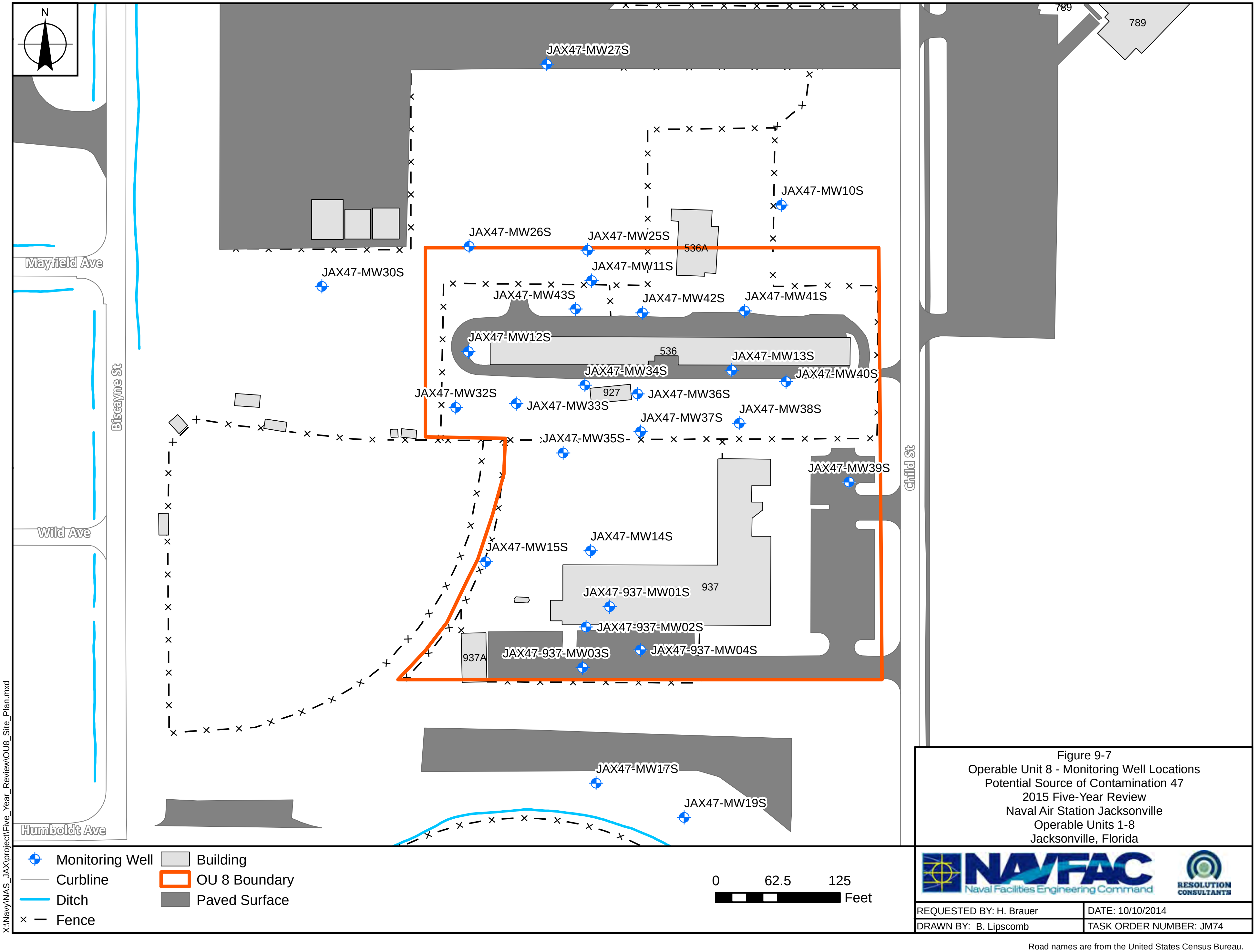
9.5.1 Document Review

This five-year review included review of relevant documents generated after January 2010, the end review period date for the 2011 Five-Year Review, and applicable information from previous documents including the ROD, FS Addendum/IRA, Remedial Action Report, annual groundwater monitoring reports, and documentation related to supplemental arsenic and MNA studies. This five-year review also included review of NAS Jacksonville Partnering Team Meeting Minutes for bi-monthly meetings between August 2010 and May 2014, and quarterly LUCIP Inspection Checklists from 2010 through 2014.

9.5.2 Data Review

Data reviewed for this five-year review was obtained from two years (2010 through 2012) of semi-annual groundwater COC and natural attenuation monitoring conducted in accordance with approved work plans, and select arsenic/natural attenuation monitoring data from an October 2013 sampling event (CCI 2007, AGVIQ 2014).[4] Post-remedy groundwater monitoring results through April 2012 and existing monitoring wells are shown on Figure 9-7 and are included as tables in Appendix E.

[4] AGVIQ has completed the third year (October 2013 and April 2014) of semi-annual groundwater monitoring report but the annual report and supporting data were not available for this five-year review.



N
JAX47-MW27S
JAX47-MW10S
JAX47-MW26S
JAX47-MW25S
536A
JAX47-MW11S
JAX47-MW30S
JAX47-MW43S
JAX47-MW42S
JAX47-MW41S
JAX47-MW12S
536
JAX47-MW13S
JAX47-MW34S
JAX47-MW40S
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JAX47-937-MW03S
JAX47-937-MW04S
JAX47-MW17S
JAX47-MW19S
789
Mayfield Ave
Wild Ave
Humboldt Ave
Biscayne St
Child St
Monitoring Well
Curbline
Ditch
Fence
Building
OU 8 Boundary
Paved Surface
0
62.5
125
Feet
Figure 9-7
Operable Unit 8 - Monitoring Well Locations
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Operable Units 1-8
Jacksonville, Florida
NAVFAC
Naval Facilities Engineering Command
RESOLUTION CONSULTANTS
REQUESTED BY: H. Brauer
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TASK ORDER NUMBER: JM74
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Road names are from the United States Census Bureau.

VOCs / SVOCs

Chlorinated and non-chlorinated VOCs and select SVOCs (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) within the south plume exceed GCTLs. Since 2008, VOC concentrations in the south plume have been decreasing at JAX47-937-MW04S and increasing in JAX47-937-MW01S. Those changes may be associated with localized plume movement near Building 937 because similar increases are not occurring in surrounding wells that bound the south plume.

VOC/SVOC concentrations have fluctuated with no discernable trend within the north plume (JAX47-MW42S, JAX47-MW25S, and JAX47-MW11S); benzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene are the most common COCs exceeding GCTLs. In 2011 and 2012, naphthalene concentrations in JAX47-MW25S increased relative to prior events; LTM is continuing to confirm trends.

The geochemical conditions at the wells within the plume core are reducing and conducive for future natural attenuation of chlorinated VOCs; degradation of benzene, naphthalene, and other compounds requiring aerobic conditions is likely occurring as groundwater transitions from anaerobic to aerobic conditions (downgradient of the plume core). The data reviewed suggest that enhanced bioremediation or contingent actions are not necessary at this time.

Pesticides

Overall, pesticide concentrations have decreased between 2008 and 2012, with many reductions of over 50 percent. Maximum concentrations in the south plume (characterized by 4,4'-DDT and metabolites) decreased in JAX47-MW03S from 11 µg/L to 4.8 µg/L; maximum concentrations in the north plume (characterized by various BHC isomers) decreased in JAX47-MW43S from approximately 47 µg/L to 14 µg/L total BHCs. Pesticide concentrations remain above or near the GCTLs in both the north and south plumes.

Pesticides in groundwater attenuate primarily through sorption to soil particles or minerals. The geochemical and mineralogical conditions documented as part of arsenic attenuation appear to be suited for continued sorption and attenuation of pesticides. Pesticide plumes were evaluated graphically, as documented in the 2012 Annual Groundwater Monitoring Report (AGVIQ 2013); the evaluation determined that the north and south pesticide plume areas are stable.

Arsenic

Maximum arsenic concentrations are located within a hot spot in the south plume. Highly anaerobic concentrations (e.g., methanogenic conditions which are conducive to VOC degradation) within the core of the south plume have likely enhanced arsenic mobility.

Linear regressions on arsenic concentrations between 2008 and 2013 show no clear trend over time. In addition, non-parametric Mann-Kendall analyses of arsenic concentrations, mass, volume, and plume area show no statistically significant trends. However, the coefficient of variance was small (not more than 1) for those parameters; therefore, the arsenic plume is considered stable. The arsenic plume was evaluated graphically, as documented in the 2012 Annual Groundwater Monitoring Report, which suggested that the downgradient edge of the arsenic plume is not expanding or migrating beyond the historical footprint (AGVIQ 2013).

To determine the mechanism and rate of arsenic attenuation processes, and to address long-standing regulatory concerns that natural attenuation may not be reducing arsenic levels in a reasonable time frame, additional borings and metals/minerals analyses (including sequential extraction of specific solid-phase arsenic fractions) were conducted in October 2013 (AGVIQ 2014). The study showed:

- Most of the residual arsenic mass appears to be present in groundwater and aquifer solids, rather than in the vadose zone.
- The average concentration, mass, and area of the arsenic plume have been stable since 2008.
- Sorption of arsenic onto iron oxide, hydroxide, and sulfide solid phases in saturated zone soil is the mechanism responsible for immobilizing arsenic at PSC 47. Arsenic preferentially partitions to stable oxides and sulfides as it moves downgradient, resulting in decreasing mobility.
- Dissolved iron in the plume appears to precipitate due to changes in the geochemistry in the downgradient flow direction, providing an ongoing source for arsenic-reactive sites and creating a natural, self-sustaining, in-situ reaction zone capable of continually attenuating arsenic in groundwater to levels less than the GCTL within approximately 100 feet of the source area.

The study also showed that arsenic levels in groundwater at some monitoring wells will likely continue to fluctuate due to subtle variations in the subsurface geochemistry and sorption chemistry. However, multiple lines of evidence clearly suggest that attenuation mechanisms (through arsenic co-precipitation with newly precipitated iron solids and arsenic adsorption onto the surface of previously formed solid iron particles) will continue to immobilize arsenic in groundwater. These natural geochemical processes (e.g., abiotic MNA processes) and associated retardation of the arsenic plume are expected to continue for the foreseeable future.

9.5.3 Site Inspection and Interviews

Buildings 536 and 937 and the remainder of OU 8 were observed from the perimeter fence line by Resolution Consultants, accompanied by Mr. Curtin and Ms. Wilson. The 1 October 2014 site inspection did not include observations of the building interiors due to limited access. The fence and warning signs were intact, monitoring well covers observed were closed and in good condition, and the portions of the concrete pads visible from the fence appeared intact. Information regarding interior operations was obtained from Mr. Curtin, who reported no issues of vandalism, trespassing, or non-compliance with LUCs.

9.6 Technical Assessment

9.6.1 Question A: Is the remedy functioning as intended by the Record of Decision?

The selected remedy for soil was excavation of areas contaminated above FDEP Commercial/Industrial SCTLs, installation of concrete caps at areas contaminated above FDEP Leachability to Groundwater SCTLs and SSSLs, and groundwater monitoring to verify cap effectiveness. The selected remedy for groundwater was MNA to evaluate decreases in COC concentrations in the surficial aquifer and verify offsite migration does not occur. LUCs to minimize exposure to contaminants remaining above unrestricted use and unlimited exposure levels were components of soil and groundwater remedies.

Information reviewed during this five-year review indicates the remedy is functioning as intended by the ROD.

Remedial Action Performance

Excavations completed in 2007 removed soil above FDEP Commercial/Industrial SCTLs. Concrete caps emplaced onsite in 2008 have prevented direct contact with residual soil contamination onsite and minimized leaching. LTM data suggest natural attenuation is performing as expected by various biotic and abiotic mechanisms. In general, VOC, SVOC, and pesticide plumes are stable or decreasing, based on data review. Arsenic geochemical evaluations have shown, through multiple lines of evidence, that naturally occurring dissolved iron around the source area sorbs, co-precipitates, and immobilizes arsenic in groundwater. Additional studies in 2013 confirmed the stability of the plume; within 100 feet of the source zone, arsenic levels should attain GCTLs. Continued LTM including arsenic speciation data is recommended to validate natural attenuation.

Systems Operation/Operations & Maintenance

Wells are maintained and inspected regularly as part of the LTM program. There are no active remediation systems requiring O&M at OU 8.

Opportunities for Optimization

Opportunities for optimization of the LTM program are considered annually. The NAS Jacksonville Partnering Team has approved several adjustments since 2010, documented in revisions to LTM work plans, to best evaluate groundwater monitoring well distribution and analytical parameter list and ensure that the plume extent and aqueous natural attenuation parameters are fully characterized.

Implementation of LUCs and Institutional/Engineering Controls

An approved LUC RD is in place and quarterly inspections are conducted by Navy IRP personnel quarterly and submitted to the U.S. EPA and FDEP annually. Documentation of the integrity and maintenance of the concrete caps were recently added to the LUCIP inspections.

Early Indicators of Potential Remedy Problems

This five-year review identified no early indicators of potential remedy problems. Contingency actions have not been implemented to date.

9.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the remedy selection still valid?

ARARs and TBC criteria, progress towards meeting RAOs, exposure pathways, land use, contaminants and sources, remedy byproducts, toxicity and other contaminant characteristics, and risk assessment methods are discussed below.

Changes in Chemical-, Location-, and Action-Specific ARARs and TBC Criteria

Soil at PSC 47 contains COCs (PAHs, pesticides, and arsenic) with risks for direct exposure from potential human and ecological exposure and for migration to groundwater. The remedy included comparing surface soil data to FDEP Commercial/Industrial SCTLs and unsaturated soil data to FDEP Leachability to Groundwater SCTLs. The criteria used to delineate soil presenting an unacceptable risk under industrial land use to be included in the soil remedy evaluated in the ROD combine 2005 Leachability to Groundwater SCTLs and SSSLs. ROD criteria for soil listed in Table 9-2 have not changed.

Groundwater COC (VOCs, SVOCs, pesticide, and arsenic) concentrations exceeding GCTLs are in two distinct (north and south) plumes in the upper portions of the shallow saturated unit, with an arsenic “hot spot” within the south plume centered on the former DVECC tank location. Groundwater remedial action goals and GCTLs in Table 9-3 have not changed.

Expected Progress towards Meeting RAOs

In late 2011, the U.S. EPA and FDEP expressed concern that MNA may not be sufficiently reducing arsenic levels in a reasonable time frame. Additional data analyses, statistical analyses, and arsenic attenuation mechanism evaluations have shown that the arsenic plume is stable (AGVIQ 2014).

Changes in Exposure Pathways

The exposure pathways have not changed. Building 937 is used for research and development and training, and Building 536 is used by NAS Jacksonville to administer landscaping services and to store and maintain grounds landscaping and lawn care equipment. Access remains limited to select air station personnel.

Changes in Land Use

No changes to land use discussed in Section 9.2.2 is anticipated.

New/Emerging Contaminants and Contaminant Sources

The U.S. EPA’s comments on the 2011 Five-Year Review identified the need for reassessing dioxin toxicity during this five-year review. The RI/FS included collection of groundwater samples from one deep and three shallow borings from the Building 937 area for analysis of dioxins and furans. Seventeen complexes of dibenzodioxins and dibenzofurans, with specific numerical molecular structures, were included in the dioxin laboratory analysis. Tables D-1, D-2, and D-3 in Appendix D of this five-year review, summarize dioxin and furan analytical results from the RI/FS, and compare them to FDEP GCTLs. As indicated in Tables D-1 through D-3, groundwater dioxin and furan results collected during the RI/FS exceed current GCTLs. The GCTL exceedances suggest the need to evaluate background concentrations and spatial distribution of dioxins and furans in groundwater, review potential sources of dioxins/furans (if any), and determine if dioxin and dioxin equivalents are COCs at OU 8.[5] Short-term protectiveness is not affected because LUCs restrict groundwater use.

No remedy byproducts or degradation products that would be considered new or emerging contaminants have been identified.

Changes in Toxicity, Risk Assessment Methods, and Cleanup Levels

The baseline risk assessment and other risk assessment documents in the RI/FS were developed using RAGS, Volume I: Human Health Evaluation Manual and other supplemental guidance (U.S. EPA 1989, 1991, 1992).

The RI/FS identified maintenance workers and adolescent and adult trespassers as potential receptors under current land use (TtNUS 2008). Potential receptors identified under future land use included construction workers, occupational workers, and child and adult trespassers. Although the HHRA considered future land use to be the same as current land use, potential future residents were evaluated for decision-making purposes.

Soil COCs (PAHs, pesticides, and arsenic) and groundwater COCs (VOCs, SVOCs, pesticides, and arsenic) were identified during the RI/FS at unacceptable levels. Risk assessment findings, COCs, and remedial goals for soil and groundwater are summarized in Section 9.3.1. The risk assessment changes discussed in Section 1.8 are applicable to OU 8.

Vapor Intrusion

The HHRA evaluated two receptor populations (hypothetical child and adult onsite residents) for potential VI/indoor air exposure with the J&E model to estimate indoor air concentrations likely to result from VI. However, since the HHRA evaluation, significant changes have occurred with respect to toxicological assumptions of COCs and the J&E model. In the absence of indoor air data to substantiate the J&E modeling, the VISL process detailed in Appendix C was used to evaluate the potential for risk from VI.

[5] Although dioxins were detected in NAS Jacksonville Background Concentrations for soil, no dioxin/furan background data were available for groundwater.

Multiple constituents (including VOCs and naphthalene) are present in groundwater beneath or adjacent to both buildings at OU 8. Comparison with commercial/industrial TGCs suggest that predicted risks are above FDEP's 1.0E-06 risk threshold. However, given the conservatism of VISL screening values, there is no significant VI risk from shallow groundwater at OU 8. Given that VISL screening values are at the low end of the U.S. EPA acceptable risk range (1.0E-06 to 1.0E-04), actual vapor risks at OU 8 are expected to be low. Preliminary risk screening suggests that current groundwater concentrations do not affect protectiveness at this time.

Summary

In summary, risk assessment findings at NAS Jacksonville were based on current and proposed future industrial land use. LUCs have been implemented to prevent future residential land use and limit groundwater uses. Except for dioxins, this five-year review determined that integrating new risk assessment guidance and updating risk calculations would not affect protectiveness of the ARAR-based remedy because LUCs are in place to prevent exposure. The need to conduct VI or other risk assessments will be evaluated prior to any land use changes. Further assessment of dioxin and dioxin-like compounds as emerging contaminants may be necessary to determine whether they are COCs at OU 8.

9.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

9.7 Issues and Recommendations/Follow-Up Actions

Issues and recommendations for follow-up actions are in Table 9-4.

9.8 Protectiveness Statement

The remedy at OU 8 is protective of human health and the environment because soil removal, capping, and LUCs have eliminated risk from direct exposure to soil in excess of industrial criteria, contaminated soil leaching to groundwater, and use of groundwater. Groundwater monitoring ensures contamination is not migrating offsite and the natural attenuation portion of the remedy is effective. VI screening suggests that current groundwater concentrations do not affect protectiveness at this time.

Table 9-4
Issues and Recommendations/Follow-Up Actions at Operable Unit 8

Issue Number	Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
						Current	Future
1	Emerging contaminants (dioxins/furans) were detected above Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Levels (GCTLs) and United States Environmental Protection Agency (U.S. EPA) Toxicity Equivalency thresholds at Operable Unit 8. Background concentrations in groundwater were not available for comparison. Protectiveness is not affected while Land Use Controls prevent groundwater use.	Evaluate whether further assessment of dioxins/furans in groundwater (e.g., background or spatial evaluations) is necessary, and document recommendations as appropriate.	Navy	U.S. EPA, FDEP	31 March 2018	N	N

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Appendix A
Site Inspection Photographs

Photo 1 — OU 1: Looking west across the PSC 26 landfill at the warning sign on the gated entrance.

Photo 2 — OU 1: Looking north-northeast at the portion of PSC 26 north of Child Street where concrete pads from former LNAPL removal system equipment remain.

Photo 3 — OU 2: View facing east-northeast near PSCs 41 and 43.

Photo 4 — OU 2: View facing northeast at PSCs 41 and 43.

Photo 5 — OU 2: View of Former PSC 2/Fire-Fighter Training Area.

Photo 6 — OU 2: View within north parcel (Parcel 1) of PSC 3 planted with pine trees.

Photo 7 – OU 2: View facing east-southeast across open field in the former polishing pond area (PSC 42).

Photo 8 — OU 2: View facing east-northeast at warning sign demarcating the location of PSC 42.

Photo 9 — OU 4: View facing northwest along north side of Casa Linda Lake; note predatory statue (owl) in tree and mowed shoreline.

Photo 10 — OU 4: View of a warning sign posted along the north banks of Casa Linda Lake.

Photo 11 — OU 4: View of overflow weirs at southeast end of Casa Linda Lake.

Photo 12 — OU 4: View of earthen spillway at the southeast end of Casa Linda Lake.

Photo 13 — OU 4: View of warning sign at Casa Linda Lake.

Photo 14 — OU 5: View facing southeast across OU 5.

Photo 15 — OU 5: View of warning sign posted at OU 5.

Photo 16 — OU 6: View of current and former monitoring well locations near the Former Tank A in the keyway outside Hangar 1000.

Photo 17 — OU 6: View of current and former monitoring well locations near the Former Tank A in the keyway outside Hangar 1000.

Photo 18 — OU 6: View facing south across Yorktown Avenue taken near the keyway entrance to Hangar 1000.

Photo 19 — OU 7: View facing north along the fenced east border (drainage ditch and Roosevelt Boulevard/U.S. Highway 17).

Photo 20 — OU 7: View of grassy area at former rail spur location along the west fenced border of the south portion of the DRMO.

Photo 21 — OU 7: View of oil-water separator and former fuel aboveground storage tank location at southeast corner of the DRMO.

Photo 22 — OU 7: View of the southeast end of the drainage ditch that borders the DRMO on the south where it empties into the concrete-lined portion.

Photo 23 — OU 7: View of fences enclosing the unlined ditch along the south border of the DRMO.

Photo 24 — OU 7: View of fences enclosing the unlined ditch along the south end of the west border of the DRMO.

Photo 25 — OU 7: View of a concrete pad replacement location in the southwest portion of the DRMO.

Photo 26 — OU 7: View of typical paved area within the DRMO, taken near the south-center of the west border.

Photo 27 — OU 7: View facing east at the RAD-screening equipment near the Roosevelt Boulevard/U.S. Highway 17 entrance to the DRMO.

Photo 28 — OU 7: View of the north fenced boundary of the DRMO, beyond which are woods.

Photo 29 — OU 8: View facing south at the warning sign on the gated entrance at the north side of Building 536 and OU 8.

Photo 30 — OU 8: View of monitoring well outside the north fenced OU 8 boundary.

Photo 31 — OU 8: View facing west of warning sign on fenced access to the south side of Building 937 and the south border of OU 8.

Photo 32 — OU 8: View facing west along the south side of Building 536 at the larger concrete pad (cap).

Appendix B
Affidavit of Publication

THE FLORIDA TIMES-UNION
Jacksonville, FL
Affidavit of Publication

Florida Times-Union

ENSAFE INC.
5724 SUMMER TREES DR
MEMPHIS TN 38134

Reference: 1000665966
Ad Number: C15693568

State of Florida
County of Duval

Before the undersigned authority personally appeared Sharon Walker who on oath says he/she is a Legal Advertising Representative of The Florida Times-Union, a daily newspaper published in Duval County, Florida; that the attached copy of advertisement is a legal ad published in The Florida Times-Union. Affiant further says that The Florida Times-Union is a newspaper published in Duval County, Florida, and that the newspaper has heretofore been continuously published in Duval County, Florida each day, has been entered as second class mail matter at the post office in Jacksonville, in Duval County, Florida for a period of one year preceding the first publication of the attached copy of advertisement; and affiant further says that he/she has neither paid nor promised any person, firm or corporation any discount, rebate, commission, or refund for the purpose of securing this advertisement for publication in said newspaper.

PUBLISHED ON: 08/24/2014

FILED ON: 08/24/2014

LEGAL NOTICE
UNITED STATES
The United States Navy Announces
NOTICE TO CONDUCT
Five-Year Review
Naval Air Station Jacksonville - Operable Units 1 through 8
Jacksonville, Florida

The United States Navy (Navy) in coordination with the United
States Environmental Protection Agency (U.S. EPA) Region 4 and
the Florida Department of Environmental Protection will initiate
the fourth **Five-Year Review** for Naval Air Station (NAS) Jack-
sonville Operable Units (OUs) 1, 2, 3, 4, 5, 6, 7, and 8.

This Five-Year Review will be performed by the Navy as part of
the Installation Restoration Program for the Department of the
Navy, following U.S. EPA guidelines under the Comprehensive
Environmental Response, Compensation, and Liability Act (CER-
CLA). The purpose of the Five-Year Review process is to deter-
mine whether the remedies selected at each OU are protective of
human health and the environment. The Navy will conduct the
Five-Year Review with evaluation of pending, completed, and
ongoing remedial actions implemented at OUs 1 through 8 to
determine whether the selected remedies are effective. This
Five-Year Review will include areas where site-related contami-
nants remain at levels above those that would allow for unre-
stricted use.

Navy and CERCLA guidelines call for this review every five years
to ensure protection of human and ecological communities in the
area. The Five-Year Review Report will be completed on March
6, 2015. This document will be maintained in the NAS Jackson-
ville Information Repository, which is located in the Charles D.
Webb Wesconnett Branch of the Jacksonville Public Library, 6887
103rd Street.

Any person wishing to provide comments regarding this notice
may respand in writing to:

Tim Curtin
Installation Restoration Manager
NAS Jacksonville Building 1 Code 064TC
Navol Air Station JAX Yorktown & Langley
Jacksonville, Florida 32212
904-542-4228
tim.l.curtin@navy.mil

For information about the Five-Year Review or any environmen-
tal cleanup activities at NAS Jacksonville, please call Miriam Gal-
let, NAS Jacksonville Public Affairs Officer at 904-542-5588 or
Adrienne Wilson, Restoration Project Manager at 904-542-6160,
Naval Facilities Engineering Command Southeast, NAS Jackson-
ville, 135 Ajax Street (Code OPA6), Jacksonville, Florida,
32212-0030.

Name: Sharon Walker Title: Legal Advertising Representative
In testimony whereof, I have hereunto set my hand and affixed my official Seal, the day and year aforesaid.

NOTARY: Sally W. Willis

NOTARY PUBLIC STATE OF FLORIDA
SALLY W. WILLIS
Commission # FF 070166
Expires January 30, 2018
Bonded Thru Troy Fain Insurance 800-385-7019

Appendix C
Vapor Intrusion Documentation

1.0 INTRODUCTION

In support of the 2015 Five-Year Review for Naval Air Station (NAS) Jacksonville, Operable Units (OUs) 1 through 8, Resolution Consultants conducted a vapor intrusion (VI) screening evaluation to supplement Technical Assessment Question B. This screening effort evaluated criteria identified in the United States Environmental Protection Agency (U.S. EPA) *Assessing Protectiveness at Sites for Vapor Intrusion*.[1]

Resolution Consultants utilized the following seven-step process to conduct initial screening-level protectiveness assessments for potential VI human health exposures from chlorinated volatile organic compounds (CVOCs) and petroleum hydrocarbon compounds (PHCs) in groundwater at NAS Jacksonville OUs 1, 3, 6, 7, 8:[2,3] The screening process was applied at OUs with documented CVOC and/or PHC concentrations in groundwater, proximal to occupied structures.

- Step One: Compile maximum groundwater CVOC and PHC concentrations from recent (i.e., 2010 to 2014) groundwater analytical data from five OUs at NAS Jacksonville.

- Step Two: Compare the maximum groundwater concentrations from Step One to U.S. EPA Vapor Intrusion Screening Levels (VISLs).[4] The VISL screening criteria were developed using a target cancer risk (TCR) of 1E-06 for carcinogens, a target hazard quotient (THQ) of 1.0 for non-carcinogens, and an average groundwater temperature of 25 degrees Celsius. Both residential and commercial/industrial VISLs were generated for use as screening criteria.

- Step Three: Compile a list of sample locations (monitoring wells) within the shallowest groundwater interval for which maximum groundwater concentrations compiled in Step One exceeded residential or commercial/industrial VISL Target Groundwater Concentration (TGC) screening thresholds developed in Step Two.

- Step Four: Use available NAS Jacksonville scaled site maps to determine the approximate horizontal distance from the nearest buildings to sample locations identified as having groundwater concentrations above VISL residential or commercial/industrial screening criteria in Step Three.

[1] *Assessing Protectiveness at Sites for Vapor Intrusion*; Supplement to the "Comprehensive Five-Year Review Guidance" OSWER Directive 9200.2-84 (U.S. EPA November 2012).
[2] NAS Jacksonville OU 2, OU 4, and OU 5 were initially considered but screened out because there were no structures present (OU 5) or no CVOC/PHC concentrations indicative of potential VI conditions were identified (OU 2 and OU 4).
[3] PHCs include non-chlorinated VOCs such as benzene, ethylbenzene, toluene, xylene, and the semivolatile compound naphthalene.
[4] VISL, version 3.3.1 (U.S. EPA May 2014).

- Step Five: Revise the list of sample locations with maximum groundwater concentrations above VISL TGCs, limiting it to locations that are <u>no more than</u> 100 feet from an existing building.

- Step Six: Compare maximum concentrations to TGCs, and estimate (using ratios) the potential risk and hazard due to the vapor intrusion pathway posed by groundwater exceeding VISL thresholds. Preliminary risk associated with the pathway was evaluated qualitatively using U.S. EPA's risk range of 1E-06 to 1E-04, and the Florida Department of Environmental Protection's (FDEP's) lifetime excess cancer risk threshold of 1E-06. Preliminary hazard associated with the pathway was evaluated using a target cumulative hazard index (HI) (sum of non-cancer hazard quotients for multiple compounds) of 1.0.

- Step Seven: Qualitatively evaluate whether the preliminary risk and hazard associated with the groundwater-to-indoor air pathway identified by the VISL screening was reasonable and appropriate to the OU, given site-specific factors.

This VI screening evaluation did not document every well with an exceedance of VISL TGCs at each OU because the purpose was to gauge the relative risk and hazard for each OU under maximum exposure conditions. As such, this screening was not an assessment of risk and hazard in indoor air based on current/documented indoor air CVOC/PHC concentrations. The screening-level assessment is based on potential movement of vapor from groundwater to indoor air, and compared select maximum groundwater CVOC and/or PHC concentrations to conservative target VISL values.

Actual VI exposures are likely to be less, because the maximum reported concentration was used during this screening assessment, and contaminant concentrations in indoor air can be affected by multiple factors, including contaminant degradation rates, building slab characteristics, and ventilation/air exchange rates. A risk assessment for VI would modify exposure duration data to reflect expected exposure defaults typical of NAS Jacksonville personnel, which are expected to vary by OU, overall significantly less than the 30-year default assumed by VISL. The VISL screening process was used to identify a potential for unacceptable VI risk. No risk, or a very low-level risk (given the conservatism of the methodology), was deemed sufficient for the purposes of the Five-Year Review to screen out the OU as a potential VI concern with respect to short- and long-term protectiveness.

2.0 VISL PROTECTIVENESS ASSESSMENTS

The VI screening considered conditions at OU 1, OU 3, OU 6, OU 7, and OU 8. Details for each OU are discussed below. Because it is the only operable unit at which indoor air/sub-slab vapor sampling and analysis have been performed, the VI screening-level protectiveness assessment process was first applied to OU 3 to gauge the sensitivity of Resolution Consultants' assessment process relative to data from recent indoor air/sub-slab vapor sampling data, and observed attenuation factors. Additional information regarding the groundwater data used in Resolution Consultants' screening process is provided in Table A (CVOCs) and Table B (PHCs).

2.1 OU 3

Significant VI assessment has been performed at OU 3 to support ongoing remedial investigation addendum/risk assessment addendum work at NAS Jacksonville. Field efforts to date, which have included sub-slab vapor and indoor air sampling, have indicated limited risk due to VI. AGVIQ Environmental Services' (AGVIQ's) three-phase VI investigation concluded:[5]

- *Sub-slab source strength remains stable but the VI pathway is not significant*
- *Long-term (seasonal) temporal variability for sub-slab soil gas and indoor air was insignificant between Summer 2012 (Phase 2) and Winter 2014 (Phase 3)*
- *Short-term (sample duration) temporal variability for indoor air was insignificant between 24 hours (TO-15) and 14 days (TO-17)*

Resolution Consultants used the seven-phase screening described above to evaluate the conservatism of the VISL approach relative to known indoor air results. This screening focused on a limited number of shallow-zone monitoring wells in Area A of OU 3 to evaluate site status. Monitoring well OU3A-GEW01 was selected for the screening evaluation based on a combination of elevated groundwater CVOC concentrations, proximity to an occupied building, and available sub-slab/indoor air analytical results for comparison of screening outputs.

The CVOCs trichloroethene (TCE) and vinyl chloride were present in monitoring well OU3A-GEW01 at concentrations exceeding commercial/industrial VISLs within approximately 20 feet of Building 101. Assuming the default assumptions utilized in generating the VISL screening levels adequately address site conditions (e.g., commercial/industrial use), the potential risk and hazard from those compounds is summarized in Table 1.

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[5] *Update — Vapor Intrusion Investigation Phase 3*, AGVIQ presentation to the NAS Jacksonville Partnering Team, 13 May 2014.

Table 1
Potential Vapor Intrusion Screening Level Risk and Hazard from Volatile Organic Compounds
Operable Unit 3 / Area A
NAS Jacksonville — Jacksonville, Florida
(all concentrations presented in micrograms per liter)

		Risk		Hazard	
Volatile Organic Compound	**Maximum Concentration (well ID)**	**VISL Target Groundwater Concentration 1E-06**	**Predicted Vapor Intrusion Risk**	**VISL Target Groundwater Concentration HQ=1.0**	**Predicted Vapor Intrusion Hazard**
Trichloroethene	18,600 (OU3A-GEW01)	7.4	2.5E-03	22	850
Vinyl Chloride	1,361 (OU3A-GEW01)	2.5	5.5E-04	390	4

As stated previously, the VISL comparison is not an assessment of risk and hazard in indoor air based on documented indoor air CVOC concentrations, but rather on potential movement of vapor from groundwater to indoor air. The comparison is based on conservative, target VISL values. As expected, the VISL screening over-predicts risk relative to AGVIQ findings: the potential risks appear to be at the upper end of FDEP's 1E-06 risk threshold, and hazard estimates for both TCE and vinyl chloride are above the target cumulative HI of 1.0 (or 3.0 for hot-spot exposure).

The most recent Building 101 indoor air sampling event (conducted by AGVIQ in February 2014) employed active sample collection using sorbent tubes and method TO-17 analysis. One Building 101 indoor air sample (OU3-BLDG101-A106) yielded a TCE concentration of 1.39 micrograms per cubic meter ($\mu g/m^3$), which exceeds the VISL target indoor air concentration (0.88 $\mu g/m^3$) for TCE in a commercial/industrial setting; the exceedance is not significant and the hazard is low (0.16).

According to the Phase 3 Data Summary Table included in the AGVIQ VI Investigation report, a 14-day indoor air sample (OU3-BLDG103-A109) collected from Building 103 on 5 February 2014 yielded a TCE concentration of 3.25 $\mu g/m^3$. These data suggest that VI is occurring at Building 103 and the reported TCE concentration is above FDEP's 1E-06 lifetime excess cancer risk threshold. These risk/hazard values associated with measured indoor air concentrations are, as expected, significantly less than those predicted by the VISL screening due to site-specific attenuation factors relative to the aquifer, contaminant plume, building construction, and operations within the building.

Given the VI monitoring conducted to date in Buildings 101 and 103, VISL risk/hazard estimates appear to be extremely conservative at NAS Jacksonville. Therefore, while the VISL screening numbers are considered a potential indicator of VI, they should not be considered predictive of actual exposure scenarios. OU 3 vapor issues will be addressed in the ongoing remedial investigation/risk assessment/feasibility study addendum process.

2.2 OU 1

In 2005, Tetra Tech NUS, Inc. (TtNUS), collected shallow groundwater samples using direct-push technology (DPT) within the River Oaks Neighborhood base housing, which adjoins OU 1 to the east, to evaluate the potential for VI. This sampling event focused on the top 2 feet of the saturated zone, to determine whether there was a "clean" groundwater zone (due to infiltration, etc.) located between the CVOC plume and the vadose zone which would preclude VI migration. The report identified CVOCs in one out of 22 sampling locations, and concluded that there were no exceedances of FDEP Groundwater Cleanup Target Levels.[6]

The 2005 Five-Year Review identified the potential for indoor air intrusion. To address those concerns, TtNUS subsequently conducted predictive modeling to estimate contaminant of concern (COC) concentrations in indoor air using the U.S. EPA Johnson & Ettinger (J&E) model and data from the 2005 sampling event, which had not been submitted to regulatory agencies. Data input for the J&E modeling were concentrations of TCE and cis-1,2-dichlorothene (DCE) from a shallow groundwater sample collected near one of the residences in 2005. The 2008 TtNUS *Indoor Vapor Intrusion Letter Report* concluded:

> *Results of the J&E model indicated no cancer risks were present for either COC in excess of 1.0E-06 (1-in 1,000,000 chance), which is the maximum value USEPA has determined to be acceptable. The HQ (non cancer risk) for both COCs was less than 1.0. USEPA has determined that any HQ greater than 1.0 presents an unacceptable risk.*

Significant changes have occurred with respect to TCE and DCE toxicological assumptions and use of the J&E model since 2008.[7] Because no indoor air data are available to substantiate the results of the outdated J&E modeling, Resolution Consultants applied the VISL screening process to evaluate the potential VI risk at OU 1 using the single detection used for J&E modeling in 2005.

[6] *Indoor Vapor Intrusion Letter Report*, Tetra Tech NUS, Inc.; 19 September 2008.

[7] U.S. EPA's Integrated Risk Information System database indicates the available information is insufficient to develop inhalation toxicity factors for DCE; therefore prior J&E conclusions regarding DCE would also need to be evaluated. The next five-year review should also evaluate DCE if sufficient toxicity information becomes available.

Comparison of OU 1 groundwater CVOCs with VISL TGCs indicates that, based on 2005 data, the single location would slightly exceed risk/hazard thresholds. Assuming the default assumptions utilized in generating the VISL screening levels adequately address site conditions (residential exposure scenario), the potential risk and hazard from TCE and vinyl chloride are summarized in Table 2.

Table 2
Potential Vapor Intrusion Screening Level Risk and Hazard from Volatile Organic Compounds
Operable Unit 1
NAS Jacksonville — Jacksonville, Florida
(all concentrations presented in micrograms per liter)

		Risk		Hazard	
Volatile Organic Compound	**Maximum Concentration (well ID)**	**VISL Target Groundwater Concentration 1E-06**	**Predicted Vapor Intrusion Risk**	**VISL Target Groundwater Concentration HQ=1.0**	**Predicted Vapor Intrusion Hazard**
Trichloroethene	1.4 OU1-DPT009	1.2	1.2E-06	05.2	0.27

As noted in Section 2.1, VISL screening appears to be conservative relative to attenuation factors between groundwater and indoor air; screening risks due to TCE appear to be above FDEP's 1E-06 risk threshold, but were at the lower end of U.S. EPA's risk range. However, given that VOCs were only detected in one out of 22 borings, and that the 2005 DPT event identified an interval of clean groundwater between the CVOC plume and the vadose zone preventing upward migration of vapor, the original 2005/2008 conclusion that VI risks at OU 1 are low appear to still be valid considering the conservatism of the VISL approach and changes in toxicity factors.

2.3 OU 6

TtNUS performed a screening-level Human Health Preliminary Risk Evaluation (HHPRE) for Hangar 1000 at OU 6, as summarized in a 2004 TtNUS report.[8] The HHPRE utilized the J&E model to estimate indoor air concentrations likely to result from VI. The J&E inputs included a combination of default and site-specific parameters, including average groundwater COC concentrations from a January 2001 groundwater sampling event. The J&E model defaults incorporated a TCR of 1E-06 and a THQ for non-carcinogens of 1.0. The TtNUS HHPRE concluded the cancer risk of 6.4E-07 was less than U.S. EPA's target risk range of 1E-06 to 1E-04 and less than FDEP's target risk level of 1E-06, and the HI of 0.0003 was less than the U.S. EPA and FDEP acceptable level of 1.0.

[8] *Remedial Investigation/Focused Feasibility Study for Hangar 1000, Volume I*, Section 7.0, Human Health Preliminary Risk Evaluation, Revision 1; Tetra Tech NUS, Inc.; 19 March 2004.

As discussed in Section 2.2, the J&E model and TCE toxicity inputs have been revised since 2004; additionally, the data used for the J&E evaluation were from 2001. Resolution Consultants conducted a screening evaluation for shallow-zone monitoring wells in OU 6 for comparison with the findings of the TtNUS assessment and to determine whether additional evaluation is warranted. The maximum groundwater COC concentrations used in Resolution Consultants' screening evaluation from sampling events in 2012 through 2014 were, in some cases, more than an order of magnitude higher than the 2001 concentrations used by TtNUS.

CVOCs and PHCs detected within the building footprint of Hangar 1000 in shallow groundwater exceeded commercial/industrial VISLs. The CVOCs tetrachloroethene (PCE), 1,1-dichloroethane (DCA), 1,1-DCE, and 1,1,1-trichloroethane and the PHC naphthalene were detected. CVOCs TCE, 1,2-DCA, and vinyl chloride were detected within approximately 65 feet of an unidentified structure west/southwest of Building 774 (Line Operation Shack).

Comparison of OU 6 groundwater CVOC and PHC concentrations with VISL TGCs indicates the need for further VI screening to assess potential risks to Hangar 1000 and surrounding structures. Assuming the default assumptions utilized in generating the VISL screening levels adequately address site conditions (commercial/industrial use), the potential risk and hazard from these compounds are listed in Table 3.

Table 3
Potential Vapor Intrusion Screening Level Risk and Hazard from Contaminants of Concern
Operable Unit 6
NAS Jacksonville — Jacksonville, Florida
(all concentrations presented in micrograms per liter)

Contaminant of Concern	Maximum Concentration (well ID)	Risk		Hazard	
		VISL Target Groundwater Concentration 1E-06	Predicted Vapor Intrusion Risk	VISL Target Groundwater Concentration HQ=1.0	Predicted Vapor Intrusion Hazard
1,1-dichloroethane	1,230 (MW08)	33	3.7E-05	—	—
1,2-dichloroethane	8.8 (MW-14)	9.8	9E-07	640	0.01
1,1-dichloroethene	1,310 (MW08)	—	—	820	1.6
1,1,1-trichloroethane	5,550 (MW08)	—	—	22,000	0.25
Tetrachloroethene	30 (MW08)	65	4.6E-07	240	0.13
Trichloroethene	170 (MW22)	7.4	2.3E-05	22	7.7
Vinyl Chloride	2.6 (MW22)	2.5	1E-06	390	0.01
Naphthalene	397 (MW08)	20	2E-05	730	0.54

As noted in Section 2.1, VISL screening appears to be conservative relative to attenuation factors between groundwater and indoor air; risks appear to be above FDEP's 1E-06 risk threshold and the target cumulative HI of 1.0 (or 3.0 for a hot-spot exposure) is elevated. Spatially, wells MW-08 and MW-14 are in immediate proximity of building footers for Hangar 1000 and unidentified structure southwest of Building 774, respectively, and groundwater is encountered within 10 feet of the ground surface.

As noted during the site inspection, Hangar 1000 is open to ambient air and no enclosed offices/work areas over the plume were identified, therefore VI is unlikely to occur at Hangar 1000. Groundwater concentrations decrease away from the hangar complex, reducing the likelihood for VI.

2.4 OU 7

TtNUS performed an HHPRE for OU 7, as summarized in the 2005 ROD.[9] The HHPRE compared soil, sediment, and groundwater concentrations to generic screening levels and identified 1,1-DCE and vinyl chloride as COCs in groundwater but VI was not evaluated in subsequent investigations. The CVOC 1,1-DCA was detected in shallow groundwater at concentrations exceeding commercial/industrial VISLs within approximately 15 feet of Building 1903. Although comparison with commercial/industrial VISL TGCs suggests that there is no significant VI risk from shallow groundwater at OU 7, it appears to be above FDEP's 1E-06 risk threshold. Assuming the default assumptions utilized in generating the VISL screening levels adequately address site conditions (commercial/industrial use), the potential risk and hazard from these compounds is listed in Table 4.

Table 4
Potential Vapor Intrusion Screening Level Risk and Hazard from 1,1-Dichloroethane
Operable Unit 7
NAS Jacksonville — Jacksonville, Florida
(all concentrations presented in micrograms per liter)

Contaminant of Concern	Maximum Concentration (well ID) (µg/L)	Risk		Hazard	
		VISL Target Groundwater Concentration 1E-06 (µg/L)	Predicted Vapor Intrusion Risk	VISL Target Groundwater Concentration HQ=1.0 (µg/L)	Predicted Vapor Intrusion Hazard
1,1-dichloroethane	56 (MW8)	33	1.7E-06	—	—

[9] *Record of Decision for Operable Unit 7, Potential Source of Contamination 46, Defense Reutilization and Marketing Office, Revision 2*; Tetra Tech NUS, Inc.; September 2005.

Building 1903 is a single-story administrative (office) building. Given that VISL screening values were near the FDEP acceptable risk level of 1E-06, vapor risks at OU 7 are expected to be low.

2.5 OU 8

TtNUS performed a Baseline Human Health Risk Assessment (HHRA) for OU 8, as summarized in a 2008 TtNUS report.[10] The HHRA compared maximum detected groundwater concentrations to generic screening levels and identified benzene, bromoform, DCE, isopropylbenzene, TCE, and vinyl chloride as CVOCs of potential concern for VI, along with the PHC naphthalene.

Based on the 2008 and anticipated future land use conditions, TtNUS evaluated two receptor populations (hypothetical onsite residents — child, and adult) with regard to potential VI/indoor air exposure. TtNUS then utilized the 2003 J&E model to estimate indoor air concentrations likely to result from VI. According to the HHRA, the J&E volatilization model determined the HIs and cancer risks for residents exposed to chemicals of potential concern that may volatilize from groundwater and migrate into indoor air were less than U.S. EPA's target risk range and FDEP's risk thresholds.

As stated previously, significant changes have occurred both with respect to TCE toxicological assumptions and the J&E model. Because no indoor air data are available to substantiate the J&E modeling, Resolution Consultants applied the seven-step VISL process to evaluate the J&E model outputs and conclusions.

The maximum groundwater COC concentrations used in this screening evaluation were from sampling conducted in April 2012 whereas the 2008 TtNUS HHRA appears to have incorporated data from sampling events conducted in 2002 and 2006. The following were detected in shallow groundwater at concentrations exceeding residential and commercial/industrial VISL TGCs: CVOCs (PCE and TCE) and PHCs (benzene, ethylbenzene, and total xylenes) within the Building 937 footprint and the PHC naphthalene within 50 feet of Building 536.

Comparison with commercial/industrial TGCs suggests that, given the conservatism of VISL screening values, there is no significant VI risk from shallow groundwater at OU 8. Predicted risks are above FDEP's 1E-06 risk threshold. Assuming the default assumptions utilized in generating the VISL screening levels adequately address site conditions (commercial/industrial use), the potential risk and hazard from CVOCs and PHCs is summarized in Table 5.

[10] *Remedial Investigation and Feasibility Study for Potential Source of Contamination 47, Volume I*; Tetra Tech NUS, Inc.; February 2008.

Table 5
Potential Vapor Intrusion Screening Level Risk and Hazard from Contaminants of Concern
Operable Unit 8
NAS Jacksonville — Jacksonville, Florida
(all concentrations presented in micrograms per liter)

Contaminant of Concern	Maximum Concentration (well ID)	Risk		Hazard	
		VISL Target Groundwater Concentration 1E-06	Predicted Vapor Intrusion Risk	VISL Target Groundwater Concentration HQ=1.0	Predicted Vapor Intrusion Hazard
Benzene	9.9 (JAX-937-MW01S)	6.9	1.4E-06	580	0.02
Tetrachloroethene	29 (JAX-937-MW01S)	65	4.4E-07	240	0.12
Trichloroethene	5.5 (JAX-937-MW01S)	7.4	7.4E-07	22	0.25
Ethylbenzene	143 (JAX-937-MW01S)	15	9.5E-06	14,000	0.01
Xylenes (total)	2,110 (JAX-937-MW01S)	—	—	2,100	1.0
Naphthalene	137 (JAX-MW11S)	20	6E-06	730	0.19

At OU 8, Building 937 is a two-story office-type enclosed structure.[11] Building 536 is an open bay structure that contains wash facilities and a few small storage rooms or offices in between bays. Given that VISL screening values are at the low end of the U.S. EPA acceptable risk range (1E-06 to 1E-04), actual vapor risks at OU 8 are expected to be low.

3.0 SUMMARY AND RECOMMENDATIONS

Based on the results of Resolution Consultants' screening evaluation described herein, no further VI assessment is recommended at this time. Given the conservatism of VISL screening values, particularly compared to empirical data from OU 3, results on the low end of the risk range are considered less likely to pose a VI threat. Note that Resolution Consultants' initial screening-level protectiveness assessment for potential VI human health exposures from CVOCs and PHCs in groundwater used maximum groundwater concentrations from recent datasets (generally 2010 to 2014). Stated differently, the Resolution Consultants screening did not encompass all CVOCs and PHCs for every monitoring well and OU evaluated; instead, only maximum concentrations of reported compounds were incorporated in the initial screening process.

[11] Note that JAX-937-MW01S is within the footprint of Building 937.

The Technical Assessment Question B (validity of exposure assumptions, toxicity data, and cleanup levels) VI component of determining protectiveness for OUs 1, 3, 6, 7, and 8 are as follows.

- OU 1 — Protective, as the 2005 DPT study identified a clean layer of groundwater between the plume and the vadose zone which would preclude VI migration.
- OU 3 — Protectiveness deferred, as vapor issues will be addressed in the ongoing remedial investigation/risk assessment/feasibility study addendum process.[12]
- OU 6 — Protective, given physical building conditions.
- OU 7 — Protective, as current VISL screening does not indicate a threat outside acceptable risk ranges.
- OU 8 — Protective, as current VISL screening does not indicate a threat outside acceptable risk ranges.

As noted during the evaluations, DCE toxicity data are currently under evaluation, and future changes to slope factors, etc., may have impacts on VI and other assessments; 1,2-DCE data were not considered in the evaluations above.

[12] A timeframe for resolution of the protectiveness deferred condition at OU 3 will also be required, but it will be tied to the larger remedial investigation/risk assessment/feasibility study addendum process.

Summary Table A
Volatile Organic Compounds (VOCs)
Vapor Intrusion Screening Evaluation
Supplement to the Five-Year Review
Naval Air Station Jacksonville - Jacksonville, Florida

Site	Well	Screened Interval (ft. BTOC)	Date(s)	Compound	Maximum Concentration (µg/L)	Exceeds Residential VISL Screening Value for GW?[1]	Exceeds Industrial VISL Screening Value for GW?[1]	Approx. Distance to Nearest Bldg. (ft.)	Nearest Bldgs. (≤100 ft.)	Bldg. Construction
OU1	OU1-MW-89	3 - 13	Feb-10	1,1-DCE	22	N	N	>500	N/A	N/A
		3 - 13	Feb-10	1,2-DCA	5.6	Y	N	>500	N/A	N/A
		3 - 13	Feb-10	**TCE**	**340**	**Y**	**Y**	>500	N/A	N/A
		3 - 13	Feb-10	**VC**	**89**	**Y**	**Y**	>500	N/A	N/A
	OU1-MW-19	19 - 24	Jun-13	**TCE**	**61.3**	**Y**	Y	30	Residence	
		19 - 24	Jun-13	**VC**	**6.8**	**Y**	Y	30	Residence	
	OU1-MW-67	3.5 - 13.5	Aug-12	**VC**	**14.8**	**Y**	**Y**	40	Residence	
OU3	OU3A-GEW01	3 - 13	Jul-12	**TCE**	**18,600**	**Y**	**Y**	20	101	
		3 - 13	Jul-12	**VC**	**1,361**	**Y**	**Y**	20	101	
	***Only OU3, Area A selected for preliminary screening**									
OU6	MW08	Unknown	Apr-12	**1,1-DCA**	**1,230**	**Y**	**Y**	0 (Well in bldg. footprint)	Hangar 1000	
		Unknown	Apr-12	PCE	30	Y	N	0 (Well in bldg. footprint)	Hangar 1000	
		Unknown	Apr-12	**1,1-DCE**	**1,310**	**Y**	**Y**	0 (Well in bldg. footprint)	Hangar 1000	
	MW14	6.1 - 16.1	Apr-12	1,2-DCA	8.8	Y	N	10	(No Bldg. ID, SW of Bldg. 774)	
	MW19	2.4 - 12.4	Jun-13	**VC**	**2.4**	**Y**	N	110	848, 851	N/A
	MW22	10.3 - 20.3	Jun-13	**TCE**	**170**	**Y**	**Y**	65	(No Bldg. ID, SW of Bldg. 774)	
			Jun-13	VC	2.6	Y	Y	65	(No Bldg. ID, SW of Bldg. 774)	
OU7	MW8	Unknown	Nov-12	1,1-DCA	56	Y	Y	15	1903	
	MW11S	2.45 - 12.45	Nov-12	VC	1.3	Y	N	115	(No Bldg. ID, E of Bldg. 1903)	N/A
OU8	JAX47-937-MW01S	5 - 15	Apr-12	TCE	5.5	Y	N	0 (Well in bldg. footprint)	937	
		5 - 15	Apr-12	PCE	29	Y	N	0 (Well in bldg. footprint)	937	
		5 - 15	2012	**VC**	**1.8**	**Y**	N	0 (Well in bldg. footprint)	937	

NOTES

[1] Residential and Commercial VISL target groundwater concentrations, TCR=1E-06, THQ=0.1.

Red font indicates groundwater max. concentrations that exceed applicable VISL screening value by ≥ one order of magnitude (10x).

Shaded rows have "screened out".

Summary Table B
Petroleum Hydrocarbon Compounds (PHCs)
Vapor Intrusion Screening Evaluation
Supplement to the Five-Year Review
Naval Air Station Jacksonville - Jacksonville, Florida

Site	Well	Screened Interval (ft. BTOC)	Date(s)	Compound	Maximum Concentration (μg/L)	Exceeds Residential VISL Screening Value for GW?[1]	Exceeds Industrial VISL Screening Value for GW?[1]	Approx. Distance to Nearest Bldg. (ft.)	Nearest Bldgs. (≤100 ft.)	Well Screen Interval (ft. BTOC)	Bldg. Construction
OU1	OU1-MW-89	3 - 13	Feb-10	**Benzene**	**32**	**Y**	Y	450	N/A	3 -13	N/A
OU3	**Only OU3, Area A selected for preliminary screening*										
OU6	MW08	Unknown	Apr-12	**Naphthalene**	**397**	**Y**	**Y**	0 (Well in bldg. footprint)	Hangar 1000	Unknown	
OU8	JAX47-937-MW01S	5 - 15	Apr-12	**Benzene**	**9.9**	**Y**	Y	0 (Well in bldg. footprint)	937	5 - 15	
		5 - 15	Apr-12	**Ethylbenzene**	**143**	**Y**	Y	0 (Well in bldg. footprint)	937	5 - 15	
		5 - 15	Apr-12	Total xylenes	2,111	Y	Y	0 (Well in bldg. footprint)	937	5 - 15	
	JAX47-MW11S	4.5 - 15	Apr-12	**Naphthalene**	**137**	**Y**	Y	50	536	4.5 - 15.0	

NOTES
[1] "R" = Residential VISL, "C" = Commercial VISL - target groundwater concentrations, TCR=1E-06, THQ=0.1.
Red font indicates groundwater max. concentrations that exceed applicable VISL screening value by ≥ one order of magnitude (10x).
Shaded rows have "screened out".

Appendix D
Dioxins Documentation

1.0 DIOXON METHODOLOGY

Dioxins are a group of compounds that share distinct chemical structures and characteristics, including toxic mechanisms (United States Environmental Protection Agency [U.S. EPA] 2013). The compound 2,3,7,8-tetrachlorodibenzodioxin (TCDD) is the most potent of the related polychlorinated dibenzodioxin (PCDDs) and polychlorinated dibenzofurans (PCDFs) (U.S. EPA 2014). Toxicity of the different PCDD and PCDF congeners depends on the number and arrangement of the chlorine atoms and the chemical structure (U.S. EPA 2013). Evaluation methods relate concentrations of PCDDs and PCDFs to an equivalent TCDD concentration, such as the methods used by U.S. EPA and the Florida Department of Environmental Protection (FDEP) (U.S. EPA 2010; U.S. EPA 2013; U.S. EPA 2014; FDEP 2005).

Florida Administrative Code regulation 62-777.170, Derivation of Cleanup Target Levels, recommends under section (2)(a) that samples containing dioxins and furans be evaluated using the protocol described under University of Florida technical guidance. That technical guidance, in turn, cites the methodology described in the *Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and — Dibenzofurans (CDDs and CDFs) and 1989 Update(1989c),* which calculates a single 2,3,7,8-TCDD equivalent concentration from the sum of each dioxin-like compound (DLC) times its corresponding toxicity equivalency factor (TEF). This equivalent concentration would be compared to FDEP's 2,3,7,8-TCDD groundwater cleanup target level (GCTL) of 3 picograms per liter and soil cleanup target level (SCTL) of 7 picograms per liter.

$$TEQ = \sum_{i=1}^{n} (C_i \times TEF_i)$$

C_i	=	Individual TCDD or DLC concentration in environmental media.
TEF_i	=	TEF assigned for TCDD or the DLC.
TEQ	=	TCDD toxicity equivalence

A review of U.S. EPA risk assessment literature determined that TEFs were updated in 2010, as shown in *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds* was found. The table below shows which TEFs were revised in the 2010 U.S. EPA reference:

Congener	2005 Toxicity Equivalency Factor[a]	2010 Toxicity Equivalency Factor[b]
Polychlorinated dibenzodioxins		
2,3,7,8-Tetrachlorodibenzodioxin	1	1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1	1
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1	0.1
1,2,3,6,7,8-HxCDD	0.1	0.1
1,2,3,7,8,9-HxCDD	0.1	0.1
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01	0.01
Octachlorodibenzodioxin	0.0001	**0.0003**
Polychlorinated dibenzofurans		
2,3,7,8-Tetrachlorodibenzodioxin	0.1	0.1
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.05	**0.03**
2,3,4,7,8-PeCDF	0.5	**0.3**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1	0.1
1,2,3,6,7,8-HxCDF	0.1	0.1
1,2,3,7,8,9-HxCDF	0.1	0.1
2,3,4,6,7,8-HxCDF	0.1	0.1
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.01	0.01
1,2,3,4,7,8,9-HpCDF	0.01	0.01
Octachlorodibenzofuran	0.0001	**0.0003**

Notes:

[a] University of Florida, Center for Environmental & Human Toxicology, Gainesville, Florida. *Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C.* Prepared for Division of Waste Management, Florida Department of Environmental Protection. February 2005.

[b] U.S. EPA. Office of the Science Advisor, Risk Assessment Forum. *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds*. EPA/100/R 10/005. December 2010.

The most recent TEFs were used in the equivalency determinations for Octachlorodibenzodioxin, Octachlorodibenzofuran, and two Pentachlorodibenzofuran congeners. Otherwise, the same TEFs were used.

1.1 Operable Unit 1

For Operable Unit (OU) 1, Resolution Consultants accessed summary tables because the original laboratory reports were not available. A 2,3,7,8-TCDD equivalent concentration was not provided, and only a partial list of congeners and totals of each congener class were provided. For those samples, a 2,3,7,8-TCDD equivalent concentration was determined using only positive detections of specific congeners reported in the summary tables. Entries of “total” congeners of a similar size were not included in the 2,3,7,8-TCDD equivalent summation. Summary tables are in Appendix D-1.

1.2 Operable Unit 8

Resolution Consultants reviewed original (2001) analytical results in addition to summary tables for OU 8, included in Appendix D-2. A 2,3,7,8-TCDD equivalent concentration was not provided, and only some congeners were specifically listed. Resolution Consultants calculated a 2,3,7,8-TCDD equivalent concentration using the analytical sample results. Entries where a “total” dibenzofuran or dibenzodioxin was listed were summed together with individual congeners. It is possible that some congeners were double-counted, and the 2001 data did not specific which individual congeners were included or excluded.

The analytical results included totals of each congener class. Because FDEP and U.S. EPA do not list TEFs for an entire group of congeners of the same size, those totals were not included in the 2,3,7,8-TCDD equivalent calculation. The analytical results determined that several dioxin and dibenzofuran congeners were not detected or were reported at the Method Detection Limit (MDL). Because non-detected dioxins and dibenzofurans could still contribute to the 2,3,7,8-TCDD equivalent summation, non-detected congeners were included at one-half of their respective MDL.

2.0 REFERENCES

University of Florida, Center for Environmental & Human Toxicology, Gainesville, Florida. *Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C.* Prepared for Division of Waste Management, Florida Department of Environmental Protection. February 2005.

U.S. EPA. Technical Services Section. Superfund Division. *Region 4 Human Health Risk Assessment Supplemental Guidance.* Draft Final. January 2014. Obtained from: http://www.epa.gov/region4/superfund/images/allprogrammedia/pdfs/hhraguidedoc011014.pdf

U.S. EPA. *Use of Dioxin TEFs in Calculating Dioxin TEQs at CERCLA and RCRA Sites*. May 2013. Obtained from: http://www.epa.gov/superfund/health/contaminants/dioxin/pdfs/Use_of_Dioxin_TEFs_in_Calculating_Dioxin_TEQs_at_CERCLA_and_RCRA_Sites.pdf

U.S. EPA. Office of the Science Advisor, Risk Assessment Forum. *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds*. EPA/100/R 10/005. December 2010.

Dioxins Analytical Table 1992 Preliminary Characterization Summary																			
Dioxins/Furans																			
Sample ID		**SL034**	**SL034**	**SL039**	**SL039**	**SL040**	**SL040**	**SL040**	**SL040A**	**SL043**	**SL044**	**SL044**	**SL047**	**SL047**	**SL068**	**SL070**	**SL074**	**SL096**	**SL096**
Sample Date		**03/1992**	**03/1992**	**03/1992**	**03/1992**	**12/1991**	**03/1992**	**03/1992**	**12/1991**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**12/1991**	**12/1991**	**12/1991**	**03/1992**	**03/1992**
Sample Depth (feet below ground surface)		**0-3'**	**9-11'**	**0-3'**	**10-12'**	**7.5-8.5**	**0-3'**	**9-11'**	**0-2'**	**0-3'**	**0-3'**	**7-9'**	**0-3"**	**3-5'**	**0-3'**	**0-3'**	**0-3'**	**0-3'**	**2-4'**
OCDD		9.8	3.6	9.4	13	17	1.6	3.2	8	1.2	9	12	NS	0.96	2.2	0.35	0.67	0.24	0.87
1,2,3,4,6,7,8-HpCDD		1.6	0.58	1.4	2.2	2.2	0.32	0.84	—	0.24	1.3	1.7	NS	—	0.31	—	—	—	—
OCDF		1.5	—	1.1	1.2	—	—	—	—	—	—	—	NS	—	2.9	—	—	—	—
1,2,3,4,6,7,8-HpCDF		0.33	—	0.25	0.44	1.7	—	—	—	—	—	—	NS	—	0.33	—	—	—	—
Dioxin and Furan Concentrations in 2,3,7,8-TCDD Equivalents																			
Sample ID		**SL034**	**SL034**	**SL039**	**SL039**	**SL040**	**SL040**	**SL040**	**SL040A**	**SL043**	**SL044**	**SL044**	**SL047**	**SL047**	**SL068**	**SL070**	**SL074**	**SL096**	**SL096**
Sample Date		**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**	**03/1992**
Sample Depth (feet below ground surface)	**TEFs**	**0-3'**	**9-11'**	**0-3'**	**10-12'**	**7.5-8.5**	**0-3'**	**9-11'**	**0-2'**	**0-3'**	**0-3'**	**7-9'**	**0-3"**	**3-5'**	**0-3'**	**0-3'**	**0-3'**	**0-3'**	**2-4'**
OCDD	0.0003	0.00294	0.00108	0.00282	0.0039	0.0051	0.00048	0.00096	0.0024	0.00036	0.0027	0.0036	—	—	0.00066	—	—	—	—
1,2,3,4,6,7,8-HpCDD	0.01	0.016	0.0058	0.014	0.022	0.022	0.0032	0.0084	—	0.0024	0.013	0.017	—	—	0.0031	—	—	—	—
OCDF	0.0003	0.00045	-	0.00033	0.00036	—	—	—	—	—	—	—	—	—	0.00087	—	—	—	—
1,2,3,4,6,7,8-HpCDF	0.01	0.0033	-	0.0025	0.0044	0.017	—	—	—	—	—	—	—	—	0.0033	—	—	—	—
2,3,7,8-TCDD Equivalent Concentration (pg/g)		0.02269	0.00688	0.01965	0.03066	0.0441	0.00368	0.00936	0.0024	0.00276	0.0157	0.0206	0	0.000288	0.00793	0.00011	0.000201	0.000072	0.000261
FDEP Residential SCTL (pg/g)		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Exceeds Residential SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
FDEP Industrial SCTL (pg/g)		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Exceeds Industrial SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Notes:
All concentrations are in picograms per gram (pg/g).

OCDD	=	Octochlorodibenzo-p-dioxin
HpCDD	=	Heptachlorodibenzo-p-dioxin
OCDF	=	Octachlorodibenzo-p-furan
HpCDF	=	Hepatchlorodibenzofuran
TCDD	=	Tetrachlorodibenzodioxin
TEF	=	Toxicity Equivalency Factor
FDEP	=	Florida Department of Environmental Protection
SCTL	=	Soil Cleanup Target Level

Table P-1.2
Summary of Positive Detections in Surface Soil Analytical Results

Dioxins				**Dioxin Concentrations in 2,3,7,8-TCDD equivalents**	
Sample ID	**JXS04003**	**JXS05003**		**JXS04003**	**JXS05003**
Sample Date	**10/13/1994**	**10/13/1994**		**10/13/1994**	**10/13/1994**
Sample Depth (feet below ground surface)	**40.5**	**79.5**	**TEF**	**40.5**	**79.5**
1,2,3,4,6,7,8-HpCDD	—	61.4	0.01	—	0.6140
OCDD	211	517	0.0003	0.0633	0.1551
2,3,7,8-TCDD Equivalent Concentration (pg/g)				0.0633	0.7691
FDEP Residential SCTL (pg/g)				7	7
Exceeds SCTL?				NO	NO
FDEP Industrial SCTL (pg/g)				30	30
Exceeds Industrial SCTL?				NO	NO

Notes:
All concentrations are in picograms per gram (pg/g)

TCDD = Tetrachlorodibenzodioxin
TEF = Toxicity Equivalency Factor
HpCDD = Heptachlorodibenzo-p-dioxin
OCDD = Octochlorodibenzo-p-dioxin
FDEP = Florida Department of Environmental Protection
SCTL = Soil Cleanup Target Level

Table P-1.11
Surface Soil Outside and Within Presumptive Remedy Area

Dioxins/Furans

	Outside Remedy Area			**Within Remedy Area**										
Sample ID	**SL070**	**SL074**	**SL096**	**SL034 0-3**	**SL039 0-3**	**RP040**	**SL040**	**SL040A**	**SL040 0-3**	**SL043 0-3**	**SL044 0-3**	**SL047 0-3**	**RP0668**	**SL068**
Sample Date	**12/17/1991**	**12/17/1991**	**03/08/1992**	**03/03/1992**	**03/04/1992**	**12/18/1991**	**12/18/1991**	**12/18/1991**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**12/17/1992**	**12/17/1992**
Depth (foot below ground surface)	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**
OCDD	350	670	240	9,800	9,400	15,000	17,000	8,000	1,600	1,200	9,000	—	2,200	2,200
1,2,3,4,6,7,8-HpCDD	—	—	—	1,600	1,400	2,200	2,200	—	320	240	1,300	—	300	310
OCDF	—	—	—	1,500	1,100	—	—	—	—	—	—	—	2,800	2,900
1,2,3,4,6,7,8-HpCDF	—	—	—	330	250	—	1,700	—	—	—	—	—	320	330

Dioxin and Furan Concentrations in 2,3,7,8-TCDD Equivalents

		Outside Remedy Area			**Within Remedy Area**										
Sample ID		**SL070**	**SL074**	**SL096**	**SL034 0-3**	**SL039 0-3**	**RP040**	**SL040**	**SL040A**	**SL040 0-3**	**SL043 0-3**	**SL044 0-3**	**SL047 0-3**	**RP0668**	**SL068**
Sample Date		**12/17/1991**	**12/17/1991**	**03/08/1992**	**03/03/1992**	**03/04/1992**	**12/18/1991**	**12/18/1991**	**12/18/1991**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**12/17/1992**	**12/17/1992**
Depth (foot below ground surface)	**TEFs**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**	**0.13**
OCDD	0.0003	0.11	0.20	0.07	2.94	2.82	4.50	5.10	2.40	0.48	0.36	2.70	—	0.66	0.66
1,2,3,4,6,7,8-HpCDD	0.01	—	—	—	16.00	14.00	22.00	22.00	—	3.20	2.40	13.00	—	3.00	3.10
OCDF	0.0003	—	—	—	0.45	0.33	—	—	—	—	—	—	—	0.84	0.87
1,2,3,4,6,7,8-HpCDF	0.01	—	—	—	3.30	2.50	—	17.00	—	—	—	—	—	3.20	3.30

Notes:

All concentrations are in picograms per gram (pg/g)

OCDD = Octochlorodibenzo-p-dioxin
HpCDD = Heptachlorodibenzo-p-dioxin
OCDF = Octachlorodibenzo-p-furan
HpCDF = Hepatchlorodibenzofuran
TCDD = Tetrachlorodibenzodioxin
TEF = Toxicity Equivalency Factor

Table P-1.15
Summary of Positive Detections in Subsurface Soil Analytical Results

Dioxins/Furans									**Dioxin and Furan Concentrations in 2,3,7,8-TCDD Equivalents**						
Sample ID	**SL034 9-11**	**SL034 001 9-1**	**SL039 10-12**	**SL040 9-11**	**SL044 7-9**	**SL047 3-5**	**SL096 2-4**		**SL034 9-11**	**SL034 001 9-1**	**SL039 10-12**	**SL040 9-11**	**SL044 7-9**	**SL047 3-5**	**SL096 2-4**
Sample Date	**03/03/1992**	**03/03/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/08/1992**		**03/03/1992**	**03/03/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/04/1992**	**03/08/1992**
Depth (feet below ground surface)	**10**	**10**	**11**	**10**	**8**	**4**	**3**	**TEFs**	**10**	**10**	**11**	**10**	**8**	**4**	**3**
OCDD	3,600	6,500	13,000	3,200	12,000	960	870	0.0003	1.08	1.95	3.9	0.96	3.6	0.288	0.261
1,2,3,4,6,7,8-HpCDD	580	1,000	2,200	840	1,700	—	—	0.01	5.8	10	22	8.4	17	—	—
OCDF	—	—	1,200	—	—	—	—	0.0003	—	—	0.36	—	—	—	—
1,2,3,4,6,7,8-HpCDF	—	—	440	—	—	—	—	0.01	—	—	4.4	—	—	—	—
					2,3,7,8-TCDD Equivalent Concentration (pg/g)				6.88	11.95	30.66	9.36	20.6	0.288	0.261
					FDEP Residential SCTL (pg/g)				7	7	7	7	7	7	7
					Total exceeds SCTL?				NO	YES	YES	YES	YES	NO	NO
					FDEP Industrial SCTL (pg/g)				30	30	30	30	30	30	30
					Exceeds Industrial SCTL?				NO	NO	YES	NO	NO	NO	NO

Notes:

All concentrations are in picograms per gram (pg/g)
TCDD = Tetrachlorodibenzodioxin
TEF = Toxicity Equivalency Factor
OCDD = Octochlorodibenzo-p-dioxin
HpCDD = Heptachlorodibenzo-p-dioxin
OCDF = Octochlorodibenzofuran
HpCDF = Hepatchlorodibenzofuran
FDEP = Florida Department of Environmental Protection
SCTL = Soil Cleanup Target Level

Table P-1.19:
Summary of Positive Detections in Subsurface Soil Analytical Results

Dioxins/Furans									
Sample ID	**U1SB10201**	**U1SB10601**	**U1SB10601 DUP**	**U1SB10801**	**U1SB08801**	**U1SB09001**	**U1SB09401**	**U1SB09601**	**U1SB09801**
Collection Date	**11/9/1993**	**11/11/1993**	**11/11/1993**	**11/12/1993**	**11/8/1993**	**11/10/1993**	**11/11/1993**	**11/13/1993**	**11/14/1993**
Sample Depth (feet below ground surface)	**19**	**24**	**24**	**23.5**	**26**	**24**	**26**	**24**	**24**
OCDD	39.2	3.71	4.5	1.27	41.4	9.2	2.16	8.86	4.59
1,2,3,4,6,7,8-HpCDD	5.43	0.74	0.99	—	7.24	2	—	2.1	1.27
1,2,3,7,8-PeCDD	—	—	—	—	0.8	—	—	—	—
OCDF	—	—	—	—	—	—	—	1.24	—
1,2,3,6,7,8,-HxCDF	—	—	—	—	0.37	—	—	—	—
1,2,3,7,8,9-HxCDF	—	—	—	—	1.02	—	—	—	—
2,3,4,6,7,8-HxCDF	—	—	—	—	0.36	—	—	—	—
2,3,4,7,8-PeCDF	—	—	—	—	0.11	—	—	—	-

Dioxin and Furan Concentrations in 2,3,7,8-TCDD equivalents										
Sample ID		**U1SB10201**	**U1SB10601**	**U1SB10601 DUP**	**U1SB10801**	**U1SB08801**	**U1SB09001**	**U1SB09401**	**U1SB09601**	**U1SB09801**
Collection Date		**11/9/1993**	**11/11/1993**	**11/11/1993**	**11/12/1993**	**11/8/1993**	**11/10/1993**	**11/11/1993**	**11/13/1993**	**11/14/1993**
Sample Depth (feet below ground surface)	**TEFs**	**19**	**24**	**24**	**23.5**	**26**	**24**	**26**	**24**	**24**
OCDD	0.0003	0.01176	0.001113	0.00135	0.000381	0.01242	0.00276	0.000648	0.002658	0.001377
1,2,3,4,6,7,8-HpCDD	0.01	0.0543	0.0074	0.0099	—	0.0724	0.02	—	0.021	0.0127
1,2,3,7,8-PeCDD	1	—	—	—	—	0.8	—	—	—	—
OCDF	0.0003	—	—	—	—	—	—	—	0.000372	—
1,2,3,6,7,8-HxCDF	0.1	—	—	—	—	0.037	—	—	—	—
1,2,3,7,8,9-HxCDF	0.1	—	—	—	—	0.102	—	—	—	—
2,3,4,6,7,8-HxCDF	0.1	—	—	—	—	0.036	—	—	—	—
2,3,4,7,8-PeCDF	0.3	—	—	—	—	0.033	—	—	—	—
Total 2,3,7,8-TCDD Equivalents		0.06606	0.008513	0.01125	0.000381	1.09282	0.02276	0.000648	0.02403	0.014077
FDEP Residential SCTL (pg/g)		7	7	7	7	7	7	7	7	7
Dioxins exceed SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO
Furans exceed SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO
Total exceeds SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO
FDEP Industrial SCTL (pg/g)		30	30	30	30	30	30	30	30	30
Exceeds Industrial SCTL?		NO	NO	NO	NO	NO	NO	NO	NO	NO

Notes:
All concentrations are in picograms per gram (pg/g)
FDEP = Florida Department of Environmental Protection; TEF = Toxicity Equivalency Factor
HpCDD = Heptachlorodibenzo-p-dioxin
HpCDF = Hepatchlorodibenzofuran
OCDD = Octochlorodibenzo-p-dioxin
OCDF = Octochlorodibenzofuran
HxCDF = Hexachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran
PeCDD = Pentachlorodibenzo-p-dioxin
SCTL = Soil Cleanup Target Level
TCDD = Tetrachlorodibenzodioxin

Table P-1.32
Summary of Positive Detections in Sediment Analytical Results

Dioxins/Furans					**Dioxin and Furan Concentrations in 2,3,7,8-TCDD equivalents**		
Sample ID	**JXD01902**	**JXD02702**	**JXD02702D**		**JXD01902**	**JXD02702**	**JXD02702D**
Sample Date	**10/13/1994**	**10/13/1994**	**10/13/1994**		**10/13/1994**	**10/13/1994**	**10/13/1994**
Sample Depth (foot below ground surface)	**1**	**1**	**1**	**TEFs**	**1**	**1**	**1**
OCDD	970	3009	3694	0.0003	0.291	0.9027	1.1082
1,2,3,4,6,7,8-HpCDD	—	—	957	0.01	—	—	9.57
OCDF	—	—	905	0.0003	—	—	0.2715
2,3,7,8-TCDF	54	—	—	0.1	5.4	—	—
			Total 2,3,7,8-TCDD Equivalents		5.691	0.9027	10.9497
			FDEP Residential SCTL (pg/g)		7	7	7
			Total exceeds SCTL?		NO	NO	YES
			FDEP Industrial SCTL (pg/g)		30	30	30
			Exceeds Industrial SCTL?		NO	NO	NO

Notes:
All concentrations are in picograms per gram (pg/g)

TCDD = Tetrachlorodibenzodioxin
TEF = Toxicity Equivalency Factor
OCDD = Octochlorodibenzo-p-dioxin
HpCDD = Heptachlorodibenzo-p-dioxin
OCDF = Octochlorodibenzofuran
TCDF = Tetrachlorodibenzofuran
FDEP = Florida Department of Environmental Protection
SCTL = Soil Cleanup Target Level

Table D-1
Dioxin Analytical Results Summary
Remedial Investigation/Feasibility Study
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Jacksonville, Florida

Dioxin Analytical Results Summary	Results – Presented In Picograms per liter (pg/L) or parts per trillion				Toxic Equivalency Factor*	Results – Equivalent 2,3,7,8-TCDD in Picograms per liter (pg/L), or parts per trillion			
	JAX47-SB05	JAX47-SB06	JAX47-SB33	JAX47-SB38	Unitless	JAX47-SB05	JAX47-SB06	JAX47-SB33	JAX47-SB38
1,2,3,4,6,7,8,9-OCDD	81.44	26.97	251.9	422.2	0.003	0.24432	0.08091	0.7557	1.2666
1,2,3,4,6,7,8-HpCDD	8.408	3.514	61.91	17.31	0.01	0.08408	0.03514	0.6191	0.1731
1,2,3,7,8,9-HxCDD	1.044	0.987	14.59	1.079	0.1	0.1044	0.0987	1.459	0.1079
1,2,3,4,7,8-HxCDD**	0.5885	0.556	0.7435	0.608	0.1	0.05885	0.0556	0.07435	0.0608
1,2,3,6,7,8-HxCDD**	0.512	0.484	0.647	0.529	0.1	0.0512	0.0484	0.0647	0.0529
1,2,3,7,8-PeCDD**	0.476	0.483	0.5745	0.6	1	0.476	0.483	0.5745	0.6
2,3,7,8-TCDD**	0.458	0.4465	0.4355	1.1545	1	0.458	0.4465	0.4355	1.1545
					TCDD, 2,3,7,8-equivalent	1.47685	1.24825	3.98285	3.4158
					TCDD, 2,3,7,8-equivalent Groundwater Cleanup Target Level	3	3	3	3
					Exceeds Groundwater Cleanup Target Level?	**NO**	**NO**	**YES**	**YES**
					U.S. EPA Regional Screening Level (Residential Tap Water, pg/L)	0.6	0.6	0.6	0.6
					Exceeds U.S. EPA Regional Screening Level?	**YES**	**YES**	**YES**	**YES**

Notes:

* Toxic Equivalency Factors from Technical Report: Development of Cleanup Target Levels (CTLs) For Chapter 62-777, F.A.C., Table 19

* Toxic Equivalency Factors from Recommended Toxicity Equivalency Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds, U.S. EPA, December 2010, Table 2.

** This dioxin species was listed at below the minimum detection limit. The concentration used for the 2,3,7,8-TCDD equivalent summation was listed at one-half the Method Detection Limit.

Table D-2
Hexachlorodibenzo-p-dioxin, mixtures
Remedial Investigation/Feasibility Study
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Jacksonville, Florida

	Results presented in picograms per liter (pg/L) or parts per trillion			
	JAX47-SB05	**JAX47-SB06**	**JAX47-SB33**	**JAX47-SB38**
Hexachlorodibenzo-p-dioxin, mixtures	14.95	0.968	218.7	13.09
Groundwater Cleanup Target Level*	6	6	6	6
Exceeds Groundwater Cleanup Target Level?	**YES**	**NO**	**YES**	**YES**

*Groundwater Cleanup Target Level from Chapter 62-777, F.A.C., Table 19

Table D-3
Furan Analytical Results Summary
Remedial Investigation/Feasibility Study
Potential Source of Contamination 47
2015 Five-Year Review
Naval Air Station Jacksonville
Jacksonville, Florida

Furan Analytical Results Summary	Results presented in picograms per liter (pg/L) or parts per trillion				Toxic Equivalency Factor*	Results Equivalent 2,3,7,8-TCDD in picograms per liter (pg/L), or parts per trillion			
	JAX47-SB05	JAX47-SB06	JAX47-SB33	JAX47-SB38	unitless	JAX47-SB05	JAX47-SB06	JAX47-SB33	JAX47-SB38
1,2,3,4,6,7,8-HpCDF	0.2385	0.255	0.2485	1.1925	0.01	0.002385	0.00255	0.002485	0.011925
1,2,3,4,7,8,9-HpCDF	0.3505	0.375	0.365	0.5735	0.01	0.003505	0.00375	0.00365	0.005735
1,2,3,4,7,8-HxCDF	0.3525	0.3205	0.338	2.2025	0.1	0.03525	0.03205	0.0338	0.22025
1,2,3,6,7,8-HxCDF	0.3385	0.308	0.3245	2.115	0.1	0.03385	0.0308	0.03245	0.2115
1,2,3,7,8,9-HxCDF	0.4725	0.4295	0.4525	2.9505	0.1	0.04725	0.04295	0.04525	0.29505
1,2,3,7,8-PeCDF	0.399	0.3615	0.3885	0.862	0.03	0.01197	0.010845	0.011655	0.02586
2,3,4,6,7,8-HxCDF	0.378	0.3435	0.362	2.3605	0.1	0.0378	0.03435	0.0362	0.23605
2,3,4,7,8-PeCDF	0.383	0.347	0.373	0.827	0.3	0.1149	0.1041	0.1119	0.2481
2,3,7,8-TCDF	0.8775	0.625	0.509	1.69	0.1	0.08775	0.0625	0.0509	0.169
TCDD, 2,3,7,8-equivalent						0.37466	0.323895	0.32829	1.42347
TCDD, 2,3,7,8-equivalent Groundwater Cleanup Target Level						3	3	3	3
Exceeds Groundwater Cleanup Target Level?						**NO**	**NO**	**NO**	**NO**
U.S. EPA Regional Screening Level (Residential Tap Water, pg/L)						0.6	0.6	0.6	0.6
Exceeds U.S. EPA Regional Screening Level?						**NO**	**NO**	**NO**	**YES**

Notes:

* Toxic Equivalency Factors from Recommended Toxicity Equivalency Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds, U.S. EPA, December 2010, Table 2.

** Each furan species was listed at below the minimum detection limit. The concentration used for the 2,3,7,8-TCDD equivalent summation was listed at one-half the Method Detection Limit.

Appendix E
Excerpts of LTM-MNA Data Tables, Trend Graphs, Figures, and Reports

E-1

OU 1

FIGURE 6
HISTORICAL BENZENE CONCENTRATIONS IN SELECT WELLS

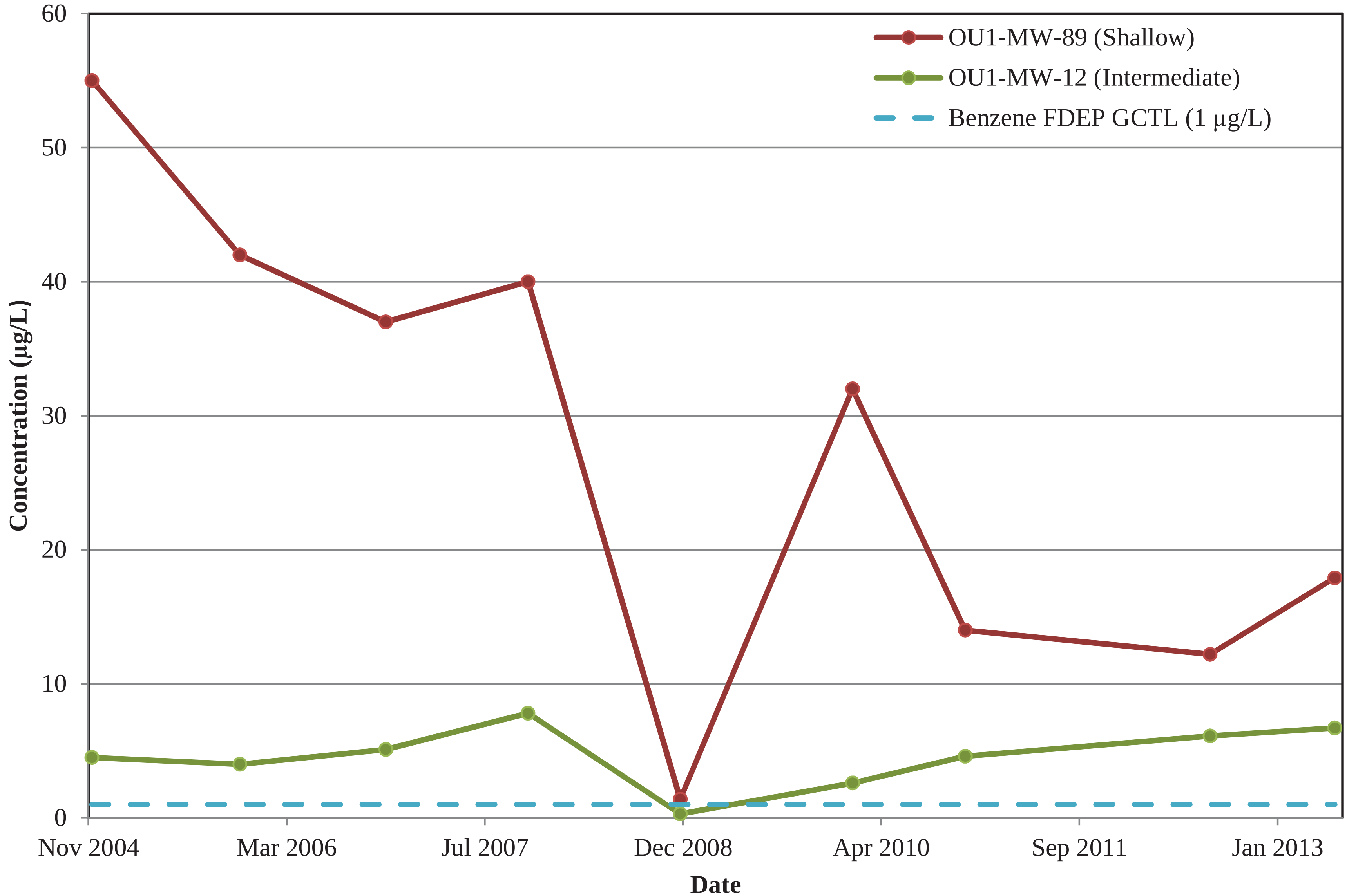


FIGURE 7
HISTORICAL TCE CONCENTRATIONS IN SELECT WELLS

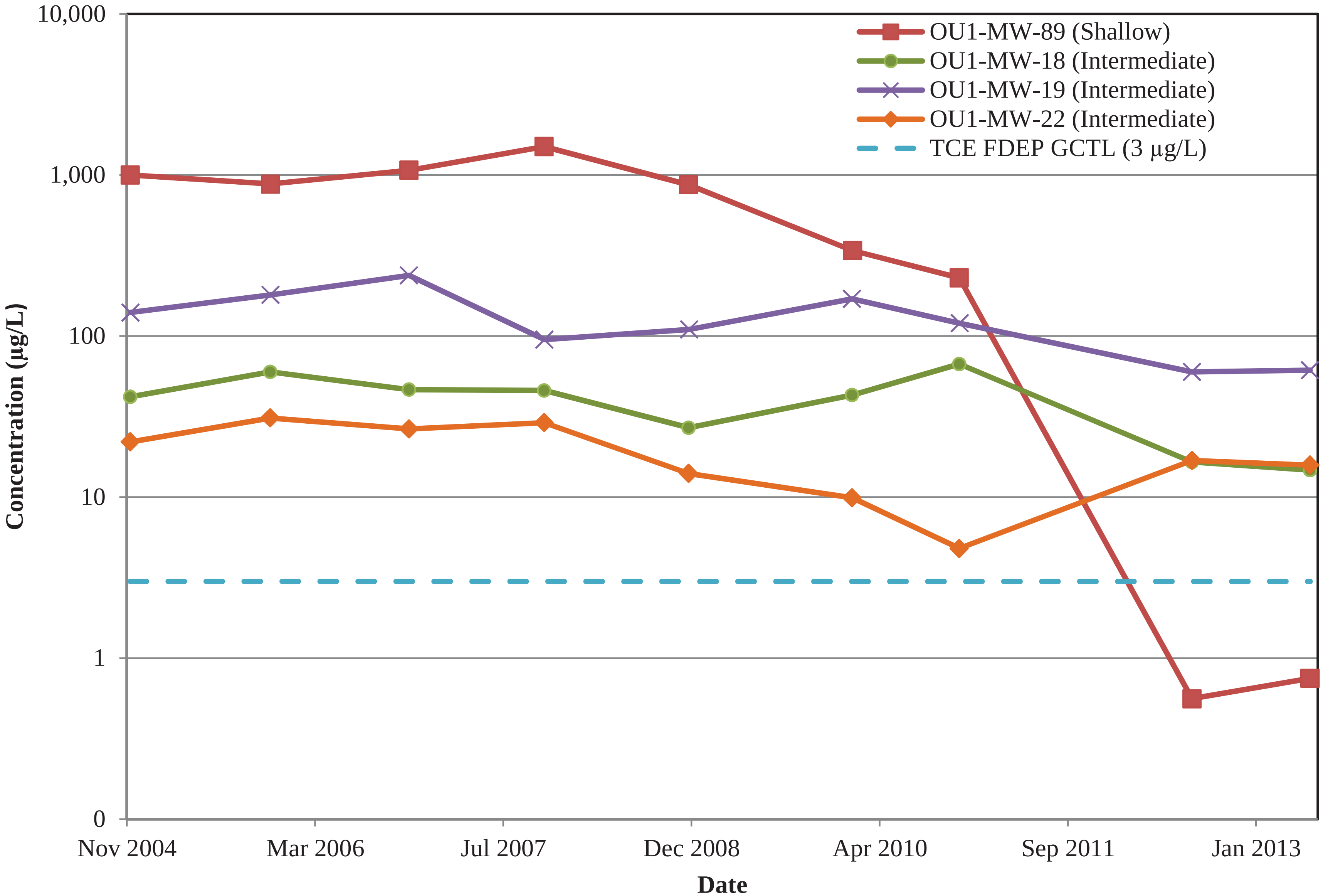


FIGURE 8
HISTORICAL VC CONCENTRATIONS IN SELECT WELLS

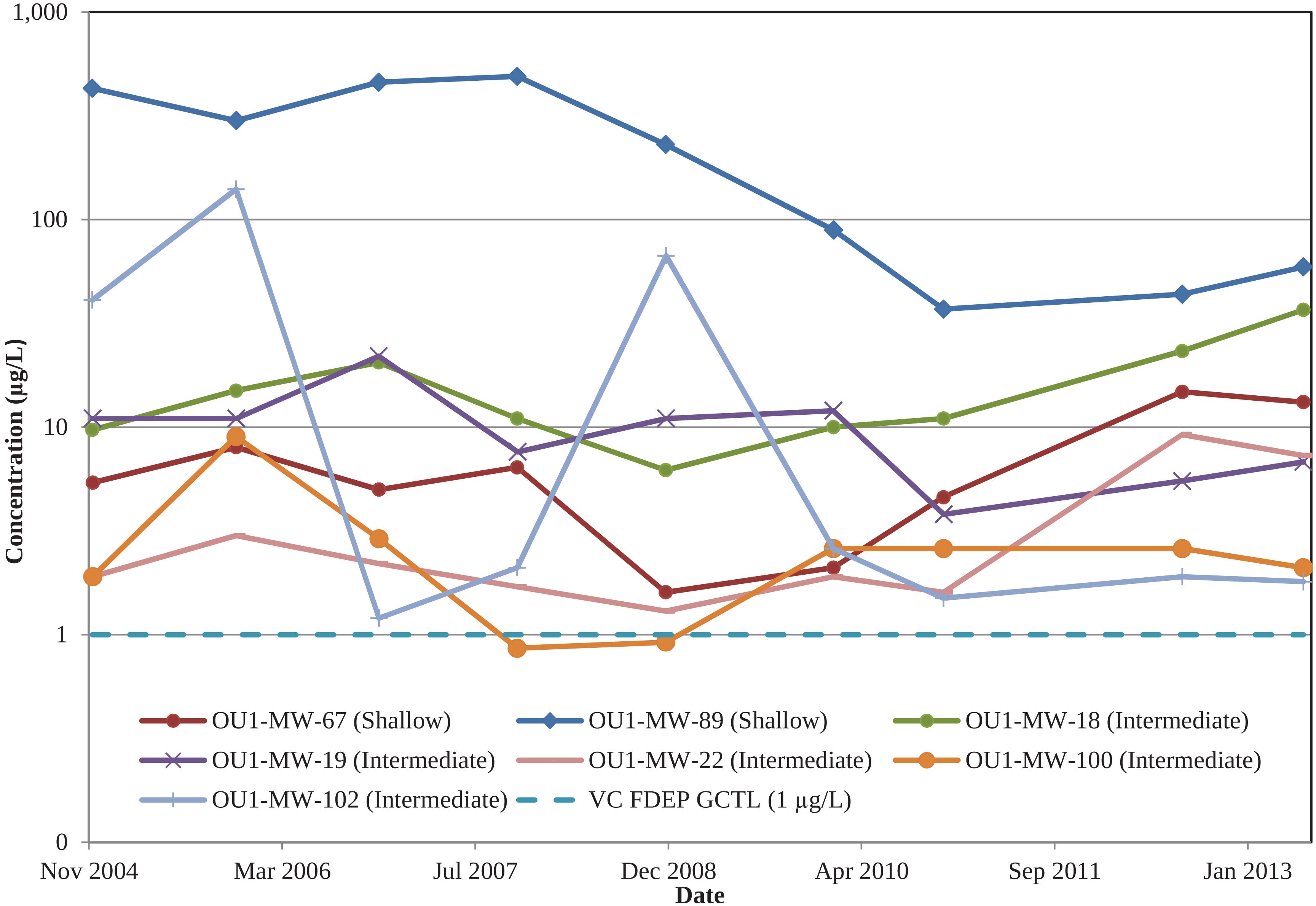


TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		SHALLOW WELL									SHALLOW WELL								
Well ID	FDEP	OU1-MW-67									OU1-MW-89								
Sample Date	GCTL	11/11/04	11/17/05	11/22/06	11/15/07	12/3/08	2/10/10	11/22/10	8/1/12	6/11/13	11/10/04	11/18/05	11/21/06	11/15/07	12/3/08	2/11/10	11/22/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																			
Benzene	1	<1.0	<0.2	<0.2	<0.23	<0.29	<0.27	<0.35	<0.20	<0.21	**55**	**42 D2**	**37**	**40**	<1.4	**32**	**14**	**12.2**	**17.9**
1,1-DCE	7	<1.0	<0.3	<0.2	<0.36	<0.34	<0.21	<0.50	<0.23	<0.20	**61**	**63 D2**	**131**	**90**	**64**	**22**	**13**	<0.23	<0.20
1,2-Dichloroethane	3	<1.0	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22	**6 I**	**6.0 I D2**	**10.2**	**9.2**	<2.2	**5.6**	<3.4	**0.82 I**	**0.82 I**
cis -1,2-DCE	70	**80**	**58**	**83.2**	**57**	**25**	**24**	**34**	**44.5**	**44.6**	**300**	**210**	**448 D**	**320**	**190**	**93**	**39**	**24.5**	**31.9**
tran s-1,2-DCE	100	**7.7**	**5**	**7.9**	**1.9**	**1.3**	<0.30	<0.47	<0.35	**0.38 I**	**3 I**	**4.0 I D2**	**6.4**	**5.8**	<2.4	**2.1**	<4.7	<0.35	<0.23
TCE	3	**7**	**6**	**12.5**	**3.2**	**2.6**	<0.24	<0.39	<0.26	<0.31	**1000**	**880 D2**	**1070 D**	**1500**	**870**	**340**	**230**	**0.56 I**	**0.75 I**
Vinyl Chloride	1	**5.4**	**8**	**5**	**6.4**	**1.6**	**2.1**	**4.6**	**14.8**	**13.2**	**430**	**300 D2**	**459**	**490**	**230**	**89**	**37**	**43.7**	**59.2**
Methane, Ethane, Ethene (RSK 175) µg/L																			
Methane	NE	**260**	**200 D1**	**6.2**	**0.082**	**56**	**49**	<0.49	**75.9**	**71.0**	**5700**	**2000 V D1**	**1670 D**	**4580**	**1050**	**1510**	**277**	**1,090**	**1,470**
Ethene	NE	<1.0	<0.3	<0.3	<0.0003	<1.0	<0.4	<1.6	<0.32	<0.32	**66**	<0.3	**29**	**59**	**22**	**6**	**1.94 I**	**8.61**	**14.9**
Ethane	NE	<1.0	**2**	<0.2	**0.0008 I**	**0.9 I**	**1.0 I**	<1.5	**0.46 I**	<0.43	**73**	**40**	**13**	**44**	**13**	**8**	**3.1**	**3.00**	**2.9**
Chloride (300.0) mg/L																			
Chloride	250*	**19**	**17**	**11**	**16 V**	**20**	**20**	**19**	**20.9**	**20.5**	**16**	**15.6**	**10**	**13 V**	**15**	**13**	**17**	**22.5**	**17.0**
Sulfate (300.0) mg/L																			
Sulfate	250*	**14**	**13.7**	**14**	**14**	**16**	**19**	**23**	**19.5**	**20.4**	**2.9**	**2.2**	**28**	**2.6**	**2.4 I**	**44**	**69**	**50.4**	**38.8**
Sulfide (SM18 4500) mg/L																			
Sulfide	NE	<1.0	<1.0	<0.49	**0.61 I**	<0.45	<0.45	<0.45	<0.30	<0.22	<1.0	<1.0	<0.49	**0.45 I**	<0.45	<0.45	<0.45	**1.4**	**0.29 I**
Total Organic Carbon (SM18 5310B) mg/L																			
Total Organic Carbon	NE	**7.0**	**9.3**	**2.9**	**9.2**	**11**	**10**	**4.4**	**4.4**	**4.7**	**16**	**25.8**	**8.4**	**28**	**19**	**18**	**10**	**8.4**	**6.8**
Metals (6010C) µg/L																			
Iron	300*	**5,500**	**4,200**	**3,840**	**2,980**	**17,100**	**5,200**	**2,640**	**1,790**	**2,200**	**28,000**	**34,300**	**33,500**	**31,800**	**30,900**	**59,600**	**39,200**	**14,400**	**20,100**
Dissolved Iron	300*	NA	NA	NA	NA	NA	**2,050**	**995**	**337**	**326**	NA	NA	NA	NA	NA	**39,900**	**31,100**	**9,200**	**18,400**
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**15.3**	**13.0 I**	NA	NA	NA	NA	NA	NA	NA	**39.7**	**31.4**
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**16.6**	**13.1 I**	NA	NA	NA	NA	NA	NA	NA	**39.4**	**33.2**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		SHALLOW WELL									SHALLOW WELL								
Well ID	**FDEP**	**OU1-MW-93**									**OU1-MW-95**								
Sample Date	**GCTL**	11/11/04	11/17/05	11/21/06	11/15/07	12/3/08	2/11/10	11/22/10	8/1/12	6/11/13	11/11/04	11/18/05	11/22/06	11/15/07	12/4/08	2/10/10	11/22/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																			
Benzene	1	<1.0	<0.2	<0.2	<0.23	<0.29	<0.050	<0.35	<0.20	<0.21	<1.0	<0.2	<0.2	<0.23	<0.29	<0.27	<0.35	<0.20	<0.21
1,1-DCE	7	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.50	<0.23	<0.20	<1.0	<0.3	<0.2	<0.36	<0.34	<0.21	<0.50	<0.23	<0.20
1,2-Dichloroethane	3	<1.0	<0.2	<0.1	<0.19	<0.43	<0.082	<0.34	<0.20	<0.22	<1.0	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22
cis -1,2-DCE	70	**1**	**0.2**	**0.2**	<0.45	<0.32	<0.075	<0.41	<0.26	<0.24	<1.0	<0.2	**0.2**	<0.45	<0.32	<0.22	<0.41	<0.26	<0.24
tran s-1,2-DCE	100	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.47	<0.35	<0.23	<1.0	<0.2	<0.2	<0.41	<0.49	<0.30	<0.47	<0.35	<0.23
TCE	3	<1.0	<0.3	0.4 I	<0.26	<0.50	<0.13	<0.39	<0.26	<0.31	<1.0	<0.3	<0.3	<0.26	<0.50	<0.24	<0.39	<0.26	<0.31
Vinyl Chloride	1	<1.0	<0.4	<0.4	<0.52	<0.61	<0.083	<0.48	<0.22	<0.44	<1.0	<0.4	<0.4	<0.52	<0.61	<0.33	<0.48	<0.22	<0.44
Methane, Ethane, Ethene (RSK 175) µg/L																			
Methane	NE	NA	**2**	**3**	**1**	**1**	**29**	<1.5	**1.26**	**1.6**	**29**	**3**	**6**	**7**	**3**	**1**	**2,160**	**1.37**	**4.6**
Ethene	NE	NA	<0.3	<0.3	<0.3	<1.0	<0.4	<1.6	<0.32	<0.32	<1.0	<0.3	<0.3	<0.3	<1.0	<0.4	<1.6	<0.32	<0.32
Ethane	NE	NA	<0.2	<0.2	<0.2	<0.9	<0.4	<0.49	<0.43	<0.43	<1.0	<0.2	<0.2	<0.2	<0.9	<0.4	<1.5	<0.43	<0.43
Chloride (300.0) mg/L																			
Chloride	250*	NA	**3.1**	**2.2**	**3.7 V**	**4 I**	**4.4 I**	**4.6 I**	**5.4**	**4.7**	**9.8**	**4.9**	**4**	**15 V**	**5.6**	**9.2**	**17**	**23.3**	**10.2**
Sulfate (300.0) mg/L																			
Sulfate	250*	NA	**12.9**	**17**	**14**	**20**	**17**	**18**	**18.6**	**18.7**	**40**	**13.2**	**13**	**28**	**120**	**49**	**54**	**213**	**63.6**
Sulfide (SM18 4500) mg/L																			
Sulfide	NE	NA	<1.0	<0.49	**0.77 I**	<0.45	**0.56 I**	**0.46 I**	**1.4**	**0.48 I**	<1.0	<1.0	<0.49	**0.77 I**	<0.45	<0.45	<0.45	**1.3**	<0.22
Total Organic Carbon (SM18 5310B) mg/L																			
Total Organic Carbon	NE	NA	**5.6**	<0.3	**5.3**	**5.1**	**2.8**	**1.9**	**2.1**	**1.7**	**13**	**23.1**	**3.3**	**20**	**5.6**	**19**	**11**	**14.6**	**12.3**
Metals (6010C) µg/L																			
Iron	300*	NA	**1,900**	**2,350**	**2,740**	**726**	**3,410**	**1,240**	**2,660**	**2,820**	**3,400**	**9,700**	**5,890**	**1,240**	**7,990**	**8,500**	**869**	**1,310**	**2,610**
Dissoolved Iron	300*	NA	NA	NA	NA	NA	**1,230**	**145**	**1,020**	**2,490**	NA	NA	NA	NA	NA	**1,210**	**328**	**851**	**1,950**
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**6.5 I**	**5.0 I**	NA	NA	NA	NA	NA	NA	NA	**7.9 I**	**4.0 I**
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**9.9 I**	**5.1 I**	NA	NA	NA	NA	NA	NA	NA	**7.7 I**	**4.8 I**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		SHALLOW WELL									INTERMEDIATE WELL								
Well ID	**FDEP**	**OU1-MW-101**									**OU1-MW-12**								
Sample Date	**GCTL**	11/10/04	11/17/05	11/22/06	11/15/07	12/4/08	2/10/10	11/22/10	8/1/12	6/11/13	11/10/04	11/18/05	11/21/06	11/15/07	12/3/08	2/11/10	11/22/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																			
Benzene	1	<0.2	<0.2	<0.2	<0.23	<0.29	<0.27	<0.35	<0.20	<0.21	**4.5**	**4.0**	**5.1**	**7.8**	<0.29	**2.6**	**4.6**	**6.1**	**6.7**
1,1-DCE	7	<2.0	<0.3	<0.2	<0.36	<0.34	<0.21	<0.50	<0.23	<0.20	<0.3	<0.3	<0.2	<0.36	<0.34	<0.15	<0.50	<0.23	<0.20
1,2-Dichloroethane	3	<0.2	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22	<0.2	<0.2	<0.1	<0.19	<0.43	<0.082	<0.34	<0.20	<0.22
cis -1,2-DCE	70	**0.1**	**0.2**	**0.2**	**8**	**39**	<0.22	<0.41	<0.26	<0.24	**2.6**	**3.0**	**1.8**	**0.76 I**	**1.6**	**1.3**	**0.66 I**	**0.42 I**	**0.26 I**
tran s-1,2-DCE	100	<0.2	<0.2	<0.2	<0.41	<0.49	<0.30	<0.47	<0.35	<0.23	<0.2	**0.2 I**	<0.2	<0.41	<0.49	<0.11	<0.47	<0.35	<0.23
TCE	3	<0.3	**0.4 I**	<0.3	<0.26	<0.50	<0.24	<0.39	<0.26	<0.31	**1**	**1.0**	<0.3	<0.26	<0.50	<0.13	<0.39	<0.26	<0.31
Vinyl Chloride	1	**0.4 I**	<0.4	**0.4 I**	**19**	**51**	<0.33	<0.48	<0.22	<0.44	**2.4**	**2.0**	**1.6**	<0.52	<0.61	**0.80 I**	**0.65 I**	**0.27 I**	<0.44
Methane, Ethane, Ethene (RSK 175) µg/L																			
Methane	NE	**5,270**	**12,000 D3**	**704 D**	**4,170**	**804**	**1,670**	**16.7**	**2,680**	**2,900**	**3,010**	**800 V D1**	**2,000 D**	**6.84**	**1,020**	**626**	**1,170**	**2,110**	**3,750**
Ethene	NE	<0.3	<0.3	<0.3	**2 I**	**1 I**	<0.4	<1.6	<0.32	<0.32	**3.7**	<0.3	<0.3	<0.0003	<1.0	**1 I**	<1.6	**6.82**	**5.1**
Ethane	NE	<0.2	<0.2	<0.2	<0.2	<0.9	<0.4	<1.5	<0.43	<0.43	**36**	**10**	**10**	**0.027**	**6**	**4**	**3.67**	<0.43	**0.44 I**
Chloride (300.0) mg/L																			
Chloride	250*	**11**	**8.9**	**6.9**	**12 V**	**22**	**11**	**14**	**13.6**	**12.9**	**56**	**25.9**	**26**	**29 V**	**15**	**14**	**20**	**30.2**	**25.1**
Sulfate (300.0) mg/L																			
Sulfate	250*	**3.9**	<0.2	<0.03	**3.1**	**11**	**14**	**1.8 I**	<2.0	**1.2 I**	**18**	**22.6**	**11**	**6.5**	**15**	**20**	**10**	<5.0	**6.7 I**
Sulfide (SM18 4500) mg/L																			
Sulfide	NE	<1.0	<1.0	<0.49	**0.77 I**	<0.45	<0.45	**0.46 I**	**1.9**	**0.62 I**	<1.0	<1.0	<0.49	**0.45 I**	**1.2**	<0.45	**0.79 I**	**1.0**	**1.7**
Total Organic Carbon (SM18 5310B) mg/L																			
Total Organic Carbon	NE	**5**	**21.7**	<0.3	**6.3**	**7.6**	**14**	**11**	**7.4**	**7.0**	**29**	**19.4**	**11**	**24**	**9.9**	**6.9**	**13**	**15.3**	**17.5**
Metals (6010C) µg/L																			
Iron	300*	**3,800**	**4,000**	**4,200**	**4,790**	**8,640**	**15,600**	**13,900**	**9,220**	**8,650**	**97,000**	**81,600**	**100,000**	**85,400**	**71,000**	**41,400**	**75,800**	**102,000**	**89,300**
Dissoolved Iron	300*	NA	NA	NA	NA	NA	**13,700**	**10,200**	**274 I**	**113 I**	NA	NA	NA	NA	NA	**41,300**	**73,100**	**58,200**	**19,000**
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**104**	**93.2**	NA	NA	NA	NA	NA	NA	NA	**48.5**	**43.4**
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**94.0**	**98.0**	NA	NA	NA	NA	NA	NA	NA	**46.3**	**42.7**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		INTERMEDIATE WELL									INTERMEDIATE WELL								
Well ID	FDEP	OU1-MW-18									OU1-MW-19								
Sample Date	GCTL	11/10/04	11/17/05	11/21/06	11/15/07	12/3/08	2/10/10	11/22/10	8/1/12	6/11/13	11/11/04	11/18/05	11/21/06	11/16/07	12/4/08	2/10/10	11/23/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																			
Benzene	1	0.5 I	0.6 I	0.4 I	0.52 I	<0.29	<0.27	<0.35	0.33 I	0.33 I	<1.0	0.3 I	<1.0 D	<1.2	0.34 I	<0.27	<0.27	<0.40	<0.21
1,1-DCE	7	2.6	6.0	6.3	<0.36	1.9	<0.21	4.8	3.8	3.9	2.1	3.0 V	<4.4 D	2.4 I	2.3	2.2	1.1	1.2 I	1.3
1,2-Dichloroethane	3	<0.2	<0.2	<0.2	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22	<1.0	<0.2	<0.5 D	<0.95	<0.43	<0.28	1.2	<0.40	<0.22
cis-1,2-DCE	70	39	66	74	37	22	39	51	49.3	81.0	150	170	420 D	140	150	260	110	147	140
*tran*s-1,2-DCE	100	6	12	8	6	2.4	5.5	8.2	3.5	3.4	21	36	134 D	18	41	81	59	30.6	35.8
TCE	3	42	60	46.5	46.0	27.0	43	67	16.5	14.7	140	180	238 D	95	110	170	120	59.9	61.3
Vinyl Chloride	1	9.7	15	20.5	11.0	6.2	10	11	23.3	36.8	11	11	22.0 D	7.6	11	12	3.8	5.5	6.8
Methane, Ethane, Ethene (RSK 175) µg/L																			
Methane	NE	210	60	44	0.108	36	38	48	61.9	42.1	200	80 V	0.06	159	1	1	19	177	92.5
Ethene	NE	<0.3	3,000	0.7 I	<0.0003	<1.0	0.7 I	<1.6	4.89	2.9	3.1	<0.3	0.0003	<0.3	<1.0	<0.4	<1.6	2.50	2.0
Ethane	NE	20	4	3	0.01	<3.0	3	3.28	0.93 I	0.72 I	3.9	1.0	0.0002	3	<0.9	<0.4	<1.5	0.86 I	<0.43
Chloride (300.0) mg/L																			
Chloride	250*	100	99.2	69	85	84	71	81	64.1	58.4	62	53.2	35	49 V	55	34	31	43.7	45.0
Sulfate (300.0) mg/L																			
Sulfate	250*	34	22	37	49	68	76	47	86.8	96.7	26	21.7	14	29	21	25	27	34.5	39.8
Sulfide (SM18 4500) mg/L																			
Sulfide	NE	<1.0	<1.0	<0.49	0.61 I	<0.45	<0.45	0.46 I	0.90 I	<0.22	<1.0	<1.0	<0.49	<0.45	<0.45	<0.45	<0.45	1.0	0.46 I
Total Organic Carbon (SM18 5310B) mg/L																			
Total Organic Carbon	NE	8	8.7	0.81 I	8.6	5.9	7.8	6.1	6.8	7.3	3.0	7.8	<0.3	6.0	3.5	9.0	2.7	4.0	4.4
Metals (6010C) µg/L																			
Iron	300*	140	50	180	245	167 V	169	60.2	227 I	345	2,700	5,200	4,690	43,400	2,780	47,900	2,600	6,520	5,620
Dissoolved Iron	300*	NA	NA	NA	NA	NA	158	55.3	173 I	410	NA	NA	NA	NA	NA	3,670	384	3,530	2,020
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	75.0	76.5	NA	NA	NA	NA	NA	NA	NA	55.9	54.2
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	74.8	77.8	NA	NA	NA	NA	NA	NA	NA	60.2	56.1

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		INTERMEDIATE WELL									INTERMEDIATE WELL							
Well ID	FDEP	OU1-MW-22									OU1-MW-98							
Sample Date	GCTL	11/10/04	11/17/05	11/21/06	11/15/07	12/3/08	2/10/10	11/22/10	8/1/12	6/11/13	11/11/04	11/18/05	11/16/07	12/4/08	2/10/10	11/23/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																		
Benzene	1	0.2 I	<0.2	0.3 I	<0.23	<0.29	<0.27	<0.35	0.44 I	0.46 I	<1.0	<0.2	0.24 I	NA	<0.27	<0.27	<0.20	<0.21
1,1-DCE	7	<0.3	<0.3	0.9 I	0.81 I	0.76 I	<0.21	0.74 I	2.6	2.7	<1.0	<0.3	<0.36	NA	<0.21	<0.21	<0.23	<0.20
1,2-Dichloroethane	3	<0.2	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22	<1.0	<0.2	<0.19	NA	<0.28	<0.28	<0.20	<0.22
cis -1,2-DCE	70	26	30	27.4	18	14	11	8	40.5	35.5	<1.0	0.6 I	2.7	NA	<0.22	0.54 I	<0.26	<0.24
tran s-1,2-DCE	100	8.3	10	7.2	4.2	2.8	1.6	1.3	5.8	4.4	<1.0	<0.2	<0.41	NA	<0.30	0.42 I	<0.35	<0.23
TCE	3	22	31	26.5	29	14	9.9	4.8	16.9	15.8	<1.0	0.4 I	0.91 I	NA	<0.24	0.42 I	<0.26	<0.31
Vinyl Chloride	1	1.9	3	2.2	1.7	1.3	1.9	1.6	9.2	7.3	<1.0	<0.4	<0.52	NA	<0.33	<0.33	<0.22	<0.44
Methane, Ethane, Ethene (RSK 175) µg/L																		
Methane	NE	350	400	171	667	161	198	196	652	343	47	10 V	36	NA	7	32.1	12.2	26.2
Ethene	NE	<0.3	<0.3	<0.3	<0.3	<0.1	<0.4	<1.6	1.6	0.85 I	<1.0	<0.3	<0.3	NA	<0.4	<1.6	<0.32	<0.32
Ethane	NE	<0.2	<0.2	<0.2	1 I	<0.9	<0.4	<1.5	<0.43	<0.43	<1.0	<0.2	<0.2	NA	<0.4	<1.5	<0.43	<0.43
Chloride (300.0) mg/L																		
Chloride	250*	25	21.5	15	23 V	26	21	24	33.2	31.9	37	19.1	13 V	NA	23	25	25.5	17.5
Sulfate (300.0) mg/L																		
Sulfate	250*	6.9	7.4	9	8.7	12	10	11	14.4	17.8	42	38.1	37	NA	46	46	45.8	27.9
Sulfide (SM18 4500) mg/L																		
Sulfide	NE	<1.0	<1.0	<0.49	0.94	<0.45	<0.45	<0.45	0.30 I	<0.22	<1.0	<1.0	<0.45	NA	<0.45	<0.45	0.30 I	0.23 I
Total Organic Carbon (SM18 5310B) mg/L																		
Total Organic Carbon	NE	6	7.4	1.6	5.8	4.4	4.4	4.1	4.2	4.4	2.0	8.9	10.0	NA	6.1	4.2	3.4	5.3
Metals (6010C) µg/L																		
Iron	300*	1,900	1,900	3,180	3,260	3,100	2,620	4,370	2,910	2,450	12,000	18,000	34,700	NA	1,980	12,300	2,590	7,890
Dissoolved Iron	300*	NA	NA	NA	NA	NA	1,020	4,390	385	155 I	NA	NA	NA	NA	794	11,800	47.9 I	883
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	57.5	58.5	NA	NA	NA	NA	NA	NA	35.6	42.9
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	50.7	58.4	NA	NA	NA	NA	NA	NA	29.1	38.7

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		INTERMEDIATE WELL									INTERMEDIATE WELL								
Well ID	FDEP	OU1-MW-100									OU1-MW-102								
Sample Date	GCTL	11/11/04	11/17/05	11/22/06	11/15/07	12/3/08	2/10/10	11/22/10	8/1/12	6/11/13	11/10/04	11/17/05	11/22/06	11/15/07	12/4/08	2/10/10	11/22/10	8/1/12	6/11/13
Volatile Organic Compounds (8260B) µg/L																			
Benzene	1	<1.0	<0.2	<0.2	<0.23	<0.29	<0.27	<0.35	<0.20	<0.21	<0.2	<0.2	<0.2	<0.23	<0.29	<0.27	<0.35	<0.20	<0.21
1,1-DCE	7	<1.0	<0.3	<0.2	<0.36	<0.34	<0.21	<0.50	<0.23	<0.20	<2.0	<0.3	<0.2	<0.36	**1.2**	<0.21	<0.50	<0.23	<0.20
1,2-Dichloroethane	3	<1.0	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22	<0.2	<0.2	<0.1	<0.19	<0.43	<0.28	<0.34	<0.20	<0.22
cis -1,2-DCE	70	**53**	**97**	**80**	**31**	**35**	**80**	**39**	**51.2**	**83.5**	**18**	**24**	**1.3**	**14**	**85**	**0.85 I**	**0.52 I**	**0.39 I**	**0.45 I**
tran s-1,2-DCE	100	**5.7**	**6.0**	**5.6**	**1.8**	**2.4**	**4.6**	**1.6**	**2.9**	**4.4**	<0.2	<0.2	<0.2	<0.41	**0.53 I**	<0.30	<0.47	<0.35	<0.23
TCE	3	**2.6**	**2.0**	**1.8**	**1.4**	**0.99 I**	<0.24	**0.48 I**	**0.41 I**	<0.31	<0.3	<0.3	<0.3	<0.35	<0.50	<0.24	<0.39	<0.26	<0.31
Vinyl Chloride	1	**1.9**	**9.0**	**2.9**	**0.86 I**	**0.92**	**2.6**	**2.6**	**2.6**	**2.1**	**41**	**140**	**1.2**	**2.1**	**67**	**2.6**	**1.5**	**1.9**	**1.8**
Methane, Ethane, Ethene (RSK 175) µg/L																			
Methane	NE	**130**	**70**	**28**	**72**	**20**	**13**	**24**	**66.2**	**74**	**130**	**0.1 D1**	**2**	**72**	**7**	<0.2	**33.6**	**32.3**	**44.7**
Ethene	NE	<1.0	<0.3	<0.3	<0.3	<1.0	<0.4	<1.6	<0.32	<0.32	<0.3	<0.3	<0.3	<0.3	<1.0	<0.4	<1.6	<0.32	<0.32
Ethane	NE	<1.0	<0.2	<0.2	<0.2	<0.9	<0.4	<1.5	<0.43	<0.43	<0.2	<0.2	<0.2	<0.2	<0.9	<0.4	<1.5	<0.43	<0.43
Chloride (300.0) mg/L																			
Chloride	250*	**21**	**22**	**12**	**16 V**	**17**	**21**	**25**	**25.4**	**22.9**	**16**	**13.3**	**10**	**16 V**	**27**	**13**	**15**	**13.1**	**11.9**
Sulfate (300.0) mg/L																			
Sulfate	250*	**17**	**16.7**	**18**	**19**	**26**	**23**	**26**	**21.0**	**25.0**	**11**	**12.8**	**15**	**19**	**26**	**24**	**24**	**23.8**	**17.5**
Sulfide (SM18 4500) mg/L																			
Sulfide	NE	<1.0	<1.0	<0.49	**0.61 I**	<0.45	<0.45	<0.45	**0.67 I**	**0.22 I**	<1.0	<1.0	<0.49	**0.61 I**	<0.45	<0.45	<0.45	**0.65 I**	**0.62 I**
Total Organic Carbon (SM18 5310B) mg/L																			
Total Organic Carbon	NE	**3.0**	**7.1**	<0.30	**4.0**	**4.1**	**3.6**	**3.2**	**3.4**	**3.0**	**4**	**9.0**	<0.3	**4.0**	**7.8**	**5.1**	**4.6**	**4.4**	**4.3**
Metals (6010C) µg/L																			
Iron	300*	**3,700**	**7,700**	**38,000**	**6,790**	**25,300**	**6,740**	**5,330**	**19,500**	**4,240**	**4,100**	**14,600**	**12,600**	**6,790**	**93,900**	**5,280**	**2,490**	**3,330**	**2,570**
Dissoolved Iron	300*	NA	NA	NA	NA	NA	**1,820**	**1,340**	**117 I**	**77.4 I**	NA	NA	NA	NA	NA	**1,140**	**879**	**221 I**	**216 I**
Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**48.6**	**38.3**	NA	NA	NA	NA	NA	NA	NA	**24.8**	**24.0**
Dissolved Manganese	50*	NA	NA	NA	NA	NA	NA	NA	**35.7**	**37.0**	NA	NA	NA	NA	NA	NA	NA	**23.7**	**23.5**

NOTES:
FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
µg/L = Micrograms per liter
NL = Not located
Bold results indicate a reported concentration above the laboratory detection limit.
Shaded cells indicate a reported concentration above the FDEP GCTL.
NE = Not established
D1 = Analyte value was determined from a 1:5 dilution
V = Analyte detected in method blank above the laboratory minimum detection limit
D3 = Analyte value was determined from a 1:200 dilution
I = Result is above the laboratory method detection limit but below the practical quantitation limit
mg/L = Milligram per liter
* Secondary water quality value as specified in Chapter 62-550 F.A.C.
NA = Not available/not analyzed
D2 = Analyte value was determined from a 1:10 dilution
Data prior to August 2012 was provided by previous consultant.

TABLE 3

SUMMARY OF GROUNDWATER FIELD PARAMETERS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	pH (SU)	DO (mg/L)	Conductivity (µS/cm)	ORP (mV)	Temperature (ºC)	Turbidity (NTU)
SHALLOW WELLS							
OU1-MW-67	11/22/2010	6.8	1.8	580	59	22.8	11
	8/1/2012	6.6	0.3	485	-33	27.0	8
	6/11/2013	6.6	0.2	480	-28	24.9	6
OU1-MW-89	11/22/2010	5.7	1.3	302	65	23.0	14
	8/1/2012	6.1	0.2	341	-4	27.1	91
	6/11/2013	5.9	0.1	224	-16	24.3	18
OU1-MW-93	11/22/2010	4.8	4.2	83	273	21.5	13
	8/1/2012	4.8	0.3	75	159	26.1	19
	6/11/2013	4.0	0.3	80	221	24.9	16
OU1-MW-95	11/22/2010	6.1	3.9	317	171	22.1	8
	8/1/2012	6.1	0.4	634	21	25.6	7
	6/11/2013	5.7	0.4	314	51	25.6	18
OU1-MW-101	11/22/2010	6.8	1.7	619	-66	25.4	9
	8/1/2012	6.8	0.5	654	-105	27.7	6
	6/11/2013	6.5	0.3	707	-75	24.8	2
INTERMEDIATE WELLS							
OU1-MW-12	11/22/2010	6.5	1.9	560	-62	24.3	4
	8/1/2012	6.5	0.2	620	-103	24.6	5
	6/11/2013	6.4	0.2	563	-89	24.4	9
OU1-MW-18	11/22/2010	5.6	1.3	599	140	20.9	4
	8/1/2012	5.8	0.2	709	70	22.8	1
	6/11/2013	5.3	0.3	658	72	22.0	1
OU1-MW-19	11/23/2010	5.8	3.8	347	193	19.3	17
	8/1/2012	6.0	0.5	429	-4	22.6	25
	6/11/2013	6.3	0.2	813	-46	22.8	3
OU1-MW-22	11/22/2010	7.2	3.7	821	-64	19.5	10
	8/2/2012	6.7	0.5	751	-83	22.1	72
	6/11/2013	6.7	0.3	753	-69	22.4	4
OU1-MW-98	11/23/2010	7.0	3.3	568	-45	23.9	4
	8/1/2012	7.0	1.1	529	-40	28.1	23
	6/11/2013	6.9	0.2	418	-120	27.4	8
OU1-MW-100	11/22/2010	7.3	4.5	610	102	22.9	8
	8/1/2012	7.1	0.7	576	-50	27.7	120
	6/11/2013	2.0	0.3	575	201	25.2	13
OU1-MW-102	11/22/2010	7.3	3.9	477	33	24.1	6
	8/1/2012	6.8	0.5	445	-38	25.1	10
	6/11/2013	6.7	0.3	450	-73	23.8	10

NOTES:
SU = Standard Unit
DO = Dissolved oxygen
mg/L = Milligrams per liter
µS/cm = MicroSiemens per centimeter
ORP = Oxidation/reduction potential
mV = MillVolts
NTU = Nephelometric turbidity units
NL = Not located
Data prior to August 2012 was provided by previous consultant.

TABLE 4

SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
OU-1 PSCs 26&27
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample ID	**FDEP SWCTL**	**OU1-SW-20**												
Sample Date		6/20/01	11/16/01	11/8/02	11/20/03	11/10/04	11/18/05	11/21/06	11/15/07	12/3/08	2/11/10	11/22/10	8/1/12	6/11/2013
Volatile Organic Compounds (8260B) µg/L														
Benzene	71.28	<1.0	<1.0	<5.0	<1.0	<0.2	<0.2	<0.2	<0.23	<0.29	<0.050	<0.35	<0.20	<0.21
1,1-DCE	3.2	<1.0	<1.0	<5.0	<1.0	<0.3	<0.3	<0.2	<0.36	<0.34	<0.15	<0.50	<0.23	<0.20
1,2-Dichloroethane	37	<1.0	<1.0	<5.0	<1.0	<0.2	**0.2 I**	**0.2 I**	<0.19	<0.43	<0.082	<0.34	<0.20	<0.22
cis -1,2-DCE	NE	**0.2 J**	**0.9 J**	<5.0	**0.99 J**	**1.2**	**0.2 I**	<0.2	**1.1**	**0.81 I**	**2.7**	**3.1**	<0.26	<0.24
tran s-1,2-DCE	11,000	<1.0	<1.0	<5.0	<1.0	<0.2	<0.2	<0.2	<0.41	<0.49	<0.11	<0.47	<0.35	<0.23
TCE	80.7	<1.0	<1.0	<5.0	<1.0	<0.3	<0.3	<0.3	<0.26	<0.50	**0.64 I**	**0.49 I**	<0.26	<0.31
Vinyl Chloride	2.4	<1.0	<1.0	<5.0	<1.0	<0.4	<0.4	<0.4	<0.52	<0.61	**0.48 I**	<0.48	<0.22	<0.44

Sample ID	**FDEP SWCTL**	**OU1-SW-55**												
Sample Date		6/20/01	11/16/01	11/8/02	11/20/03	11/10/04	11/18/05	11/21/06	11/15/07	12/3/08	2/11/10	11/22/10	8/1/12	6/11/2013
Volatile Organic Compounds (8260B) µg/L														
Benzene	71.28	<1.0	<1.0	<5.0	<1.0	<0.2	<0.2	<0.2	<0.23	<0.29	<0.050	<0.35	<0.20	<0.21
1,1-DCE	3.2	<1.0	<1.0	<5.0	<1.0	<0.3	<0.3	<0.2	<0.36	<0.34	<0.15	<0.50	<0.23	<0.20
1,2-Dichloroethane	37	<1.0	<1.0	<5.0	<1.0	<0.2	<0.2	<0.1	<0.19	<0.43	<0.082	<0.34	<0.20	<0.22
cis -1,2-DCE	NE	**0.7 J**	**0.9 J**	**4.6 J**	**2.7**	**0.9 I**	**0.9 I**	<0.2	**0.75 I**	**0.90 I**	**0.55 I**	<0.41	**0.61 I**	**2.4**
tran s-1,2-DCE	11,000	<1.0	<1.0	<5.0	<1.0	<0.2	<0.2	<0.2	<0.41	<0.49	<0.11	<0.47	<0.35	<0.23
TCE	80.7	<1.0	<1.0	**1.5 J**	**1.3**	**0.7 I**	**0.7 I**	<0.3	<0.26	<0.50	**0.47 I**	<0.39	<0.26	**0.80 I**
Vinyl Chloride	2.4	<1.0	<1.0	<5.0	**0.42 J**	<0.4	<0.4	<0.4	<0.52	<0.61	<0.083	<0.48	<0.22	<0.44

NOTES:

FDEP SWCTL = Florida Department of Environmental Protection Surface Water Cleanup Target Level
µg/L = Micrograms per liter
I = Result is above the laboratory method detection limit but below the practical quantitation limit
NE = Not established
J = Estimated concentration
Bold results indicate a reported concentration above the laboratory detection limit.
Data prior to August 2012 was provided by previous consultant.

E-2

OU 3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		SHALLOW WELL										
Well ID	**FDEP GCTL**	**OU3A-GEW-01**										
Sample Date		6/26/02	11/24/03	11/15/04	11/16/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	**21**	**19 J**	**12**	**18**	<100	<180	<170	<30	<52	<58	<40
cis -1,2-DCE	70	**5,600**	**3,200**	**2,000**	**2,300 D1**	**7,620**	**3,800**	**1,800**	**3,200**	**1,400**	**2,490**	**1,480**
trans -1,2-DCE	100	40	56	48	20	<100	<200	<240	<22	<75	<88	<46
1,1,2-Trichloroethane	5	<5	**11 J**	**6.1**	**6**	<150	<180	<200	<14	<100	<55	<40
TCE	3	**23,000**	**20,000**	**13,000**	**28,000**	**42,000**	**32,000**	**13,000**	**23,000**	**11,000**	**18,600**	**14,800**
Vinyl Chloride	1	**1,200**	**160 J**	**40**	**6**	**1,740**	<260	<300	**520**	<82	**136 I**	**293**

WELL INTERVAL		SHALLOW WELL										
Well ID	**FDEP GCTL**	**OU3A-MW-1S**										
Sample Date		6/26/02	11/24/03	11/15/04	11/16/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<5	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	**110**	**32**	**5.7**	**1**	**7.3**	**0.89 I**	**0.85 I**	**0.63 I**	**2.9**	**0.35 I**	<0.24
trans -1,2-DCE	100	**2 J**	<1	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.30	<0.35	<0.23
1,1,2-Trichloroethane	5	<5	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	**400**	**49**	**7.8**	**2 V**	**3.8**	**0.92 I**	**1.5**	**0.57 I**	**1.6**	**0.30 I**	<0.31
Vinyl Chloride	1	**41**	**26**	**8.7**	<0.4	**18.8**	<0.52	<0.61	<0.083	<0.33	<0.22	<0.44

WELL INTERVAL		SHALLOW										
Well ID	**FDEP GCTL**	**OU3A-MW-3S**										
Sample Date		6/26/02	11/24/03	11/15/04	11/17/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<5	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	**0.7 J**	<1	<1.0	**0.2 I**	<0.2	<0.45	<0.32	<0.075	<0.22	<0.26	<0.24
trans -1,2-DCE	100	<5	<1	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.30	<0.35	<0.23
1,1,2-Trichloroethane	5	<5	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	**8**	<1	**4.5**	**3 V**	<0.3	<0.26	<0.50	<0.13	<0.24	<0.26	<0.31
Vinyl Chloride	1	<5	<2	<1.0	<0.4	<0.4	<0.52	<0.61	<0.083	<0.33	<0.22	<0.44

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		SHALLOW										
Well ID	**FDEP GCTL**	**OU3A-MW-5S**										
Sample Date		6/26/02	11/24/03	11/15/04	11/17/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<5	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	**0.6 J**	**0.8 J**	<1.0	**3**	**4.2**	**9.5**	**5.4**	**2**	**2.2**	**2.2**	**2.0**
trans -1,2-DCE	100	<5	<1	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.30	<0.35	<0.23
1,1,2-Trichloroethane	5	<5	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	<5	<1	<1.0	<0.3	**1.2**	<0.26	<0.50	<0.13	<0.24	<0.26	<0.31
Vinyl Chloride	1	<5	1 J	<1.0	<0.4	<0.4	<0.52	0.67 I	<0.083	<0.33	<0.22	<0.44

WELL INTERVAL		INTERMEDIATE										
Well ID	**FDEP GCTL**	**OU3A-MW-3I**										
Sample Date		6/26/02	11/24/03	11/15/04	11/17/05	11/20/06	11/16/07	12/4//2008	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<5	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.42	<0.23	<0.20
cis -1,2-DCE	70	<5	<1	<1.0	**0.2 I**	<0.2	<0.45	<0.32	<0.075	<0.44	<0.26	<0.24
trans -1,2-DCE	100	<5	<1	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.60	<0.35	<0.23
1,1,2-Trichloroethane	5	<5	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.80	<0.22	<0.20
TCE	3	<5	<1	**3.3**	**3 V**	**0.5 I**	<0.26	<0.50	<0.13	<0.48	<0.26	<0.31
Vinyl Chloride	1	<5	<2	<1.0	<0.4	<0.4	<0.52	<0.61	<0.083	<0.66	<0.22	<0.44

WELL INTERVAL		INTERMEDIATE										
Well ID	**FDEP GCTL**	**OU3A-MW-5I**										
Sample Date		6/26/02	11/24/03	11/15/04	11/17/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	**4 J**	**3**	**2.5**	**2**	**2.1**	**1.2**	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	**270**	**120**	**140**	**90**	**137**	**60**	**4.9**	**5**	**5.2**	**3.9**	**15.4**
trans -1,2-DCE	100	**10**	**8**	**4.8**	**4**	**5.4**	**3**	<0.49	<0.11	<0.30	<0.35	**0.85 I**
1,1,2-Trichloroethane	5	<5	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	**19**	<1	<1.0	**0.7 IV**	**0.8 I**	<0.26	<0.50	<0.13	<0.24	**24.8**	<0.31
Vinyl Chloride	1	**78**	**56**	**26**	**22**	**62.1**	**36**	**1.4**	**0.75 I**	**2.4**	**0.70 I**	**4.6**

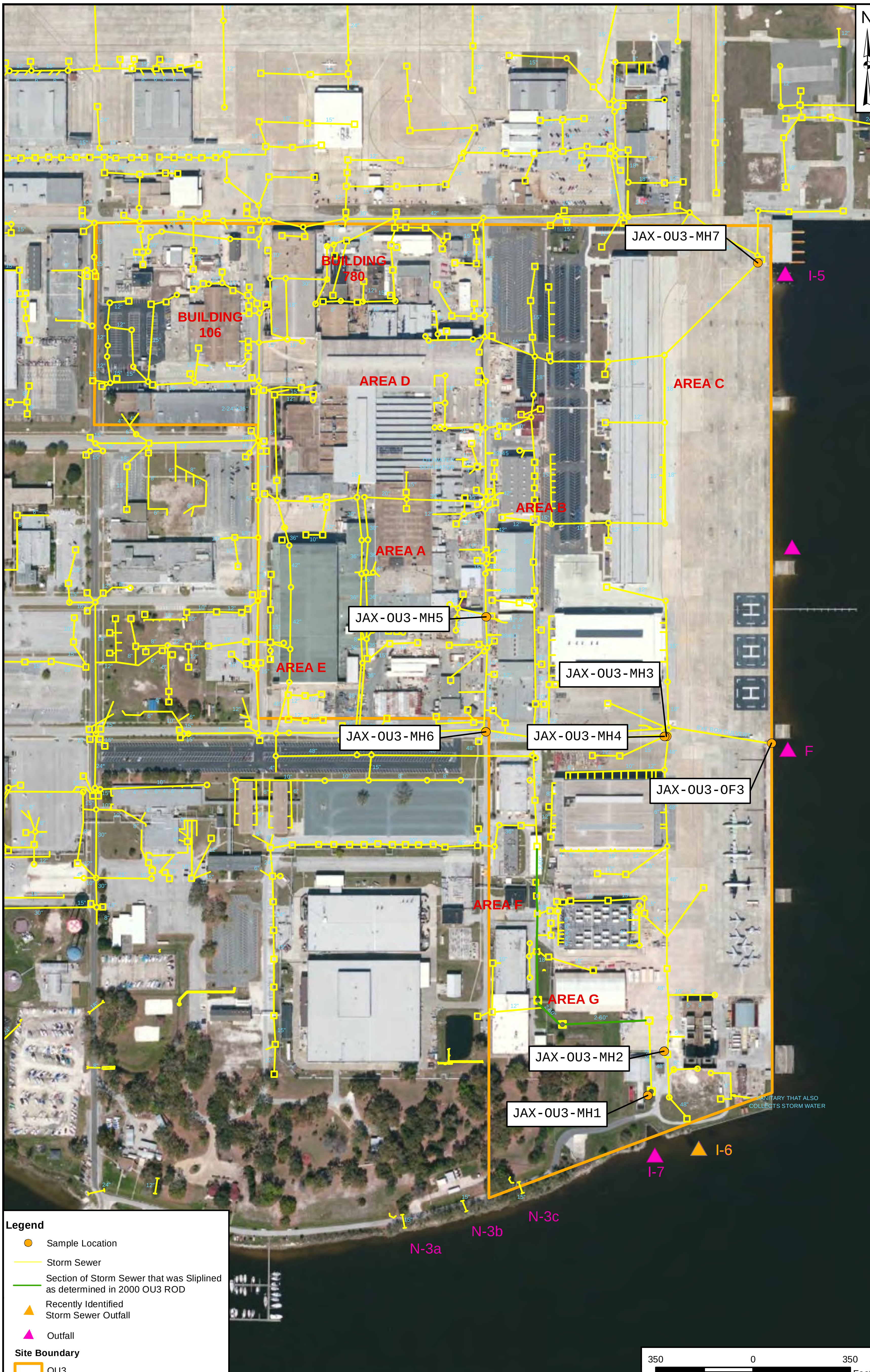
TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL INTERVAL		**INTERMEDIATE**										
Well ID	**FDEP GCTL**	**OU3A-MW-6S**										
Sample Date		11/12/02	11/25/03	11/15/04	11/16/05	11/20/06	11/16/07	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<1	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	<1	<1	<1.0	<0.2	<0.2	<0.45	<0.32	<0.075	<0.22	<0.26	<0.24
trans -1,2-DCE	100	<1	<1	<1.0	<0.2	<0.2	<0.41	<0.49	<0.11	<0.30	<0.35	<0.23
1,1,2-Trichloroethane	5	<1	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	<1	<1	<1.0	<0.3	<0.3	<0.26	<0.50	<0.13	<0.24	<0.26	<0.31
Vinyl Chloride	1	<2	<2	<1.0	<0.4	<0.4	<0.52	<0.61	<0.083	<0.33	<0.22	<0.44
WELL INTERVAL		**INTERMEDIATE**										
Well ID	**FDEP GCTL**	**OU3A-MW-7**										
Sample Date		11/13/02	11/25/03	11/15/04	11/17/05	11/20/06	11/16/08	12/4/08	2/11/10	11/23/10	7/31/12	6/12/13
Volatile Organic Compounds (8260B) µg/L												
1,1-DCE	7	<1	<1	<1.0	<0.3	<0.2	<0.36	<0.34	<0.15	<0.21	<0.23	<0.20
cis -1,2-DCE	70	<1	<1	**3.9**	**0.5 I**	**27.4**	<0.45	**1.1**	**1.4**	**2.4**	<0.26	<0.24
trans -1,2-DCE	100	<1	<1	<1.0	<0.2	**0.5 I**	<0.41	<0.49	<0.11	<0.30	<0.35	<0.23
1,1,2-Trichloroethane	5	<1	<1	<1.0	<0.3	<0.3	<0.35	<0.40	<0.068	<0.40	<0.22	<0.20
TCE	3	<1	<1	**51**	**6 V**	**1.1**	<0.26	<0.50	<0.13	<0.24	<0.26	<0.31
Vinyl Chloride	1	<2	<2	<1.0	<0.4	**37.2**	<0.52	<0.61	<0.083	<0.33	<0.22	<0.44

NOTES:

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
µg/L = Micrograms per liter
Bold results indicate a reported concentration above the laboratory detection limit.
Shaded cells indicate a reported concentration above the FDEP GCTL.
J = Estimated value
I = Result is above the laboratory method detection limit but below the practical quantitation limit
V = Analyte detected in method blank above the laboratory minimum detection limit
Data prior to July 2012 was provided by previous consultant.

14JAX0011



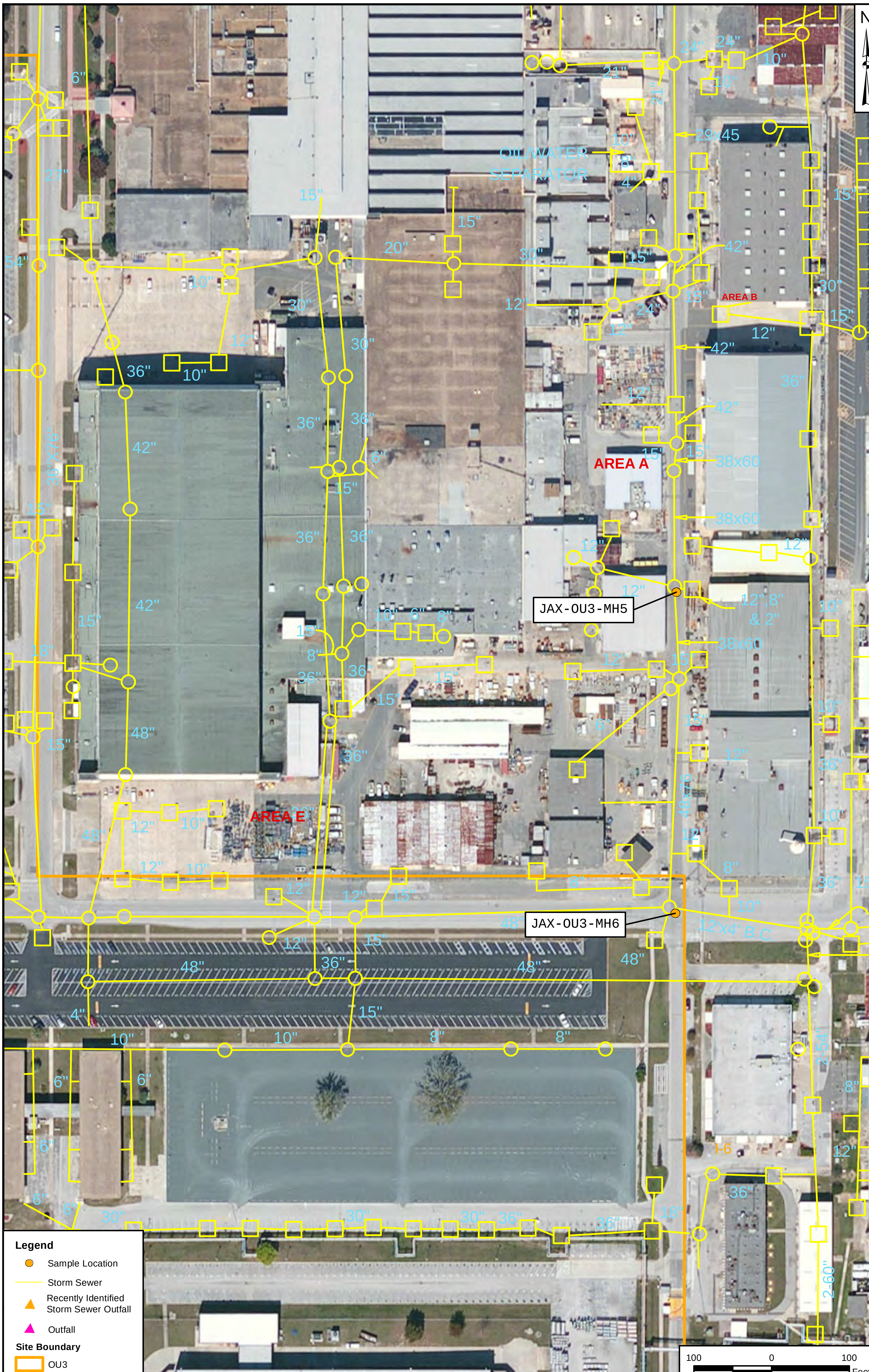
DRAWN BY T. WHEATON	DATE 05/09/11	STORM SEWER AND OUTFALL LOCATIONS	CONTRACT NUMBER CTO 154
CHECKED BY D. HARDISON	DATE 04/30/14	OU3 RI ADDENDUM	APPROVED BY	DATE
REVISED BY J.MADDEN	DATE 04/30/14	NAS JACKSONVILLE	APPROVED BY	DATE
SCALE AS NOTED		JACKSONVILLE, FLORIDA	FIGURE NO. 2-2 REV 0

NAVFAC

CTO 0154

Rev. 1
May 2014

M:\GIS\Projects\NAS JAX\DPT tag maps\Updated Tags March 14-Smaller Labels\DPT Tags with Criteria\Section 2 Apr 30 Rev 1\Figure_2-3_Sewer_Outfalls_AreaAE.mxd



DRAWN BY	DATE
T. WHEATON	05/09/11
CHECKED BY	DATE
D. HARDISON	04/30/14
REVISED BY	DATE
J.MADDEN	04/30/14
SCALE	
AS NOTED	

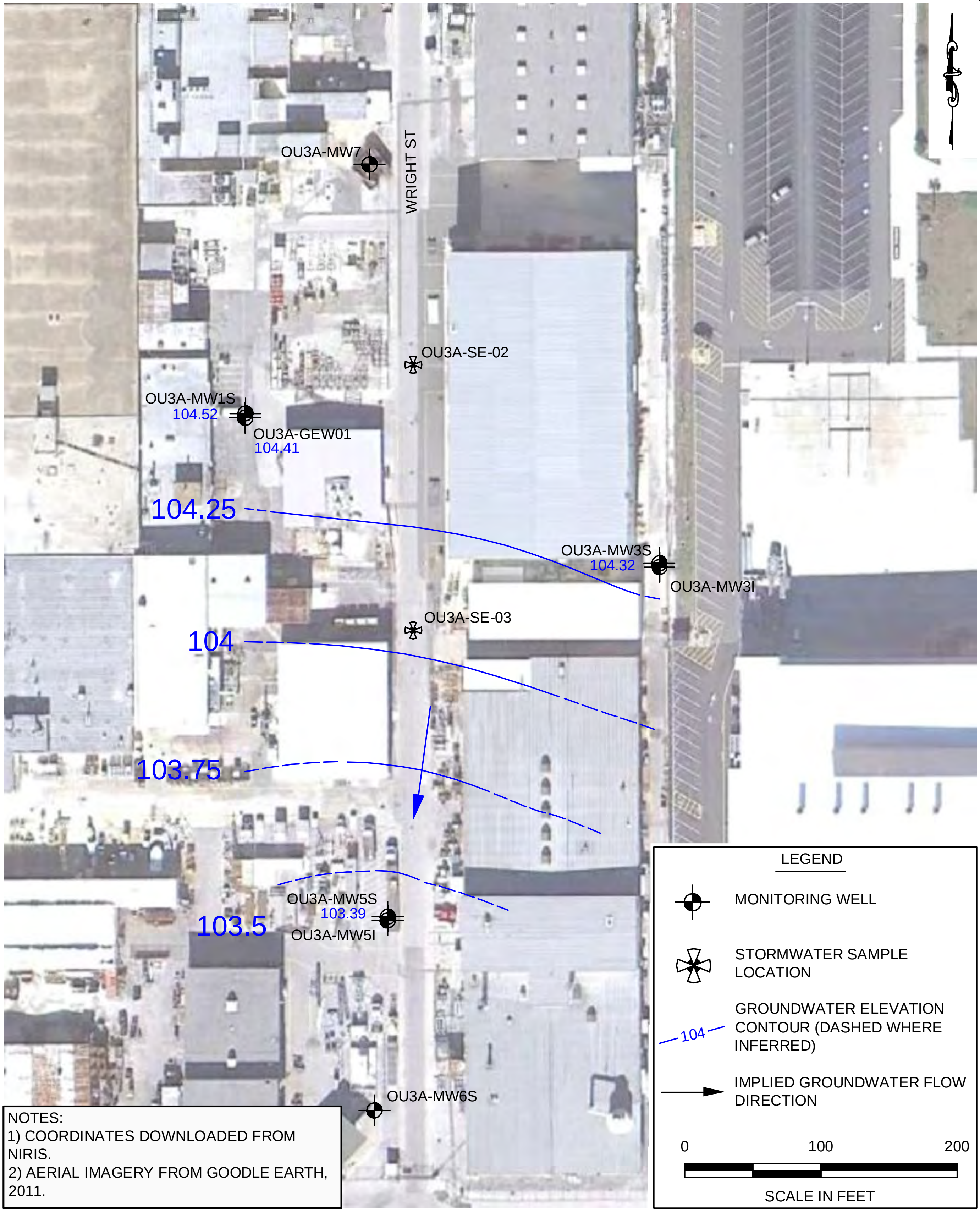
NAVFAC

STORM SEWER LOCATIONS
CENTRAL OU 3
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
CTO 154	
APPROVED BY	DATE
___	___
APPROVED BY	DATE
___	___
FIGURE NO.	REV
2-3	0

DRAWN BY	DATE		CONTRACT NUMBER
T. WHEATON	05/09/11	STORM SEWER AND OUTFALL LOCATIONS	CTO 154
CHECKED BY	DATE	SOUTHERN OU 3	APPROVED BY / DATE
D. HARDISON	04/30/14	NAS JACKSONVILLE	APPROVED BY / DATE
REVISED BY	DATE	JACKSONVILLE, FLORIDA	FIGURE NO. 2-4
J.MADDEN	04/30/14		REV 0
SCALE AS NOTED			

NAVFAC



NOTES:
1) COORDINATES DOWNLOADED FROM NIRIS.
2) AERIAL IMAGERY FROM GOODLE EARTH, 2011.

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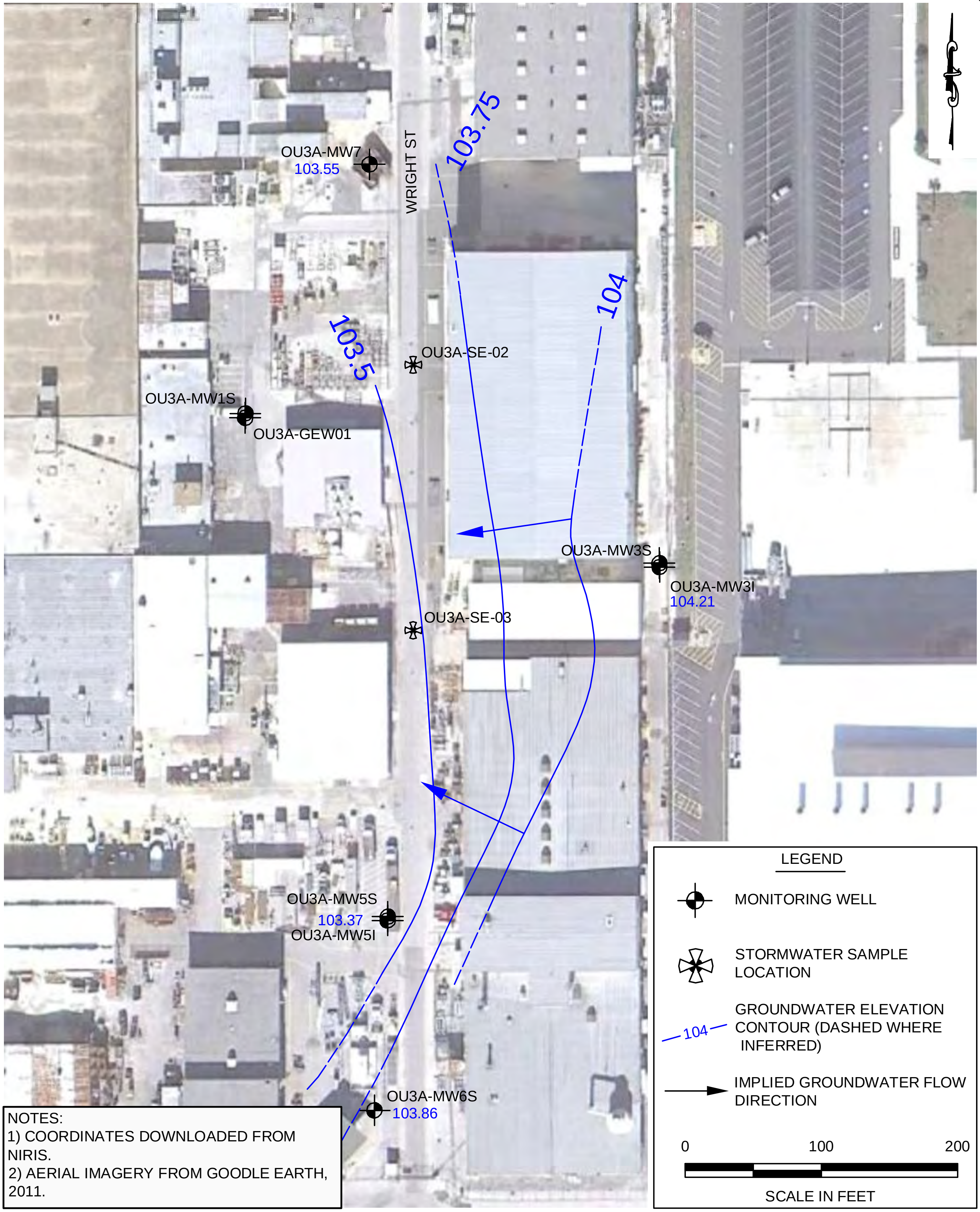
SHALLOW GROUNDWATER CONTOUR MAP
JUNE 2013
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 3



NOTES:
1) COORDINATES DOWNLOADED FROM NIRIS.
2) AERIAL IMAGERY FROM GOODLE EARTH, 2011.

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INTERMEDIATE GROUNDWATER CONTOUR MAP JUNE 2013
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 4

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7/3/2013

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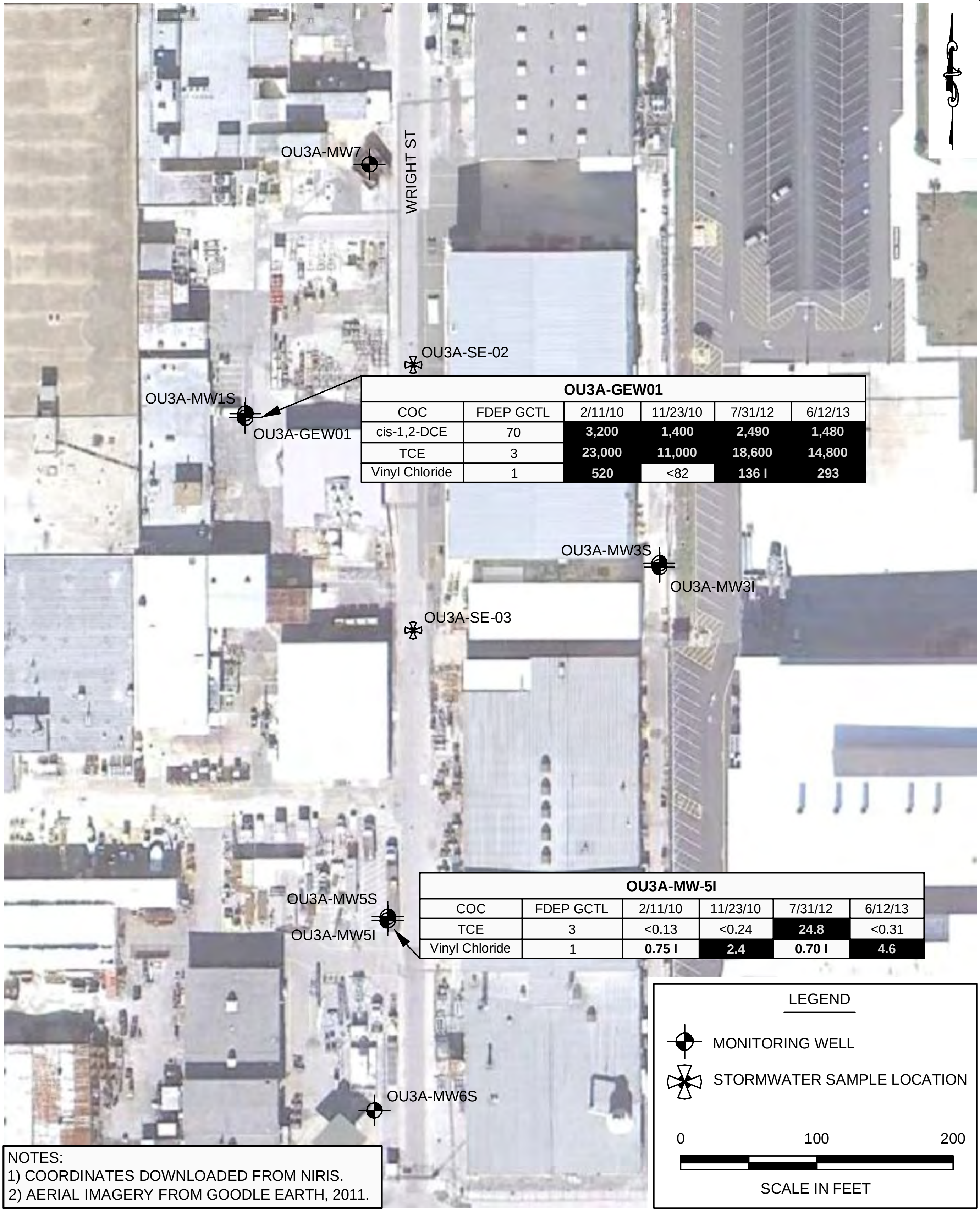

OU3A-GEW01

COC	FDEP GCTL	2/11/10	11/23/10	7/31/12	6/12/13
cis-1,2-DCE	70	**3,200**	**1,400**	**2,490**	**1,480**
TCE	3	**23,000**	**11,000**	**18,600**	**14,800**
Vinyl Chloride	1	**520**	<82	**136 I**	**293**

OU3A-MW-5I

COC	FDEP GCTL	2/11/10	11/23/10	7/31/12	6/12/13
TCE	3	<0.13	<0.24	**24.8**	<0.31
Vinyl Chloride	1	**0.75 I**	**2.4**	**0.70 I**	**4.6**

NOTES:
1) COORDINATES DOWNLOADED FROM NIRIS.
2) AERIAL IMAGERY FROM GOODLE EARTH, 2011.

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CONTAMINANT CONCENTRATION MAP
OU-3 AREA A
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE:
5

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			29.5-30.5													
Well ID	FDEP	NADC	JAX-OU3-B1													
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/11/2004	7/28/2004	1/7/2005	8/13/2005	2/3/2006	8/11/2006	1/6/2007	1/27/2009	1/31/2011	6/12/2013	Dup
Select Volatile Organic Compounds (8260B) µg/L																
TCE	3	300	**75**	**86**	**71**	**85**	**52**	**92**	**74**	**50.7**	**49.9**	**38.3**	**11.3**	**32.6**	**28.1**	**25.8**
MEE (RSK 147/175) µg/L																
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**169**	**70.2**	NA
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32	NA
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43	NA
Anions (EPA 300.0) mg/L																
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**15.5**	**12.2**	NA
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.050	NA
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.071	NA
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.9**	**7.2**	NA
Alkalinity (SM19 2320B) mg/L																
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**121**	**68.0**	NA
Sulfide (SM20 4500s F) mg/L																
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.23	NA
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L																
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.3**	**1.5**	NA
Chemetrics mg/L																
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.25**	**0.4**	NA
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**50**	**35**	NA
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.1**	**0.6**	NA
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1	NA
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3	NA

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			**34.3-39.3**												
Well ID	**FDEP**	**NADC**	**JAX-OU3-B2**												
Sample Date	**GCTL**		7/2/2002	12/4/2002	9/26/2003	1/11/2004	7/28/2004	1/7/2005	8/13/2005	2/3/2006	8/11/2006	1/6/2007	1/27/2009	1/31/2011	6/12/2013
Select Volatile Organic Compounds (8260B) µg/L															
TCE	3	300	NA	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.32	<0.26	<0.31
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.53**	**7.4**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**15.8**	**17.0**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.05 I**	<0.050
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.2**	**3.4**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**196**	**174**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.22
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.78 I**	**0.98 I**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.06**	**1**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**35**	**35**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1**	**1**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			Unknown									Unknown	
Well ID	FDEP	NADC	JAX-OU3-B3									JAX-OU3-B3R	
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/11/2004	7/28/2004	1/7/2005	8/13/2005	2/3/2006	8/11/2006	1/31/2011	6/12/2013
Select Volatile Organic Compounds (8260B) µg/L													
TCE	3	300	NA	<5	<1	<1	<1	<1	<1	<1	<1	<0.26	<0.31
MEE (RSK 147/175) µg/L													
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.78**	**4.7**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L													
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	**16.1**	**18.0**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.05 I**	**0.69 I**
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.2 I**	**2.2**
Alkalinity (SM19 2320B) mg/L													
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**36.3**	**180**
Sulfide (SM20 4500s F) mg/L													
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.23
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L													
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.1**	**1.2**
Chemetrics mg/L													
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.67**	**0.2**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**41**	**14**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.6**	**0.6**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	**0.3**

PROJECT NUMBER 2013.0019.NAVY
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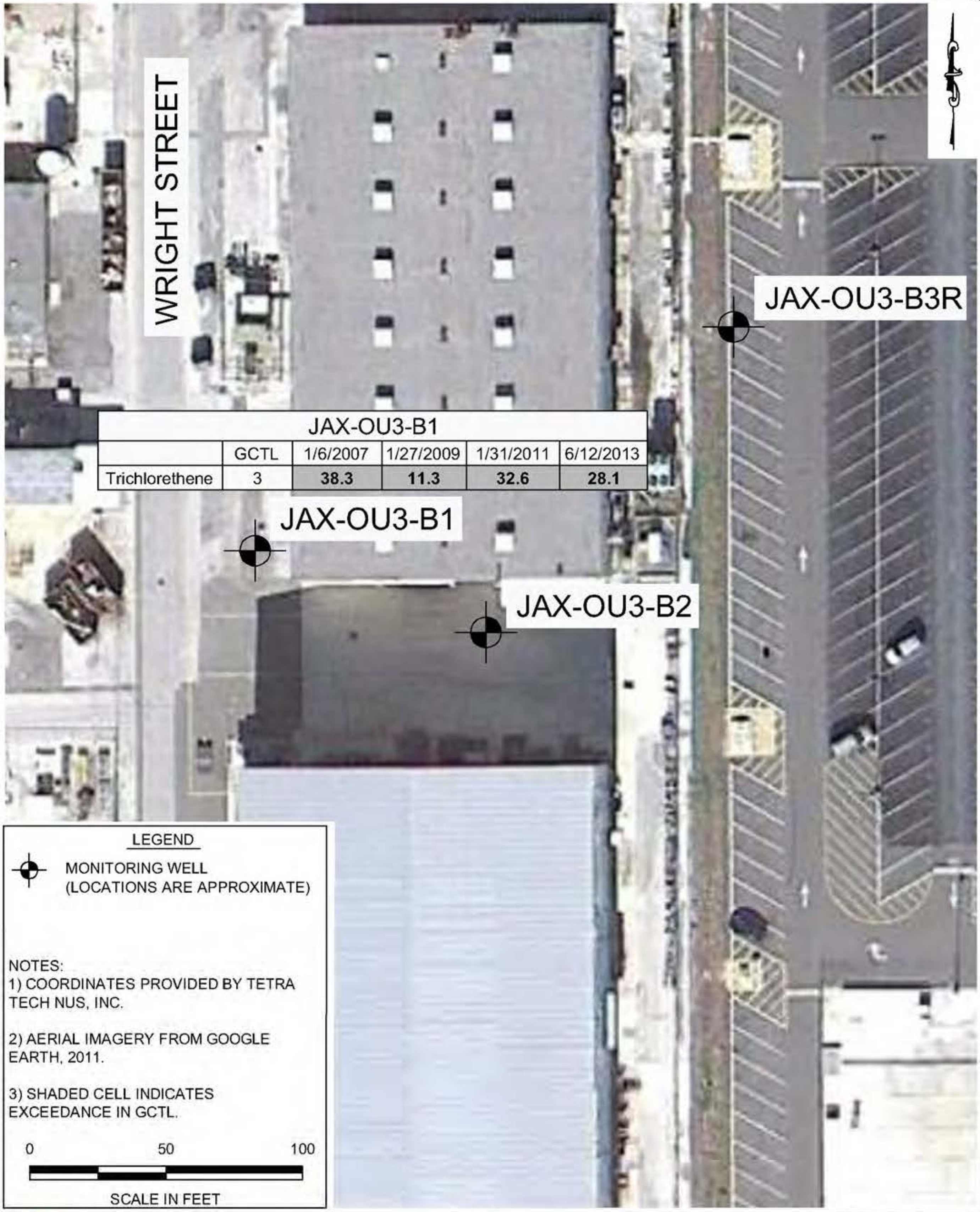
CHECKED BY JT
PROJECT MANAGER NS
DATE 7/24/2013
FILE OU3-AREA B&G SAP.dwg



JAX-OU3-B1					
	GCTL	1/6/2007	1/27/2009	1/31/2011	6/12/2013
Trichlorethene	3	**38.3**	**11.3**	**32.6**	**28.1**

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AREA B CONTAMINANT CONCENTRATION MAP
OU-3 AREA B
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE:
5

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FIGURE 7
HISTORICAL TCE CONCENTRATIONS IN JAX-OU3-B1

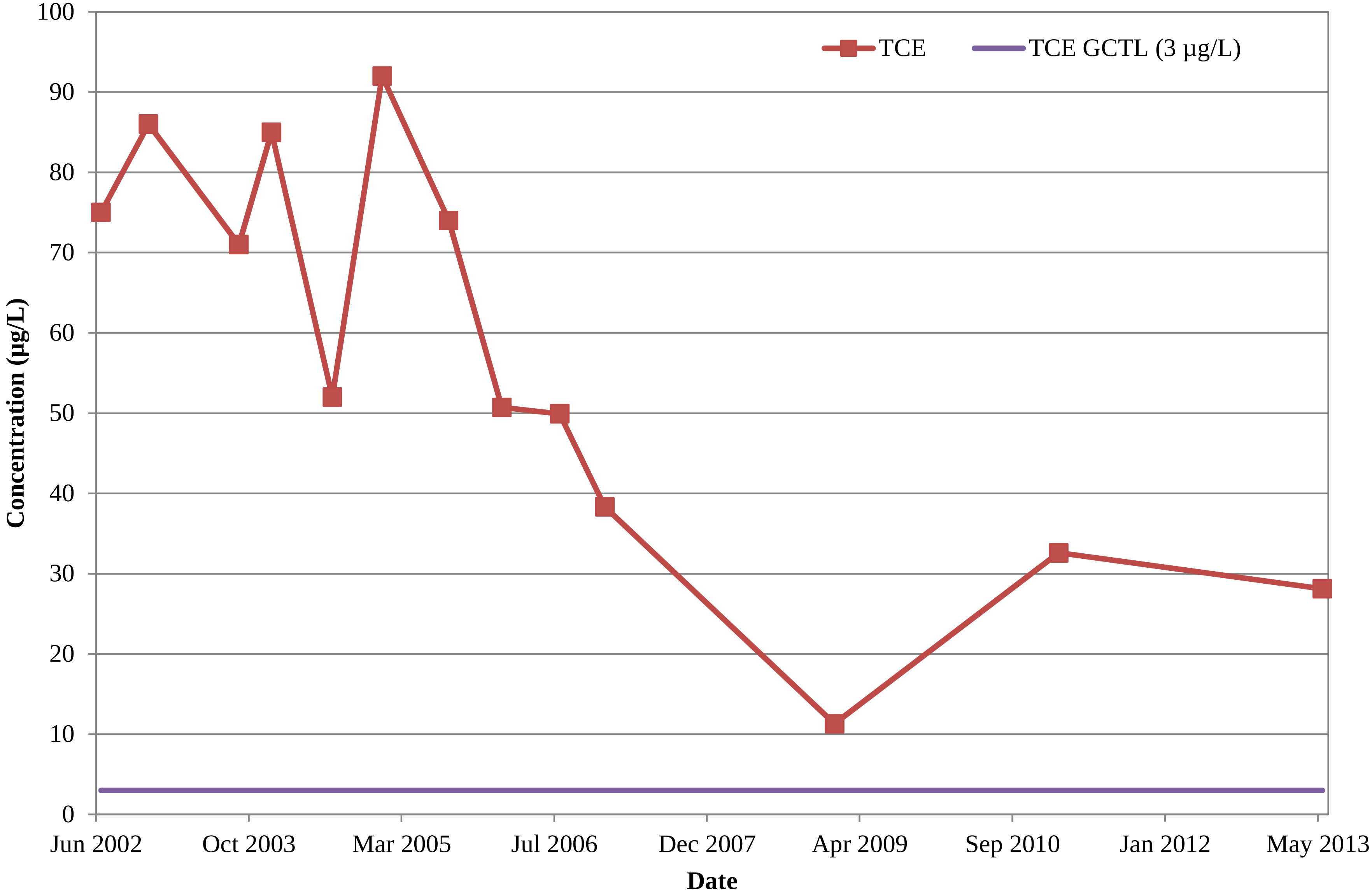


TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			18.6-19.6												
Well ID	FDEP	NADC	JAX-OU3-G1												
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	<100	**7**	**9**	<10	<10	<10	<20	**6.2**	**4.7**	**7**	**5.2**	**1.8**	**1.6**
1,1-DCE	7	70	**340**	**240**	**280**	**230**	**220**	**320**	**440**	**278**	**214**	**310**	**211**	**85.3**	**95.9**
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**257**
cis-1,2-DCE	70	700	**350**	**490**	**680**	**540**	**520**	**590**	**500**	**528**	**405**	**594**	**621**	**596**	**256**
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**10.4**	<2	<2.0
1,1,1-TCA	200	2,000	**19**	**5.3**	<10	<10	<10	<20	**0.71**	**0.37**	**0.4**	NA	<0.33	<0.25	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.31 I
TCE	3	300	**2,100**	**1,200**	**1,200**	**900**	**950**	**1,300**	**1,800**	**740**	**660**	**1,170**	**517**	**1.4**	**464**
PCE	3	300	<100	**0.9**	<2	<30	<20	<20	<40	<1	<1	<1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	<100	**0.5**	<1	<10	<20	<10	<20	**0.45**	<1	<1	<0.3	**1.1**	**1.8**
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**61.2**	**3.9**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.2**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.092 I**
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**24.2**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**24.8**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.22
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Insuficient recharge for sample	**0.8**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		**50**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		**4**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		<0.3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			37.8-38.8													
Well ID	FDEP	NADC	JAX-OU3-G2													
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013	Dup
Volatile Organic Compounds (8260B) µg/L																
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26	<0.26
1,1-DCA	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21	<0.21
1,1-DCE	7	70	**3**	**3**	**1**	**1**	< 1	< 1	< 1	< 1	< 1	< 1	<0.54	<0.23	<0.20	<0.20
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.46	<0.46
cis-1,2-DCE	70	700	< 5	< 5	**1.8**	**3**	**20**	**2**	**2**	**4.7**	**3.6**	**2.5**	**9.7**	**9.3**	**0.32 I**	<0.24
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0	<2.0
1,1,1-TCA	200	2,000	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.20	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20	<0.20
TCE	3	300	**34**	**28**	**30**	**38**	**14**	**200**	**220**	**221**	**54**	**18**	**330**	**9.2**	**7.1**	**6.0**
PCE	3	300	< 5	< 5	< 2	< 3	< 5	< 2	< 2	< 2	< 1	< 1	<0.22	<0.25	<0.32	<0.32
Vinyl Chloride	1	100	< 5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.3	<0.22	<0.44	<0.44
MEE (RSK 147/175) µg/L																
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**36.3**	**4.7**	NA
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32	NA
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43	NA
Anions (EPA 300.0) mg/L																
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**7.8**	**7.4**	NA
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.050	NA
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050	NA
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**58.6**	**38.7**	NA
Alkalinity (SM19 2320B) mg/L																
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**32.1**	**21.6**	NA
Sulfide (SM20 4500s F) mg/L																
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.22 I**	NA
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L																
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.9**	**1.3**	NA
Chemetrics mg/L																
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	**0.8**	NA
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**41**	**100**	NA
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2**	**6**	NA
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1	NA
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3	NA

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			**18.7-19.7**												
Well ID	**FDEP**	**NADC**	**JAX-OU3-G3**												
Sample Date	**GCTL**		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	< 25	< 5	<1	<1	<1	<1	<1	<1	<1	<1	<0.24	<0.25	<0.21
1,1-DCE	7	70	< 25	**2**	**2**	**1**	<1	**2**	<1	<1	<1	**0.56 I**	**0.81**	<0.23	<0.20
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.3**
cis-1,2-DCE	70	700	**21**	**56**	**140**	**68**	**78**	**36**	**42**	**27.6**	**19.5**	**23.3**	**6.1**	**3.4**	**1.3**
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0
1,1,1-TCA	200	2,000	< 25	< 5	<1	<1	<1	<1	<1	<1	<1	<1	<0.33	<0.25	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20
TCE	3	300	**440**	**320**	**100**	**98**	**55**	**92**	**44**	**60.7**	**30.6**	**45.6**	**14.4**	**14**	**2.5**
PCE	3	300	< 25	< 5	<2	<3	<2	<2	<1	<1	<1	<1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	< 25	**0.2**	**4.7**	**2.4**	**1.9**	**1**	**1**	**1.4**	<1	**0.6 I**	**0.89**	<0.22	<0.44
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**11.8**	**5.7**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.5**	**2.6**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.050
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.3**	**3.7**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**104**	**136**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.22
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.3**	**5**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.5**	**0.8**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**107**	**35**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.6**	**3**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			30.5-31.5												
Well ID	FDEP	NADC	JAX-OU3-G4												
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21
1,1-DCE	7	70	**2**	**2**	**2**	**2**	< 1	< 1	**2**	**2.1**	**1.3**	**1**	**1.2**	**0.82 I**	**0.70 I**
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.1**
cis-1,2-DCE	70	700	**5**	**11**	**12**	**13**	**4.1**	**18**	**18**	**14.5**	**7.3**	**7**	**9.5**	**4.4**	**5.1**
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0
1,1,1-TCA	200	2,000	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20
TCE	3	300	**7**	**28**	**35**	**30**	**8.1**	**64**	**56**	**53.2**	**20.5**	**18.3**	**30.5**	**8.9**	**10.9**
PCE	3	300	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.3	<0.22	<0.44
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**29.3**	**2.7**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.4**	**6.3**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	**0.077 I**
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**25.2**	**30.7**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**12.8**	**15.2**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.37 I**
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.1**	**1.4**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.74**	**0.4**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**64**	**100**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3**	**1.5**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			25.8-26.5													
Well ID	FDEP	NADC	JAX-OU3-G5													
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013	6/27/2013
Volatile Organic Compounds (8260B) µg/L																
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21	NA
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49	NA
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26	NA
1,1-DCA	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21	NA
1,1-DCE	7	70	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.54	<0.23	<0.20	NA
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.46	NA
cis-1,2-DCE	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.2	<0.26	<0.24	NA
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0	NA
1,1,1-TCA	200	2,000	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.20	NA
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20	NA
TCE	3	300	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**7.8**	<0.26	<0.31	NA
PCE	3	300	<5	<5	<3	<2	<2	<2	<2	< 1	< 1	< 1	<0.22	<0.25	<0.32	NA
Vinyl Chloride	1	100	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.3	<0.22	<0.44	NA
MEE (RSK 147/175) µg/L																
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.94**	**0.17 I**	NA
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32	NA
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43	NA
Anions (EPA 300.0) mg/L																
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**8.3**	**6.7**	NA
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.23**	NA	**0.45**
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**12.4**	**14.4**	NA
Alkalinity (SM19 2320B) mg/L																
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2.5	**7.2**	NA
Sulfide (SM20 4500s F) mg/L																
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.29 I**	NA
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L																
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**	**1.2**	NA
Chemetrics mg/L																
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.12**	**0.6**	NA
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**97**	**50**	NA
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	**0.1**	NA
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1	NA
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.3	NA

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			**18.3-19.3**												
Well ID	**FDEP**	**NADC**	**JAX-OU3-G6**												
Sample Date	**GCTL**		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21
1,1-DCE	7	70	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**0.55**	**0.75 I**	**0.97 I**
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.46
cis-1,2-DCE	70	700	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.2	<0.26	<0.24
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0
1,1,1-TCA	200	2,000	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20
TCE	3	300	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.32	**0.31 I**	**1.0**
PCE	3	300	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	<5	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.3	<0.22	<0.44
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**28.8**	**0.96**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**11.2**	**13.7**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.5**	**2.8**
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**54.3**	**75.4**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**7.2**	**10.4**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.22 I**
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**	**1.8**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.15**	**0.6**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**78**	**70**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**	**0.1**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			**16.4-17.4**												
Well ID	**FDEP**	**NADC**	**JAX-OU3-G7**												
Sample Date	**GCTL**		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21
1,1-DCE	7	70	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.54	<0.23	<0.20
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.46
cis-1,2-DCE	70	700	NA	**0.5**	**1.1**	**1.1**	<1	**2**	<1	**0.46**	<1	**0.48 I**	<0.2	<0.26	<0.24
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2.0
1,1,1-TCA	200	2,000	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.20
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20
TCE	3	300	NA	< 5	< 1	**3**	**2.3**	< 1	< 1	< 1	**2.2**	**1.7**	<0.32	<0.26	**0.66 I**
PCE	3	300	NA	< 5	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.3	<0.22	<0.44
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**59.5**	**7.4**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.43	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.7**	**5.6**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.050
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**16.7**	**20.6**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**20.2**	**26.4**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.52 I**
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**	**1.1**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.6**	**0.1**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**93**	**70**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.3**	**8**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	**0.106**
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	<0.3

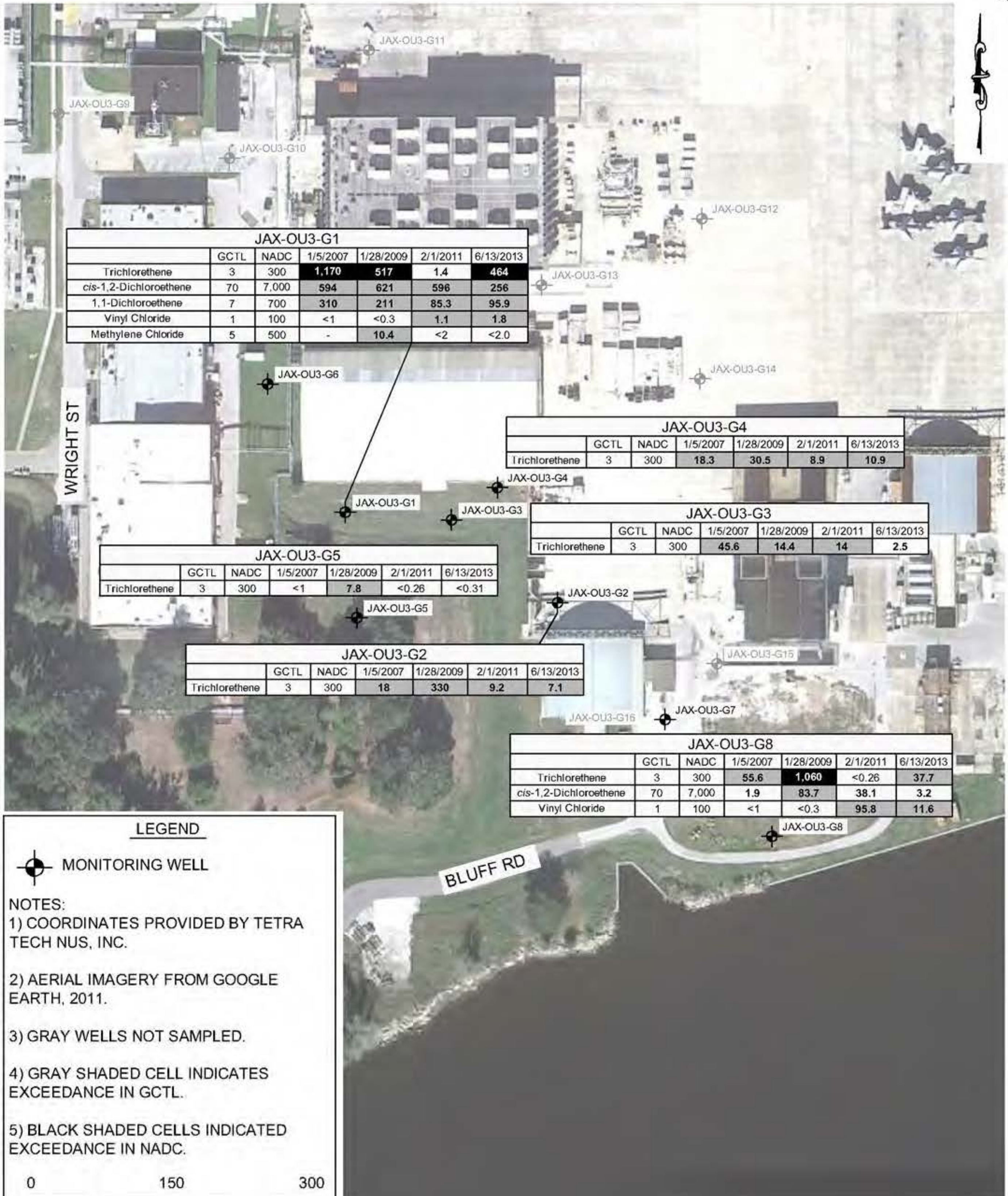
TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-3 AREAS B&G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

SCREEN INTERVAL			37.1-38.1												
Well ID	FDEP	NADC	JAX-OU3-G8												
Sample Date	GCTL		7/2/2002	12/4/2002	9/26/2003	1/9/2004	7/29/2004	1/6/2005	8/12/2005	2/2/2006	8/11/2006	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Volatile Organic Compounds (8260B) µg/L															
Benzene	1	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.21
Carbon Disulfide	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.49
Chloroform	70	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.26
1,1-DCA	70	700	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.24	<0.25	<0.21
1,1-DCE	7	70	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**1.3**	<0.23	<0.2
total 1,2-DCE	63	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.2**
cis-1,2-DCE	70	700	NA	**11**	**2.1**	**2.2**	**2.1**	<1	**2**	**1.5**	**1.6**	**1.9**	**83.7**	**38.1**	**3.2**
Methylene Chloride	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<2	<2
1,1,1-TCA	200	2,000	NA	< 5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<0.33	<0.25	<0.2
1,1,2-TCA	5	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.20
TCE	3	300	NA	**26**	**5**	**4.3**	**2.3**	**7**	**9**	**16.5**	**32.7**	**55.6**	**1,060**	<0.26	**37.7**
PCE	3	300	NA	< 5	< 2	<3	<2	<2	<2	<1	<1	<1	<0.22	<0.25	<0.32
Vinyl Chloride	1	100	NA	< 5	< 1	<1	<1	<1	<1	<1	<1	<1	<0.3	**95.8**	**11.6**
MEE (RSK 147/175) µg/L															
Methane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**108**	**21.5**
Ethane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.32	<0.32
Ethene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.5**	<0.43
Anions (EPA 300.0) mg/L															
Chloride	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.9**
Nitrate as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Nitrite as Nitrogen	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.050
Sulfate	250	25,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**58.5**
Alkalinity (SM19 2320B) mg/L															
Alkalinity, Total	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**112**
Sulfide (SM20 4500s F) mg/L															
Sulfide	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.29 I**
Total Organic Carbon (SM19 5310B/SW 9060A) mg/L															
Total Organic Carbon	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.9**
Chemetrics mg/L															
DO	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Insuficient recharge for sample	**0.05**
CO_2	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		**70**
Ferrous Iron	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		**>10**
H_2S	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		<0.1
Manganese	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		**0.1**

NOTES:

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
µg/L = Micrograms per liter; mg/L = Miligrams per liter
Bold results indicate a reported concentration above the laboratory detection limit.
Shaded cells (gray) indicate a reported concentration above the FDEP GCTL.
Shaded cells (black) indicate a reported concentration above the FDEP GCTL and NADC.
NA = Not Available/Not Analyzed

NE = Not Established
ND = Not Detected
J, I = Analyte was detected at an estimated concentration
Data prior to June 2013 was provided by previous consultant.



JAX-OU3-G1

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	1,170	517	1.4	464
cis-1,2-Dichloroethene	70	7,000	594	621	596	256
1,1-Dichloroethene	7	700	310	211	85.3	95.9
Vinyl Chloride	1	100	<1	<0.3	1.1	1.8
Methylene Chloride	5	500	-	10.4	<2	<2.0

JAX-OU3-G4

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	18.3	30.5	8.9	10.9

JAX-OU3-G3

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	45.6	14.4	14	2.5

JAX-OU3-G5

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	<1	7.8	<0.26	<0.31

JAX-OU3-G2

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	18	330	9.2	7.1

JAX-OU3-G8

	GCTL	NADC	1/5/2007	1/28/2009	2/1/2011	6/13/2013
Trichlorethene	3	300	55.6	1,060	<0.26	37.7
cis-1,2-Dichloroethene	70	7,000	1.9	83.7	38.1	3.2
Vinyl Chloride	1	100	<1	<0.3	95.8	11.6

LEGEND

MONITORING WELL

NOTES:
1) COORDINATES PROVIDED BY TETRA TECH NUS, INC.

2) AERIAL IMAGERY FROM GOOGLE EARTH, 2011.

3) GRAY WELLS NOT SAMPLED.

4) GRAY SHADED CELL INDICATES EXCEEDANCE IN GCTL.

5) BLACK SHADED CELLS INDICATED EXCEEDANCE IN NADC.

0 150 300

SCALE IN FEET

PROJECT NUMBER 2013.0019.NAVY
DRAFTER KTS
CHECKED BY JT
PROJECT MANAGER NS
DATE 7/24/2013
FILE OU3-AREA B&G SAP.dwg

Solutions-IES
Industrial & Environmental Services
1101 NOWELL ROAD
RALEIGH, NORTH CAROLINA 27607
TEL.: (919) 873-1060 FAX.: (919) 873-1074

AREA G CONTAMINANT CONCENTRATION MAP
OU-3 AREA G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 6

LEGEND

MONITORING WELL

GROUNDWATER FLOW DIRECTION

NOTES:
1) COORDINATES PROVIDED BY TETRA TECH NUS, INC.
2) AERIAL IMAGERY FROM GOOGLE EARTH, 2011.
3) GRAY WELLS NOT SAMPLED.
4) DASHED IS INFERRED.

0 150 300

SCALE IN FEET

PROJECT NUMBER	2013.0019.NAVY
DRAFTER	KTS
CHECKED BY	JT
PROJECT MANAGER	NS
DATE	7/24/2013
FILE	OU3-AREA B&G SAP.dwg

Solutions-IES
Industrial & Environmental Services

1101 NOWELL ROAD
RALEIGH, NORTH CAROLINA 27607
TEL.: (919) 873-1060 FAX.: (919) 873-1074

GROUNDWATER ELEVATION CONTOUR MAP
OU-3 AREA G
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 4

J:\Project Files\NAVFAC SE - FL ETS\Current Drawings\OU3 AREA B&G\OU3-AREA B&G SAP.dwg

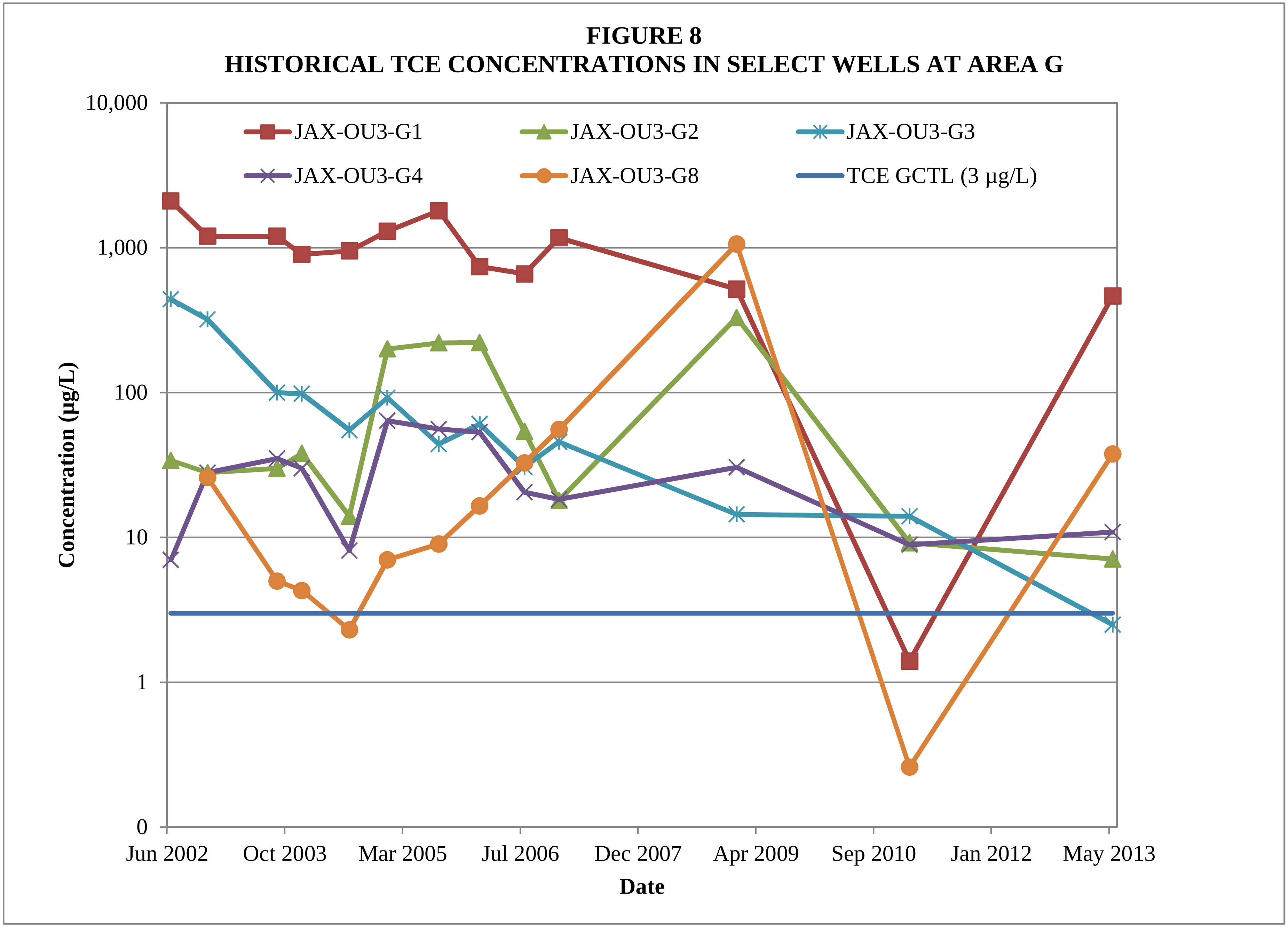


FIGURE 8
HISTORICAL TCE CONCENTRATIONS IN SELECT WELLS AT AREA G
JAX-OU3-G1
JAX-OU3-G2
JAX-OU3-G3
JAX-OU3-G4
JAX-OU3-G8
TCE GCTL (3 µg/L)
Concentration (µg/L)
10,000
1,000
100
10
1
0
Jun 2002
Oct 2003
Mar 2005
Jul 2006
Dec 2007
Apr 2009
Sep 2010
Jan 2012
May 2013
Date

FIGURE 6
SELECT HISTORICAL COC CONCENTRATIONS IN OU3A-GEW-01

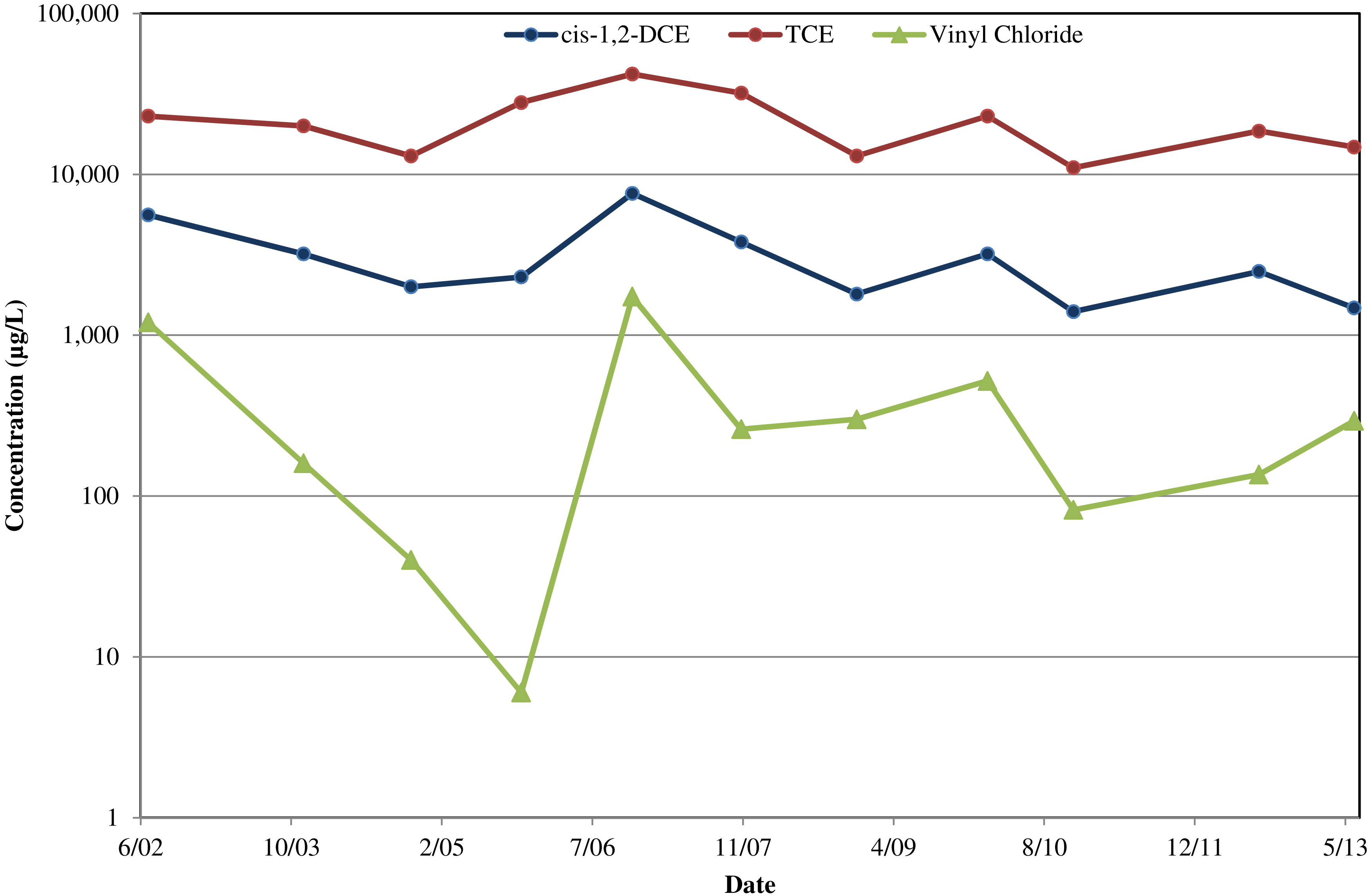


TABLE 1

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
B101S
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	FDEP	MW-101S-01				MW-780-1			
Sample Date	GCTL	6/19/2012	12/5/2012	6/13/2013	12/10/2013	6/19/2012	12/5/2012	6/13/2013	12/10/2013
Volatile Organic Compounds (8260B) µg/L									
Benzene	1	<0.20	<0.21	<0.21	<0.21	**0.24 I**	<0.21	<0.21	<0.21
sec -Butylbenzene	NE	<0.22	<0.21	<0.21	<0.21	**0.28 I**	<0.21	**0.32 I**	<0.21
tert -Butylbenzene	NE	<0.27	<0.29	<0.29	<0.29	**0.38 I**	<0.29	**0.39 I**	**0.30 I**
Chlorobenzene	100	<0.20	<0.20	<0.20	<0.2	<1.0	<0.20	<0.20	<0.20
Chloroethane	12	<0.50	<0.50	<0.50	<0.5	**4.1**	**5.9**	**4.1**	**7.5**
1,1-Dichloroethane	70	<0.25	<0.21	<0.21	<0.21	**2.3**	**5.7**	**3.7**	**4.3**
1,1-Dichloroethene	7	<0.23	<0.20	<0.20	<0.20	**1.0**	**5.7**	**1.5**	**5.4**
cis -1,2-Dichloroethene	70	<0.26	<0.24	<0.24	<0.24	**3.9**	**9.7**	**4.3**	**14.4**
o -Dichlorobenzene	600	<0.25	<0.22	<0.22	<0.22	**1.0**	**0.72 I**	**0.97 I**	**0.91 I**
trans -1,2-Dichloroethene	100	<0.35	<0.23	<0.23	<0.23	<1.0	**0.34 I**	**0.30 I**	**0.29 I**
1,1,1-Trichloroethane	200	<0.20	<0.20	<0.20	<0.20	**0.43 I**	**0.47 I**	**0.56 I**	<0.20
Trichloroethene	3	<0.26	<0.31	<0.31	<0.31	<0.26	<0.31	**0.37 I**	<0.31
Vinyl Chloride	1	<0.22	<0.44	<0.44	<0.44	**1.6**	**6.8**	**1.6**	**7.0**
Semi-Volatile Organic Compounds (8270D[1]) µg/L									
bis (2-Chloroethyl)ether	0.03	<0.51	<0.69	<0.69	NA	<0.52	<0.70	<0.69	NA
bis (2-Ethylhexyl)phthalate	6	<1.0	<1.1	<1.1	NA	**1.9 I**	<1.1	<1.1	NA
1,2-Dichlorobenzene	600	<0.95	<0.65	<0.65	NA	<0.96	**0.74 I**	<0.65	NA
1-Methylnaphthalene	28	<0.48	<0.68	<0.68	<0.32	**2.2 I**	<0.69	<0.68	<0.33
2-Methylnaphthalene	28	<0.54	<0.66	<0.66	<0.32	**3.0 I**	<0.67	<0.66	<0.33
Naphthalene	14	<0.76	<0.61	<0.61	<0.32	**1.6 I**	<0.62	<0.61	<0.33
Metals (6010C) µg/L									
Arsenic	10	**2.1 I**	<2.5	<2.5	<2.5	**3.1 I**	**6.7 I**	**3.9 I**	**4.4 I**

Well ID	FDEP	MW-780-2			
Sample Date	GCTL	6/19/2012	12/5/2012	6/13/2013	12/10/2013
Volatile Organic Compounds (8260B) µg/L					
Benzene	1	<0.20	<0.21	<0.21	<0.21
sec -Butylbenzene	NE	<0.22	<0.21	<0.21	<0.21
tert -Butylbenzene	NE	<0.27	<0.29	<0.29	<0.29
Chlorobenzene	100	<0.20	**0.94 I**	**0.27 I**	<0.20
Chloroethane	12	**1.0 I**	**0.68 I**	**0.77 I**	<0.50
1,1-Dichloroethane	70	**1.7**	**6.4**	**3.6**	**2.4**
1,1-Dichloroethene	7	<0.23	**0.78 I**	**0.40 I**	<0.20
cis -1,2-Dichloroethene	70	**2.5**	**4.2**	**2.6**	**2.8**
o -Dichlorobenzene	600	<0.25	<0.22	<0.22	<0.22
trans -1,2-Dichloroethene	100	<0.35	<0.23	<0.23	<0.23
1,1,1-Trichloroethane	200	<0.20	<0.20	<0.20	<0.20
Trichloroethene	3	**0.90 I**	**1.9**	**0.66 I**	**0.64 I**
Vinyl Chloride	1	**1.4**	**3.5**	**1.3**	**1.2**
Semi-Volatile Organic Compounds (8270D[1]) µg/L					
bis (2-Chloroethyl)ether	0.03	<0.51	**0.88 I**	<0.69	NA
bis (2-Ethylhexyl)phthalate	6	**1.4 I**	<1.2	<1.1	NA
1,2-Dichlorobenzene	600	<0.95	<0.68	<0.65	NA
1-Methylnaphthalene	28	<0.48	<0.70	<0.68	<0.32
2-Methylnaphthalene	28	**0.60 I**	<0.69	<0.66	<0.32
Naphthalene	14	<0.76	<0.64	<0.61	<0.32
Metals (6010C) µg/L					
Arsenic	10	**3.6 I**	**11.6**	**11.0**	**28.9**

NOTES:

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level

Bold results indicate a reported concentration above the laboratory detection limit.

I = result is above the laboratory method detection limit but below the practical quantitation limit

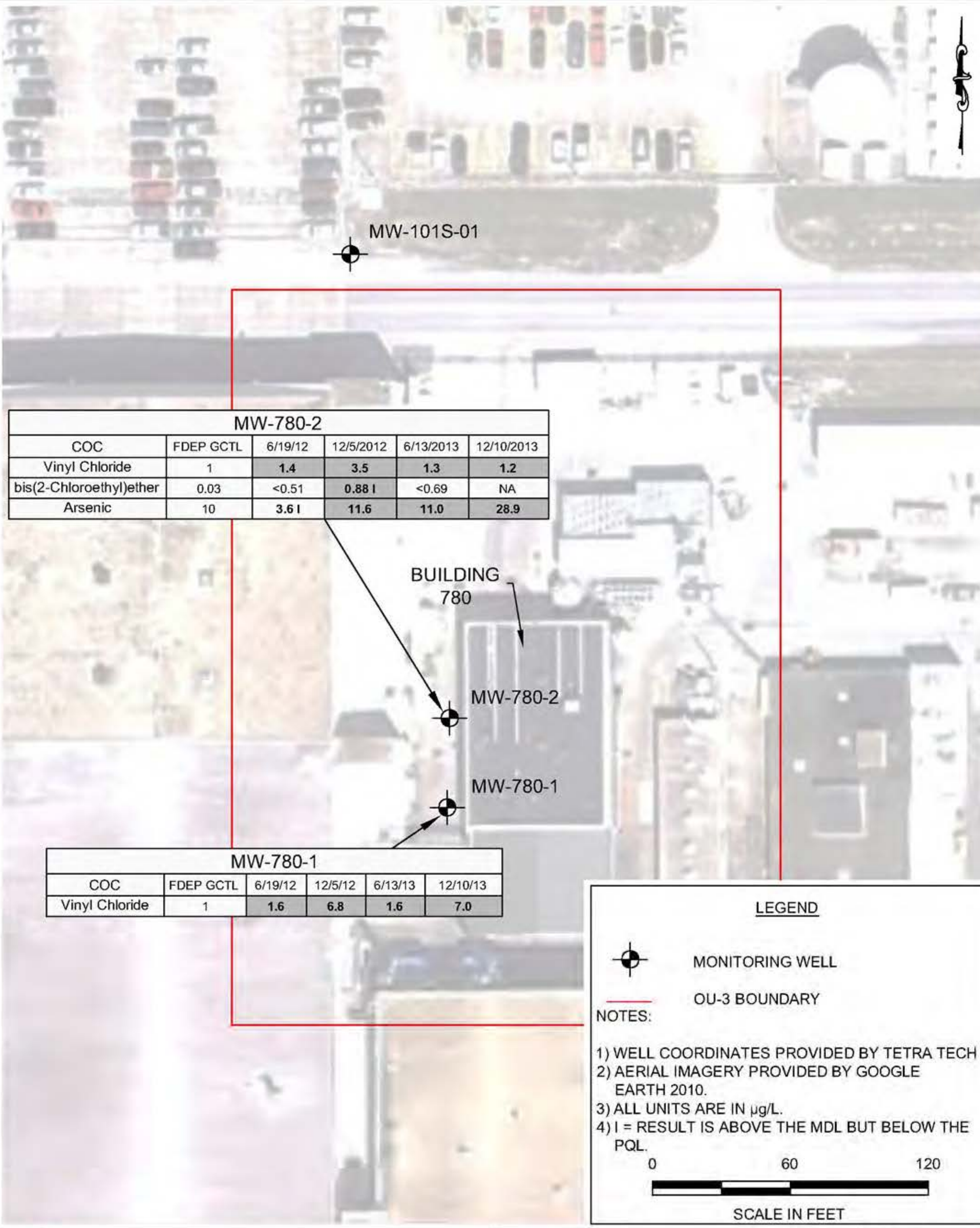
NE = not established

1. 12/10/2013 analytical results by EPA Method 8270D SIM.

NA = not analyzed

Shaded cells indicate a reported concentration above the FDEP GCTL.

Compounds not shown were not reported above the laboratory method detection limit.



MW-780-2					
COC	FDEP GCTL	6/19/12	12/5/2012	6/13/2013	12/10/2013
Vinyl Chloride	1	**1.4**	**3.5**	**1.3**	**1.2**
bis(2-Chloroethyl)ether	0.03	<0.51	**0.88 I**	<0.69	NA
Arsenic	10	**3.6 I**	**11.6**	**11.0**	**28.9**

MW-780-1					
COC	FDEP GCTL	6/19/12	12/5/12	6/13/13	12/10/13
Vinyl Chloride	1	**1.6**	**6.8**	**1.6**	**7.0**

LEGEND

MONITORING WELL

OU-3 BOUNDARY

NOTES:

1) WELL COORDINATES PROVIDED BY TETRA TECH
2) AERIAL IMAGERY PROVIDED BY GOOGLE EARTH 2010.
3) ALL UNITS ARE IN µg/L.
4) I = RESULT IS ABOVE THE MDL BUT BELOW THE PQL.

0 60 120

SCALE IN FEET

PROJECT NUMBER 2013.0029.NAVY

DRAFTER KTS

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DATE 1/7/2014

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CONTAMINANT CONCENTRATION MAP
B101S
OPERABLE UNIT 3
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 2

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU3 PSC 48 - FORMER DAY CLEANER (BUILDING 106)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	PCE	TCE	*cis* -1,2 DCE	*trans* -1,2-DCE	Vinyl Chloride	1,1-DCE	1,1,1-TCA
	FDEP GCTL	3	3	70	100	1	7	200
	NADC	300	300	7,000	10,000	100	700	20,000
SHALLOW WELLS								
OU3-MW28	5/18/00	5,000	1,200	NA	110	110	<50	-
	8/17/00	4,100	3,300	4,300	470 J	200	<6	-
	11/16/00	3,800	2,200	2,200	200	100	8.3	-
	2/23/01	3,800	2,000	2,200	170	220 J	<300	-
	5/30/01	4,900	2,700	3,400	250 J	340 J	<750	-
	8/22/01	7,100	3,600	3,700	650	380	<120	-
	11/20/01	7,800	3,800	3,800	7,700	140 J	<250	-
	2/21/02	9,000	4,500	<250	<250	160 J	<250	-
	5/23/02	6,400	3,500	4,800	340	130 J	<250	-
	8/7/02	9,750	8,100	5,830	642 J	341 J	<1,250	-
	11/13/02	9,500	4,240	4,120	1,350	<1,250	<1,250	-
	2/26/03	10,400	6,230	6,300	6,270	574 J	6,340	-
	5/13/03	12,100	7,500	6,800	8,570	596 J	8,780	-
	9/27/03	7,400	5,100	7,600	6,000	900	<200	-
	1/11/04	3,000	2,600	4,600	2,300	120	<50	-
	4/3/04	6,900	4,100	5,700	3,600	430	<50	-
	7/28/04	4,200	3,600	7,200	5,000	840	<50	-
	10/2/04	4,600	4,400	6,200	5,000	510	<15	-
	1/8/05	1,800	3,200	4,300	2,600	230	<50	-
	3/12/05	6,300	4,200	7,700	5,000	610	<50	-
	6/14/13	136	100	3,540	143	137	5.6	<0.20
OU3-106-MW36S	10/2/12	185	275	6,190	999	938	<2.5	-
	1/16/13	568	684	5,700	1,220	1,540	<5	-
	6/14/13	560	813	4,860	1,160	908	15.7	<0.20
	6/14/13 (DUP)	456	759	4,640	1,100	859	15.7	<0.20
OU3-106-MW37S	10/2/12	<0.25	<0.25	0.46 J	<0.25	<0.25	<0.25	-
	1/16/13	<0.25	<0.25	3.67	0.74 J	<0.25	<0.25	-
	6/14/13	<0.32	<0.31	<0.24	<0.23	<0.44	<0.20	<0.20
OU3-106-MW38S	10/9/12	<2.5	<2.5	16.1	<2.5	<2.5	<2.5	-
	1/23/13	<1.25	<1.25	4.85 J	<1.25	<1.25	<1.25	-
OU3-106-MW40S	10/2/12	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
	1/16/13	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-
	1/16/13 (DUP)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-
	6/14/13	<0.32	<0.31	<0.24	<0.23	<0.44	<0.20	<0.20
OU3-106-PZ-01	5/18/00	30,000	8,100	NA	120	660	50	-
	8/17/00	33,000	18,000	8,000	210	200	62	-
	11/16/00	51,000	9,400	5,900	160	190	42	-
	2/23/01	72,000	10,000	6,100	370	210 J	<600	-
	5/30/01	73,000	8,900	5,800	<1,500	320 J	<3,000	-
	8/22/01	39,000	8,900	6,400	36 J	460 J	<1,000	-
	11/20/01	11,000	7,900	6,400	210 J	270 J	<500	-
	2/21/02	4,300	7,300	9,000	220 J	300	<250	-
	5/23/02	5,000	9,900	6,600	320	260	<500	-
	8/7/02	4,090	16,300	6,990	474 J	834 J	<1,250	-
	11/13/02	3,470	4,430	5,130	334 J	248 J	<625	-
	2/26/03	3,520	3,520	4,980	153 J	507	164 J	-
	5/13/03	4,960	6,160	3,820	124 J	228 J	126 J	-
	9/27/03	350	4,100	4,000	310	380	<100	-
	1/11/04	<150	210	4,800	92	88	<50	-
	4/3/04	<100	<50	4,400	110	190	<50	-
	7/28/04	<100	<50	4,300	<50	200	<50	-
	10/2/04	<15	<15	3,300	39 J	98	<15	-
	1/7/05	<100	<50	3,500	<50	<50	<50	-
	3/12/05	<100	<50	6,300	86	54	<50	-
	2/1/10	<17	<50	3,850	345	145	<24	-
	10/1/12	<5	5.4 J	8,170	409	160	<5	-
	1/14/13	<25	<25	9,550	704	88 J	<25	-
	6/14/13	0.92 I	128	11,300	1,320	151	14.1	<0.20

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU3 PSC 48 - FORMER DAY CLEANER (BUILDING 106)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	PCE	TCE	*cis* -1,2 DCE	*trans* -1,2-DCE	Vinyl Chloride	1,1-DCE	1,1,1-TCA
	FDEP GCTL	3	3	70	100	1	7	200
	NADC	300	300	7,000	10,000	100	700	20,000
OU3-106-PZ-02	5/18/00	9,700	8,700	NA	15,000	2,000	140 J	-
	8/17/00	7,300	7,300	21,000	6,500	2,200	84	-
	11/16/00	4,900	5,100	25,000	14,000	1,700	89	-
	2/23/01	4,100 J	5,500	33,000	20,000	1,700	75 J	-
	5/30/01	2,600	5,100	39,000	16,000	2,000	<3,000	-
	8/22/01	3,900	9,800	23,000	16,000	2,500	<500	-
	11/20/01	10,000	7,800	16,000	9,800	1,800	<500	-
	2/21/02	3,700	6,400	18,000	13,000	1,900	<500	-
	5/23/02	3,300	4,900	15,000	10,000	1,900	<500	-
	8/7/02	5,060	10,600	25,700	14,300	2,430 J	<2,500	-
	11/13/02	9,530	13,700	19,100	13,200	762 J	<2,500	-
	2/26/03	17,800	22,300	15,600	17,400	558 J	17,700	-
	5/13/03	14,300	20,900	14,500	17,500	<2,500	17,900	-
	9/27/03	20,000	20,000	22,000	19,000	440	<400	-
	1/11/04	15,000	13,000	14,000	13,000	270	<250	-
	4/3/04	19,000	14,000	14,000	13,000	360	<250	-
	7/28/04	12,000	9,500	16,000	13,000	150	<100	-
	10/2/04	18,000	12,000	14,000	11,000	<200	<150	-
	1/7/05	15,000	16,000	18,000	15,000	350	<250	-
	3/12/05	22,000	18,000	27,000	24,000	540	<250	-
	2/1/10	15,300	4,720	8,870	4,820	71.5 J	<24	-
	10/1/12	6,740	3,900	9,070	2,930	320	<5	-
	1/14/13	20,500	10,100	16,100	4,410	256 J	<100	-
	6/14/13	18,800	12,100	19,600	5,040	310	**<40**	**<40**
OU3-106-PZ-03	5/18/00	6,600	3,400	NA	1,700	150	<50	-
	8/17/00	3,700	2,900	2,800	1,300	110	<6	-
	11/16/00	2,500	1,000	1,500	280	61	**2.7J**	-
	2/23/01	3,300	1,100	2,600	260	63 J	7.7	-
	5/30/01	3,100	2,600	3,800	240 J	<690	<750	-
	8/22/01	6,900	4,300	4,700	140	96 J	<120	-
	11/20/01	6,000	3,200	4,300	160 J	79 J	<250	-
	2/21/02	7,700	4,000	4,500	580	120 J	<250	-
	5/23/02	8,200	4,500	4,700	1,400	260	<250	-
	8/7/02	3,970	2,510	3,650	418	308	<250	-
	11/13/02	2,280	888	2,270	645	134 J	<250	-
	2/26/03	6,410	3,070	2,940	3,400	141 J	3,440	-
	5/13/03	1,510	745	1,990	674	96 J	718	-
	9/27/03	8,300	5,200	3,900	6,700	290	<400	-
	1/11/04	7,600	4,400	4,100	6,800	300	<50	-
	4/3/04	6,200	2,100	2,400	2,600	180	<50	-
	7/28/04	1,200	1,100	1,200	**90**	20 J	<20	-
	10/2/04	16,000	1,800	1,000	130 J	<100	<75	-
	1/7/05	1,400	1,900	2,400	1,200	<50	<50	-
	3/12/05	2,100	2,400	3,200	630	64	<50	-
	2/1/10	321	290	662	**67.4**	20.7	<1.2	-
	10/1/12	440	1,120	4,070	**31.6**	507	<2.5	-
	1/14/13	720	1,730	4,180	**69.5**	212 J	<12.5	-
	6/14/13	3,910	2,900	5,610	1,400	175	8.6	<0.20

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OU3 PSC 48 - FORMER DAY CLEANER (BUILDING 106)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	PCE	TCE	*cis* -1,2 DCE	*trans* -1,2-DCE	Vinyl Chloride	1,1-DCE	1,1,1-TCA
	FDEP GCTL	3	3	70	100	1	7	200
	NADC	300	300	7,000	10,000	100	700	20,000
OU3-106-PZ-04	5/18/00	54	42	NA	100	150	2.7 J	-
	8/17/00	270 J	220 J	3,500	51	200 J	2.9 J	-
	11/16/00	61	63	2,600	29	190	1.8 J	-
	2/23/01	170 J	110 J	2,700	25	260 J	1.8 J	-
	5/30/01	<880	<630	3,000	<380	390 J	<750	-
	8/22/01	200	120	1,800	21 J	360	<50	-
	11/20/01	150	120	1,100	9.1 J	260	<25	-
	2/21/02	<30	75	1,600	18 J	540	<50	-
	5/23/02	150	110	2,400	26	560	<100	-
	8/7/02	57.6 J	<250	3,360	<250	1,160	<250	-
	11/13/02	152 J	131 J	3,380	70.1 J	1,100	<250	-
	2/26/03	144 J	132 J	4,550	122 J	1,320	144 J	-
	5/13/03	<500	<500	5,140	<500	1,220	110 J	-
	9/27/03	<200	<100	6,400	400	1,800	<100	-
	1/11/04	<150	<50	6,600	130	870	<50	-
	4/3/04	<100	<50	6,800	140	2,300	<50	-
	7/28/04	<20	<10	1,300	25	630	<10	-
	10/2/04	<3	10	340	6J	630	<3	-
	1/8/05	<20	<10	260	<10	1,200	<10	-
	3/12/05	<20	14	440	<10	1,600	<10	-
	2/1/10	<0.85	<2.5	294	11.8	397	<1.2	-
	10/1/12	<0.25	7.68	12	<0.25	<0.25	<0.25	-
	1/4/13	<1.25	<1.25	54.8	<1.25	160 J	<1.25	-
	1/14/13 (DUP)	<1.25	<1.25	37.9	<1.25	136	<1.25	-
	6/14/13	<0.32	<0.31	39.4	1	143	<0.20	<0.20
OU3-106-PZ-05	5/18/00	9,100	12,000	NA	5,200	<200	<500	-
	8/17/00	8,100	15,000	5,400	6,200	55	<6	-
	11/16/00	7,200	15,000	5,900	6,100	<5.5	14	-
	2/23/01	18,000	16,000	7,500	6,000	150 J	<600	-
	5/30/01	14,000	19,000	9,500	11,000	<2,800	<3,000	-
	8/22/01	21,000	17,000	10,000	9,300	190 J	<500	-
	2/21/02	23,000	19,000	11,000	12,000	530 J	<1,000	-
	5/23/02	25,000	17,000	12,000	12,000	610	<1,000	-
	8/7/02	22,900	19,100	13,200	14,600	995 J	<2,500	-
	11/13/02	18,300	16,000	15,400	15,000	736 J	<2,500	-
	2/26/03	33,000	17,500	16,900	10,600	919 J	10,600	-
	5/13/03	14,100	12,200	18,200	10,300	721 J	10,300	-
	9/27/03	20,000	8,200	26,000	9,800	2,000	<400	-
	1/11/04	8,000	3,300	16,000	5,400	3,700	<250	-
	4/3/04	8,000	2,800	8,500	2,600	16,000	<250	-
	7/28/04	380	120	1,600	1,000	7,400	<50	-
	10/2/04	200	24 J	650	240	3,900	<15	-
	1/8/05	<100	<50	4,400	790	13,000	<50	-
	3/12/05	<200	<100	10,000	1,400	10,000	<100	-
	2/1/10	283	2,680	20,200	3,430	1,000	<12	-
	10/1/12	28 J	25.6 J	7,050	1,190	1,340	<10	-
	10/1/12 (DUP)	30.4 J	23.6 J	6,630	1,150	1,190	<10	-
	1/14/13	13.5 J	14.5 J	9,840	2,100	1,190 J	<12.5	-
	6/14/13	10.1	9.2	8,600	2,120	1,210	15.6	<2.0

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU3 PSC 48 - FORMER DAY CLEANER (BUILDING 106)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

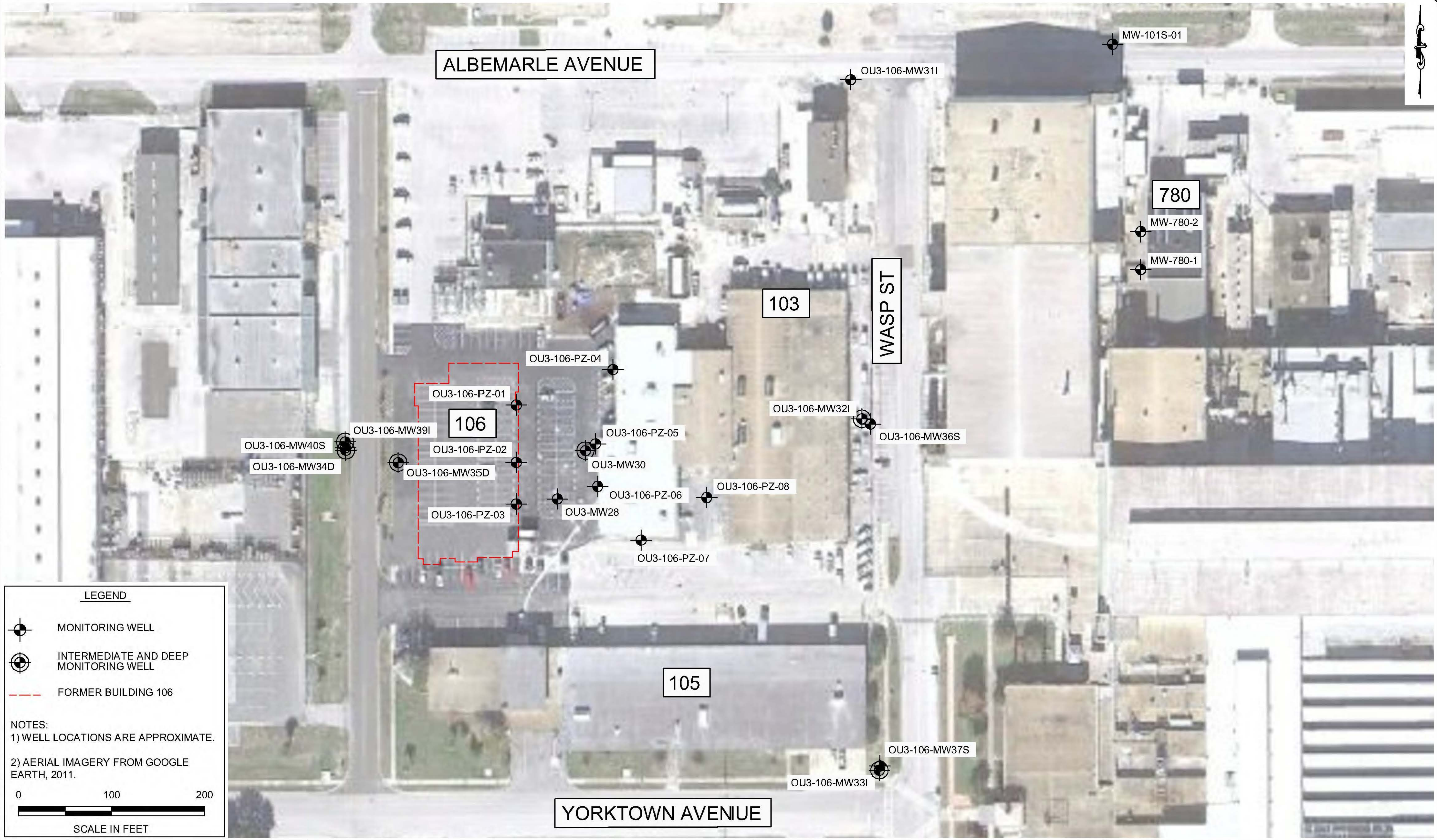
Well ID	Date	PCE	TCE	*cis*-1,2 DCE	*trans*-1,2-DCE	Vinyl Chloride	1,1-DCE	1,1,1-TCA
	FDEP GCTL	3	3	70	100	1	7	200
	NADC	300	300	7,000	10,000	100	700	20,000
OU3-106-PZ-06	5/18/00	10,000	11,000	NA	4,800	1,500	<500	-
	8/17/00	14,000	14,000	12,000	8,100	5,100	<6	-
	11/16/00	5,100	7,400	14,000	10,000	6,600	30	-
	2/23/01	3,700	2,400	17,000	15,000	12,000	42	-
	5/30/01	8,200	3,500	12,000	9,200	6,300	<3,000	-
	8/22/01	12,000	4,300	14,000	14,000	1,100	<500	-
	11/20/01	14,000	4,800	12,000	6,200	6,200	<500	-
	2/21/02	9,000	2,700	18,000	8,300	7,100	<500	-
	5/23/02	14,000	4,100	13,000	3,900	5,000	<500	-
	8/7/02	6,430	1,850 J	19,200	10,300	6,650	<2,500	-
	11/13/02	7,420	2,110 J	21,800	11,500	4,570	<2,500	-
	2/26/03	6,820	1,880 J	20,000	9,670	3,940	10,100	-
	5/13/03	5,280	2,450 J	21,500	9,980	3,330	10,300	-
	9/27/03	7,000	2,900	21,000	9,800	4,200	<400	-
	1/11/04	5,100	1,400	16,000	6,300	3,500	<250	-
	4/3/04	4,100	1,300	12,000	4,200	7,300	<250	-
	7/28/04	4,400	1,400	12,000	3,300	7,300	<100	-
	10/2/04	4,400	1,300	11,000	2,900	11,000	<30	-
	1/8/05	1,500	760	17,000	5,600	6,800	<100	-
	3/12/05	6,800	2,100	26,000	9,400	7,100	<200	-
	2/1/10	16,400	13,100	14,500	5,350	581	<24	-
	2/1/10 (DUP)	16,400	12,800	14,000	5,270	539	<24	-
	10/1/12	16,600	10,600	13,100	2,450	209	<25	-
	1/4/13	11,200	4,710	14,200	2,720	232 J	<100	-
	6/14/13	13,600	4,030	11,500	2,920	329	20.5	<2.0
OU3-106-PZ-07	5/18/00	<5	<5	NA	69	350	<5	-
	8/17/00	9.8 J	7.1 J	97	64	440	<6	-
	11/16/00	<5.5	<5	69	46	250	<6	-
	2/23/01	<35	<25	88	69	430	<30	-
	5/30/01	<180	23 J	200	140	550	<150	-
	8/22/01	<5	<5	130	79	330 J	<5	-
	11/20/01	<5	<5	120	55	280	<5	-
	2/21/02	<6	<6	230	68	320	<10	-
	5/23/02	<5	<5	240	48	290	<5	-
	8/7/02	<25	<25	316	62	468	<25	-
	11/13/02	<25	<25	214	36	322	<25	-
	2/26/03	<10	<10	54.9	7.86 J	135	8.35 J	-
	5/13/03	<10	<10	26	3.59 J	89	3.9 J	-
	9/27/03	<2	<1	4	1	72	<1	-
	1/11/04	<3	<1	7.7	1.3	62	<1	-
	4/3/04	<2	<1	16	1.2	190	<1	-
	7/28/04	<2	<1	110	3.2	210	<1	-
	10/2/04	<0.3	<0.3	31	1.2	110	<.3	-
	1/8/05	<2	<1	64	3	330	<1	-
	3/12/05	<10	<5	28	<5	230	<5	-
	2/1/10	<0.17	<0.5	32.7	4.19	151 J	<0.24	
	10/1/12	<1.25	<1.25	28	1.6 J	65	<1.25	
	1/14/13	<0.5	<0.5	10.3	1.02 J	56.3	<0.5	
	6/14/13	2.1	0.57 I	85.4	6.6	82.9	<0.20	<0.20

TABLE 2
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU3 PSC 48 - FORMER DAY CLEANER (BUILDING 106)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	PCE	TCE	*cis* -1,2 DCE	*trans* -1,2-DCE	Vinyl Chloride	1,1-DCE	1,1,1-TCA
	FDEP GCTL	**3**	**3**	**70**	**100**	**1**	**7**	**200**
	NADC	**300**	**300**	**7,000**	**10,000**	**100**	**700**	**20,000**
OU3-106-PZ-08	5/18/00	**5,800**	**9,100**	NA	**2,200**	**420**	<500	-
	8/17/00	**7,600**	**14,000**	**10,000**	**2,800**	**340**	<6	-
	11/16/00	**2,800**	**8,300**	**8,900**	**2,600**	**210**	**13**	-
	2/23/01	**4,700 J**	**16,000**	**12,000**	**3,500**	**280**	**18**	-
	5/30/01	**7,700**	**18,000**	**16,000**	**3,500**	**390 J**	<3,000	-
	8/22/01	**7,000**	**17,000**	**13,000**	**3,500**	**370 J**	<500	-
	11/20/01	**6,000**	**11,000**	**14,000**	**2,800**	**200 J**	<500	-
	5/23/02	**7,200**	**10,000**	**14,000**	**2,600**	**310 J**	<500	-
	8/7/02	**8,950**	**12,200**	**13,500**	**3,340**	**510 J**	<1,250	-
	11/13/02	**7,720**	**11,000**	**11,900**	**3,590**	**784 J**	<1,250	-
	2/26/03	**8,520**	**11,300**	**13,100**	**5,710**	**1,750**	**5,800**	-
	5/13/03	**4,910**	**8,030**	**13,400**	**6,890**	**2,820**	**6,950**	-
	9/27/03	**3,600**	**5,400**	**13,000**	**7,000**	**5,000**	<250	-
	1/11/04	**1,800**	**2,200**	**11,000**	**6,000**	**3,000**	<50	-
	4/3/04	**1,400**	**1,400**	**10,000**	**5,800**	**3,600**	<50	-
	7/28/04	**1,200**	**820**	**11,000**	**4,600**	**2,200**	<100	-
	10/2/04	**1,000**	**530**	**10,000**	**4,200**	**2,100**	<30	-
	1/8/05	**760**	**530**	**12,000**	**4,100**	**2,600**	<100	-
	3/12/05	**830**	**630**	**20,000**	**6,300**	**3,100**	<100	-
	2/1/10	**96.6**	**58.1**	**5,370**	**1,300**	**1,140**	<12	-
	10/1/12	**1,950**	**3,860**	**15,600**	**3,010**	**318**	<12.5	-
	1/14/13	**2,140**	**4,120**	**11,200**	**2,760**	**370**	<12.5	-
	1/14/13 (DUP)	**2,110**	**3,650**	**10,700**	**2,540**	**424**	<25	-
	6/14/13	**1,840**	**4,030**	**9,130**	**2,290**	**419**	**38.4 I**	<20
INTERMEDIATE WELLS								
OU3-106-MW30	6/14/13	**31.5**	**27.7**	**1,250**	**6.8 I**	<4.4	**2.3 I**	<2.0
OU3-106-MW31I	10/2/12	<1.25	<1.25	<1.25	<1.25	<1.25	<1.25	-
	10/2/2012 (DUP)	<0.5	<0.5	**2.24**	<0.5	<0.5	<0.5	-
	1/23/13	<0.25	**0.61 J**	**1.44**	<0.25	**0.32 J**	**0.33 J**	-
	1/23/2013 (DUP)	<0.25	**0.4 J**	**1.33**	<0.25	**0.27 J**	**0.35 J**	-
	6/14/13	<0.32	**0.66 I**	**1.3**	<0.23	<0.44	**0.87 I**	<0.20
OU3-106-MW32I	10/2/12	**73.3**	**122**	**138**	**12.5**	**1.04 J**	**3.02**	**-**
	1/16/13	**54.8**	**84.5**	**136**	**10.4**	**0.82 J**	**2.16**	**-**
	6/14/13	**80.1**	**84.8**	**139**	**14.3**	**1.9**	**4.1**	<0.20
OU3-106-MW33I	10/2/12	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-
	1/16/13	<0.25	**0.28 J**	<0.25	<0.25	<0.25	<0.25	-
	6/14/13	<0.32	**0.33 I**	<0.24	<0.23	<0.44	<0.20	<0.20
OU3-106-MW39I	10/2/12	<1.25	<1.25	**38.4**	<1.25	**159**	<1.25	-
	1/16/13	<0.25	**6.82**	**10.6**	<0.25	<0.25	<0.25	-
	6/14/13	<0.32	**1.7**	**4.8**	<0.23	<0.44	<0.20	<0.20
DEEP WELLS								
OU3-106-MW34D	10/2/12	<1.25	**1.55 J**	**417**	**3.3 J**	**3.7 J**	<1.25	-
	1/16/13	<0.625	<0.625	**266**	**3.48**	**2.55**	<0.625	-
	6/14/13	<1.6	<1.6	**364**	**4.0 I**	<2.2	<1.0	<1.0
OU3-106-MW35D	10/2/12	<0.25	<0.25	**0.72 J**	<0.25	<0.25	<0.25	-
	1/16/13	<0.25	**0.33 J**	**0.72 J**	<0.25	<0.25	<0.25	-
	6/14/13	**1.2**	**0.60 I**	**0.87 I**	<0.23	<0.44	<0.20	<0.20

NOTES:

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
µg/L = Micrograms per liter
Bold results indicate a reported concentration above the laboratory detection limit.
Shaded cells (gray) indicate a reported concentration above the FDEP GCTL.
Shaded cells (black) indicate a reported concentration above the FDEP GCTL and NADC.
J, I = Analyte was detected at an estimated concentration
NA = Not available
- Data not previously reported



PROJECT NUMBER 2013.0019.NAVY

DRAFTER KTS

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DATE 07/26/2013

FILE OU3-PSC48 UFP-SAP.dwg

Solutions-IES
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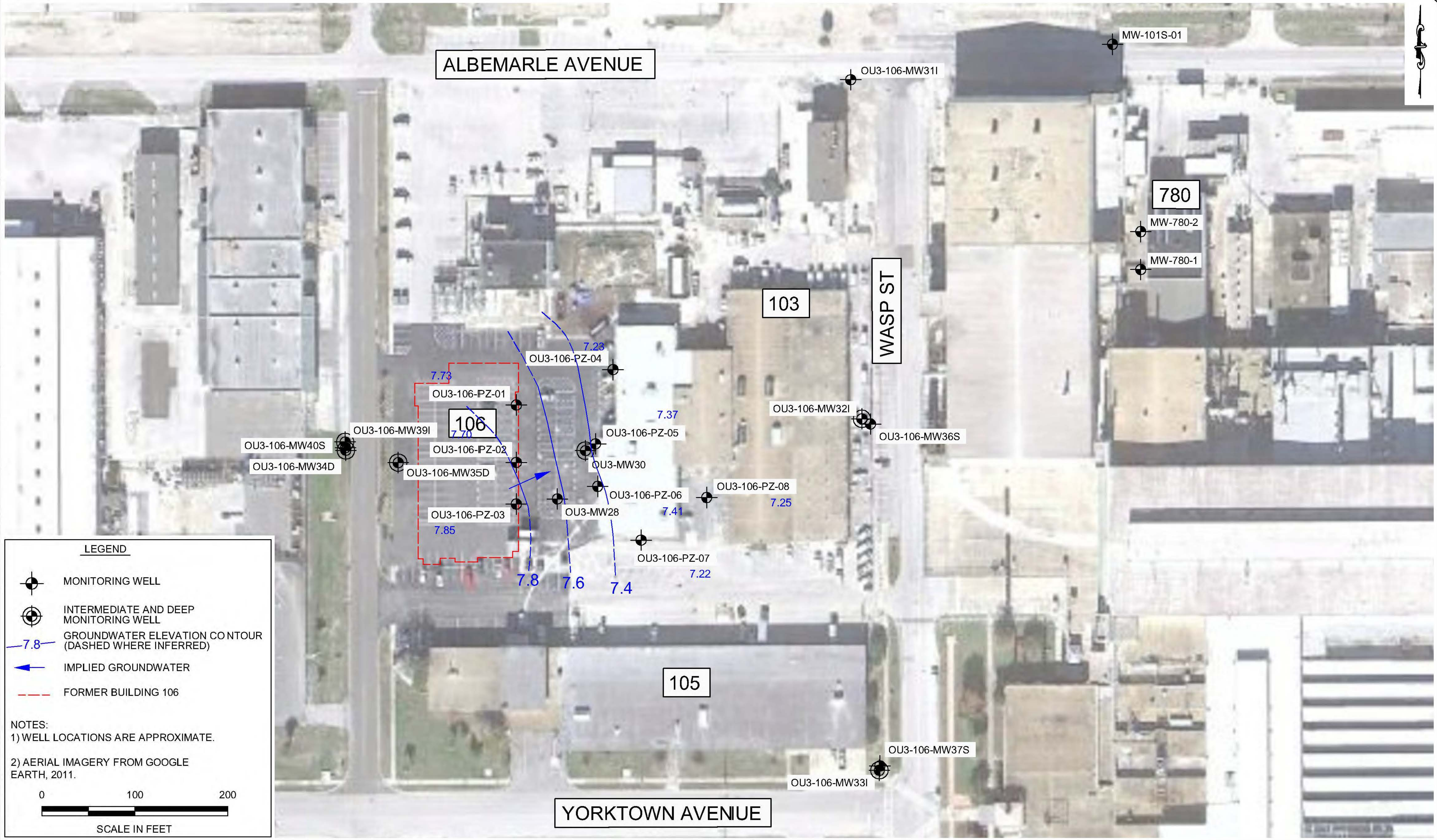
1101 NOWELL ROAD
RALEIGH, NORTH CAROLINA 27607
TEL.: (919) 873-1060 FAX.: (919) 873-1074

SITE MAP
OU-3 PSC 48
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 2

PROJECT NUMBER 2013.0019.NAVY
DRAFTER KTS
CHECKED BY NS
PROJECT MANAGER NS
DATE 07/26/2013
FILE OU3-PSC48 UFP-SAP.dwg



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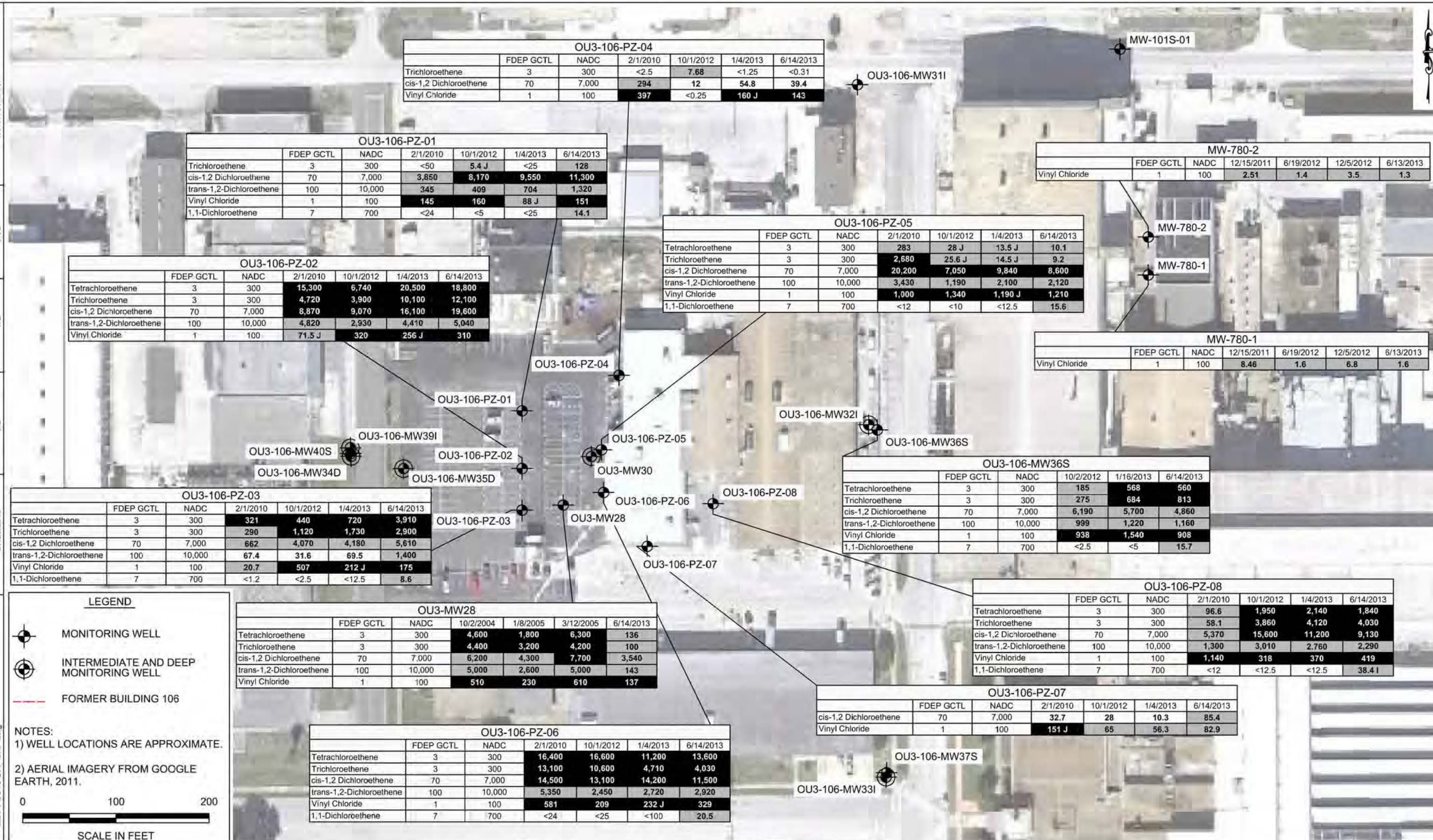
SHALLOW GROUNDWATER CONTOUR MAP
OU-3 PSC 48 - JUNE 2013
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 3

J:\Project Files\NAVFAC SE - FL ETS\Current Drawings\OU3 PSC48\OU3-PSC48 UFP-SAP.dwg



OU3-106-PZ-04

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Trichloroethene	3	300	<2.5	7.68	<1.25	<0.31
cis-1,2 Dichloroethene	70	7,000	294	12	54.8	39.4
Vinyl Chloride	1	100	397	<0.25	160 J	143

OU3-106-PZ-01

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Trichloroethene	3	300	<50	5.4 J	<25	128
cis-1,2 Dichloroethene	70	7,000	3,850	8,170	9,550	11,300
trans-1,2-Dichloroethene	100	10,000	345	409	704	1,320
Vinyl Chloride	1	100	145	160	88 J	151
1,1-Dichloroethene	7	700	<24	<5	<25	14.1

MW-780-2

	FDEP GCTL	NADC	12/15/2011	6/19/2012	12/5/2012	6/13/2013
Vinyl Chloride	1	100	2.51	1.4	3.5	1.3

OU3-106-PZ-05

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Tetrachloroethene	3	300	283	28 J	13.5 J	10.1
Trichloroethene	3	300	2,680	25.6 J	14.5 J	9.2
cis-1,2 Dichloroethene	70	7,000	20,200	7,050	9,840	8,600
trans-1,2-Dichloroethene	100	10,000	3,430	1,190	2,100	2,120
Vinyl Chloride	1	100	1,000	1,340	1,190 J	1,210
1,1-Dichloroethene	7	700	<12	<10	<12.5	15.6

OU3-106-PZ-02

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Tetrachloroethene	3	300	15,300	6,740	20,500	18,800
Trichloroethene	3	300	4,720	3,900	10,100	12,100
cis-1,2 Dichloroethene	70	7,000	8,870	9,070	16,100	19,600
trans-1,2-Dichloroethene	100	10,000	4,820	2,930	4,410	5,040
Vinyl Chloride	1	100	71.5 J	320	256 J	310

MW-780-1

	FDEP GCTL	NADC	12/15/2011	6/19/2012	12/5/2012	6/13/2013
Vinyl Chloride	1	100	8.46	1.6	6.8	1.6

OU3-106-MW36S

	FDEP GCTL	NADC	10/2/2012	1/16/2013	6/14/2013
Tetrachloroethene	3	300	185	568	560
Trichloroethene	3	300	275	684	813
cis-1,2 Dichloroethene	70	7,000	6,190	5,700	4,860
trans-1,2-Dichloroethene	100	10,000	999	1,220	1,160
Vinyl Chloride	1	100	938	1,540	908
1,1-Dichloroethene	7	700	<2.5	<5	15.7

OU3-106-PZ-03

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Tetrachloroethene	3	300	321	440	720	3,910
Trichloroethene	3	300	290	1,120	1,730	2,900
cis-1,2 Dichloroethene	70	7,000	662	4,070	4,180	5,610
trans-1,2-Dichloroethene	100	10,000	67.4	31.6	69.5	1,400
Vinyl Chloride	1	100	20.7	507	212 J	175
1,1-Dichloroethene	7	700	<1.2	<2.5	<12.5	8.6

OU3-106-PZ-08

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Tetrachloroethene	3	300	96.6	1,950	2,140	1,840
Trichloroethene	3	300	58.1	3,860	4,120	4,030
cis-1,2 Dichloroethene	70	7,000	5,370	15,600	11,200	9,130
trans-1,2-Dichloroethene	100	10,000	1,300	3,010	2.760	2,290
Vinyl Chloride	1	100	1,140	318	370	419
1,1-Dichloroethene	7	700	<12	<12.5	<12.5	38.4 I

OU3-MW28

	FDEP GCTL	NADC	10/2/2004	1/8/2005	3/12/2005	6/14/2013
Tetrachloroethene	3	300	4,600	1,800	6,300	136
Trichloroethene	3	300	4,400	3,200	4,200	100
cis-1,2 Dichloroethene	70	7,000	6,200	4,300	7,700	3,540
trans-1,2-Dichloroethene	100	10,000	5,000	2,600	5,000	143
Vinyl Chloride	1	100	510	230	610	137

OU3-106-PZ-07

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
cis-1,2 Dichloroethene	70	7,000	32.7	28	10.3	85.4
Vinyl Chloride	1	100	151 J	65	56.3	82.9

OU3-106-PZ-06

	FDEP GCTL	NADC	2/1/2010	10/1/2012	1/4/2013	6/14/2013
Tetrachloroethene	3	300	16,400	16,600	11,200	13,600
Trichloroethene	3	300	13,100	10,600	4,710	4,030
cis-1,2 Dichloroethene	70	7,000	14,500	13,100	14,200	11,500
trans-1,2-Dichloroethene	100	10,000	5,350	2,450	2,720	2,920
Vinyl Chloride	1	100	581	209	232 J	329
1,1-Dichloroethene	7	700	<24	<25	<100	20.5

LEGEND

MONITORING WELL

INTERMEDIATE AND DEEP MONITORING WELL

FORMER BUILDING 106

NOTES:

1) WELL LOCATIONS ARE APPROXIMATE.

2) AERIAL IMAGERY FROM GOOGLE EARTH, 2011.

0 100 200

SCALE IN FEET

PROJECT NUMBER 2013.0019.NAVY

DRAFTER KTS

CHECKED BY NS

PROJECT MANAGER NS

DATE 07/26/2013

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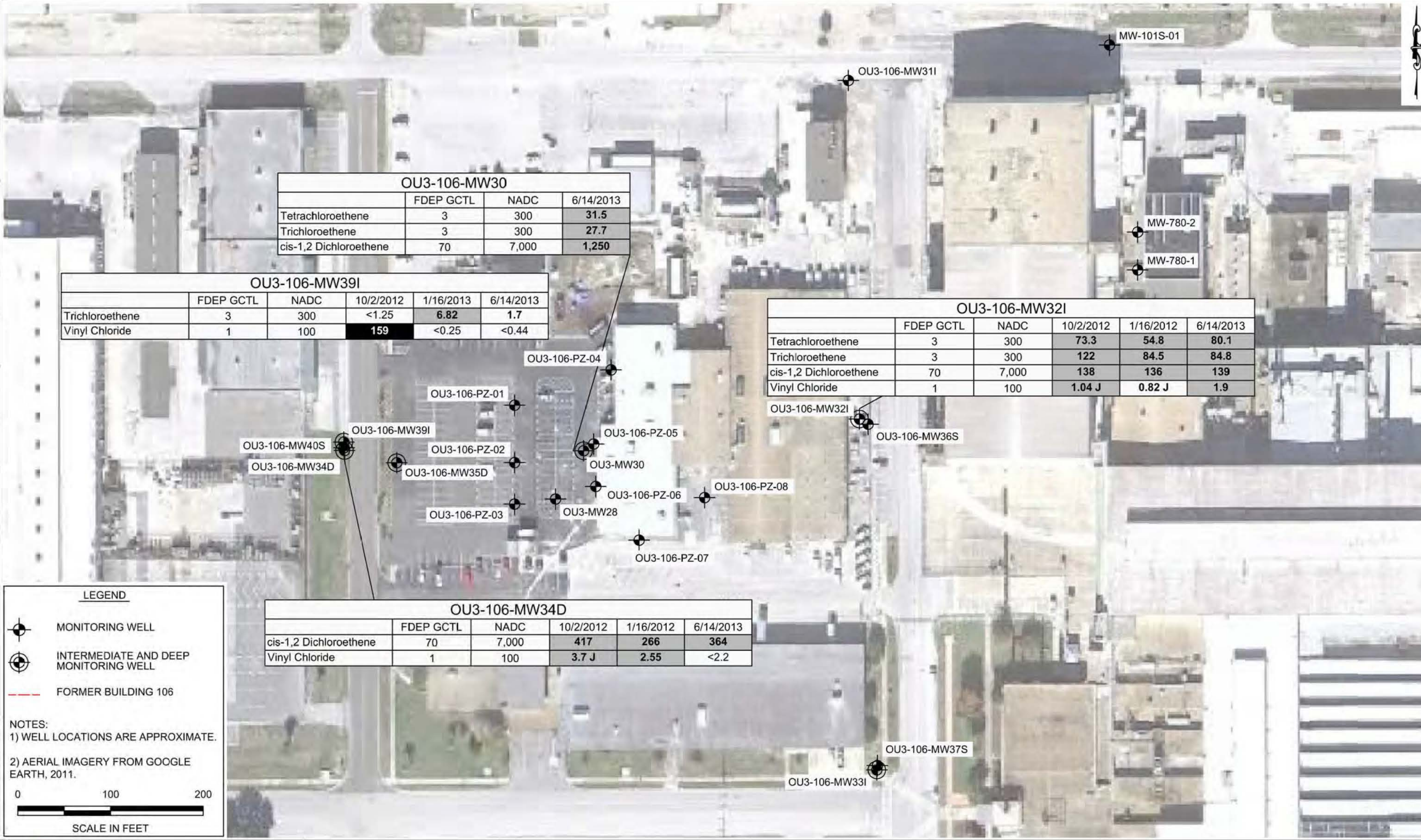
SHALLOW ZONE CONTAMINANT MAP
OU-3 PSC 48
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

FIGURE: 4



OU3-106-MW30

	FDEP GCTL	NADC	6/14/2013
Tetrachloroethene	3	300	**31.5**
Trichloroethene	3	300	**27.7**
cis-1,2 Dichloroethene	70	7,000	**1,250**

OU3-106-MW39I

	FDEP GCTL	NADC	10/2/2012	1/16/2013	6/14/2013
Trichloroethene	3	300	<1.25	**6.82**	**1.7**
Vinyl Chloride	1	100	**159**	<0.25	<0.44

OU3-106-MW32I

	FDEP GCTL	NADC	10/2/2012	1/16/2012	6/14/2013
Tetrachloroethene	3	300	**73.3**	**54.8**	**80.1**
Trichloroethene	3	300	**122**	**84.5**	**84.8**
cis-1,2 Dichloroethene	70	7,000	**138**	**136**	**139**
Vinyl Chloride	1	100	**1.04 J**	**0.82 J**	**1.9**

OU3-106-MW34D

	FDEP GCTL	NADC	10/2/2012	1/16/2012	6/14/2013
cis-1,2 Dichloroethene	70	7,000	**417**	**266**	**364**
Vinyl Chloride	1	100	**3.7 J**	**2.55**	<2.2

LEGEND

- MONITORING WELL
- INTERMEDIATE AND DEEP MONITORING WELL
- FORMER BUILDING 106

NOTES:
1) WELL LOCATIONS ARE APPROXIMATE.
2) AERIAL IMAGERY FROM GOOGLE EARTH, 2011.

0 100 200
SCALE IN FEET

PROJECT NUMBER 2013.0019.NAVY
DRAFTER KTS
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PROJECT MANAGER NS
DATE 07/26/2013
FILE OU3-PSC48 UFP-SAP.dwg

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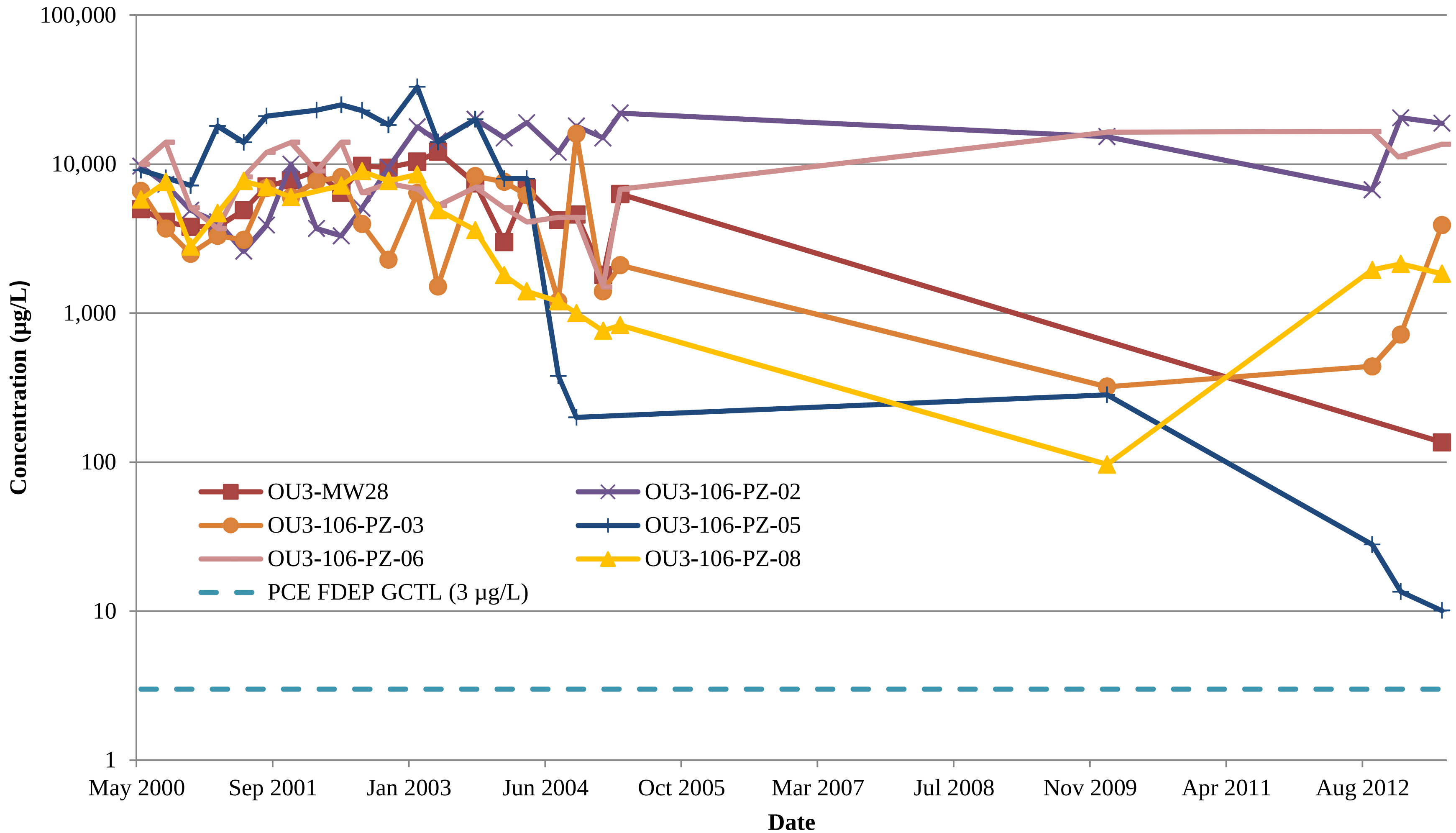
INTERMEDIATE ZONE CONTAMINANT MAP
OU-3 PSC 48
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

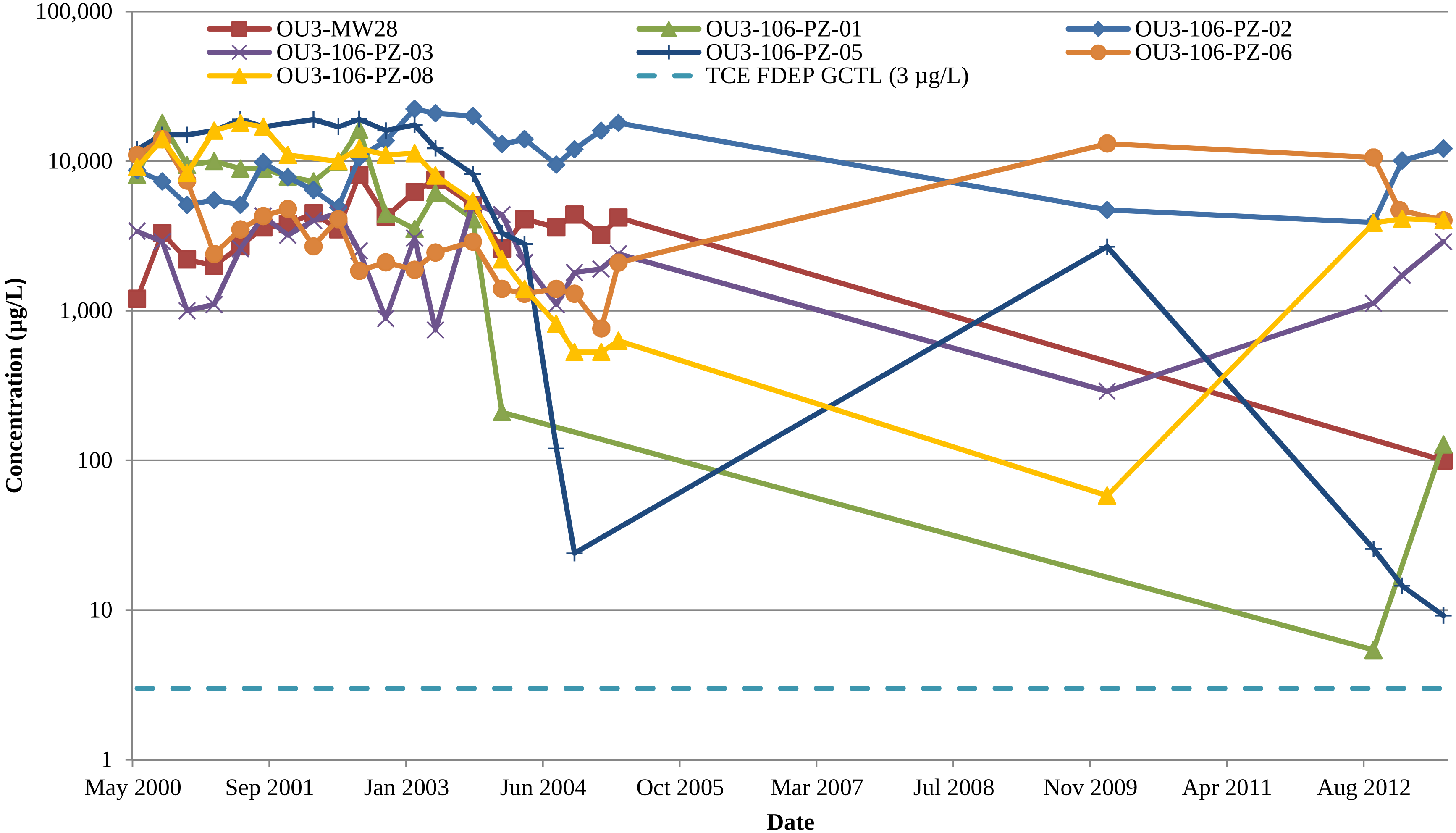
FIGURE: 5

FIGURE 6
HISTORICAL PCE CONCENTRATIONS IN SELECT SHALLOW WELLS



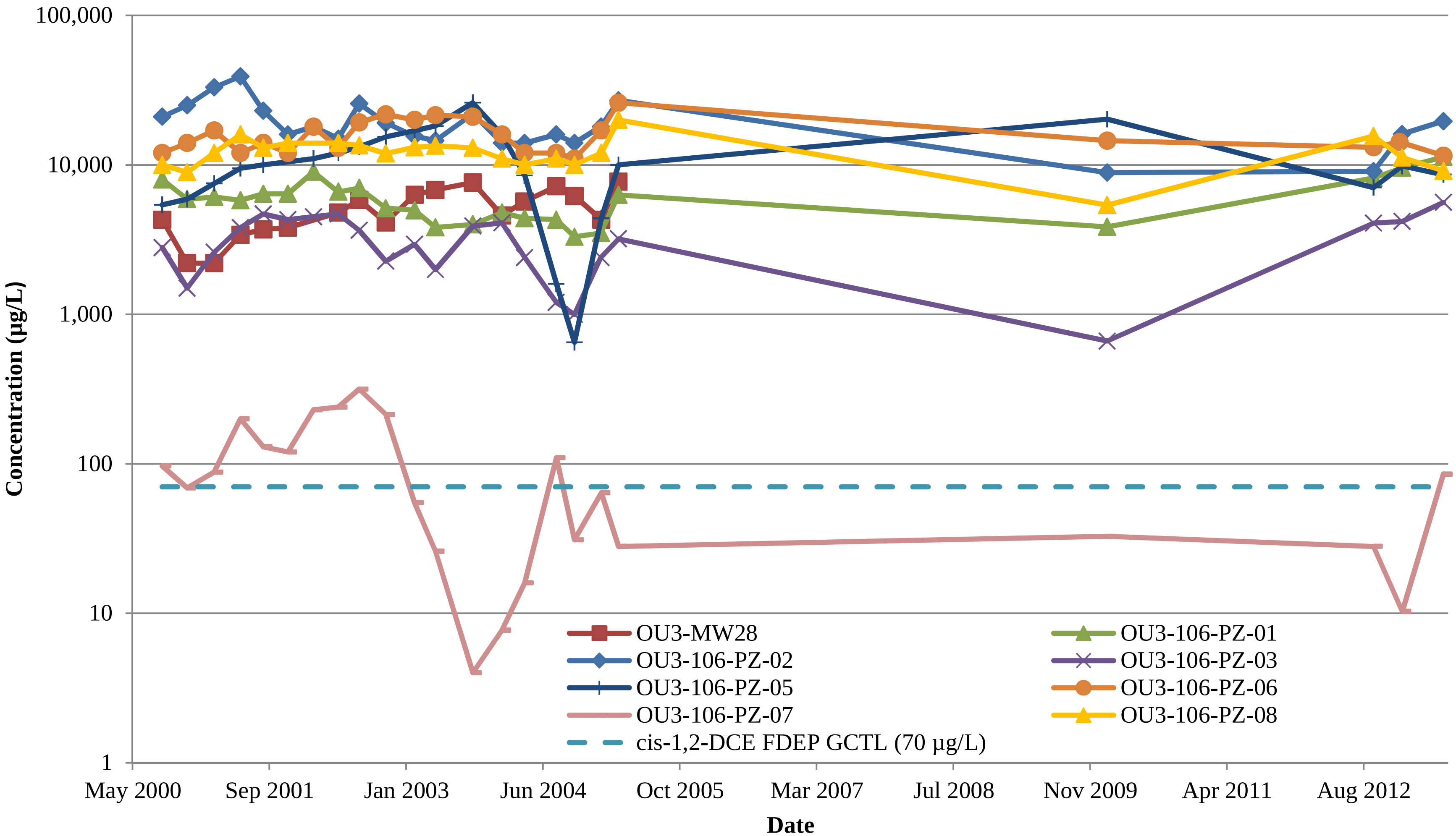
Note: Non-detects are not included in the graph.

FIGURE 7
HISTORICAL TCE CONCENTRATIONS IN SELECT SHALLOW WELLS



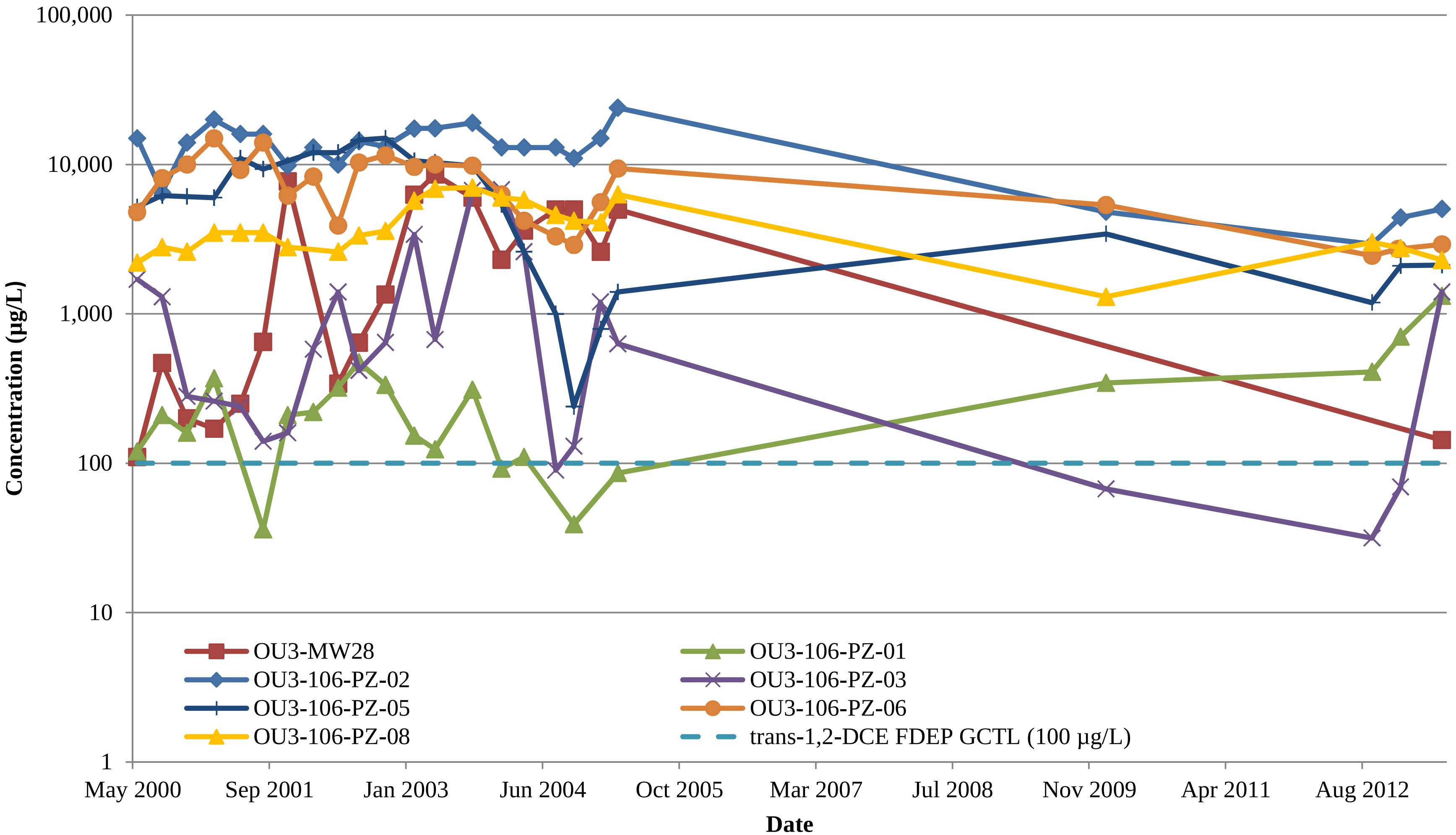
Note: Non-detects are not included in the graph.

FIGURE 8
HISTORICAL *cis*-1,2-DCE CONCENTRATIONS IN SELECT SHALLOW WELLS



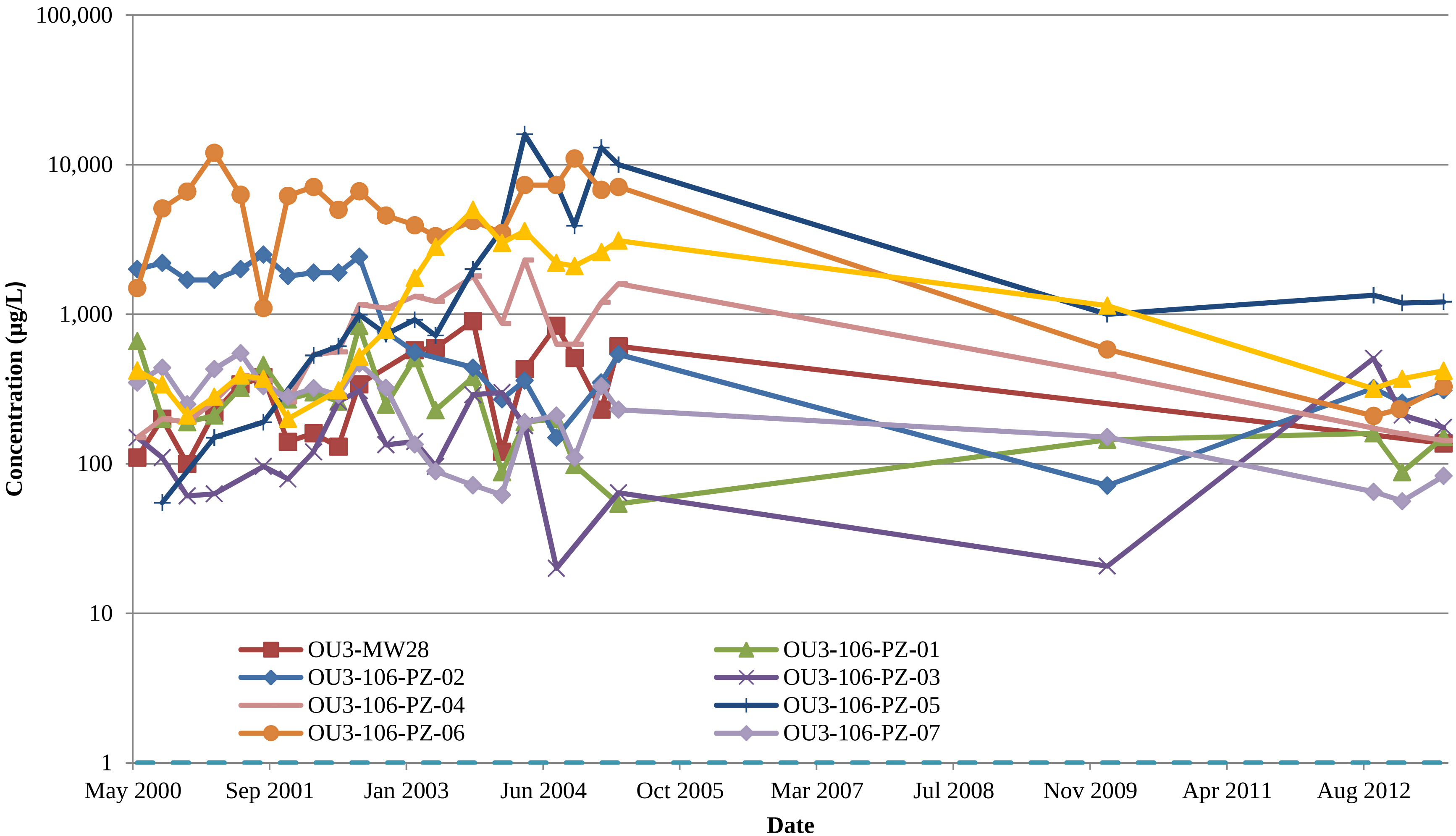
Note: Non-detects are not included in the graph.

FIGURE 9
HISTORICAL *trans*-1,2-DCE CONCENTRATIONS IN SELECT SHALLOW WELLS

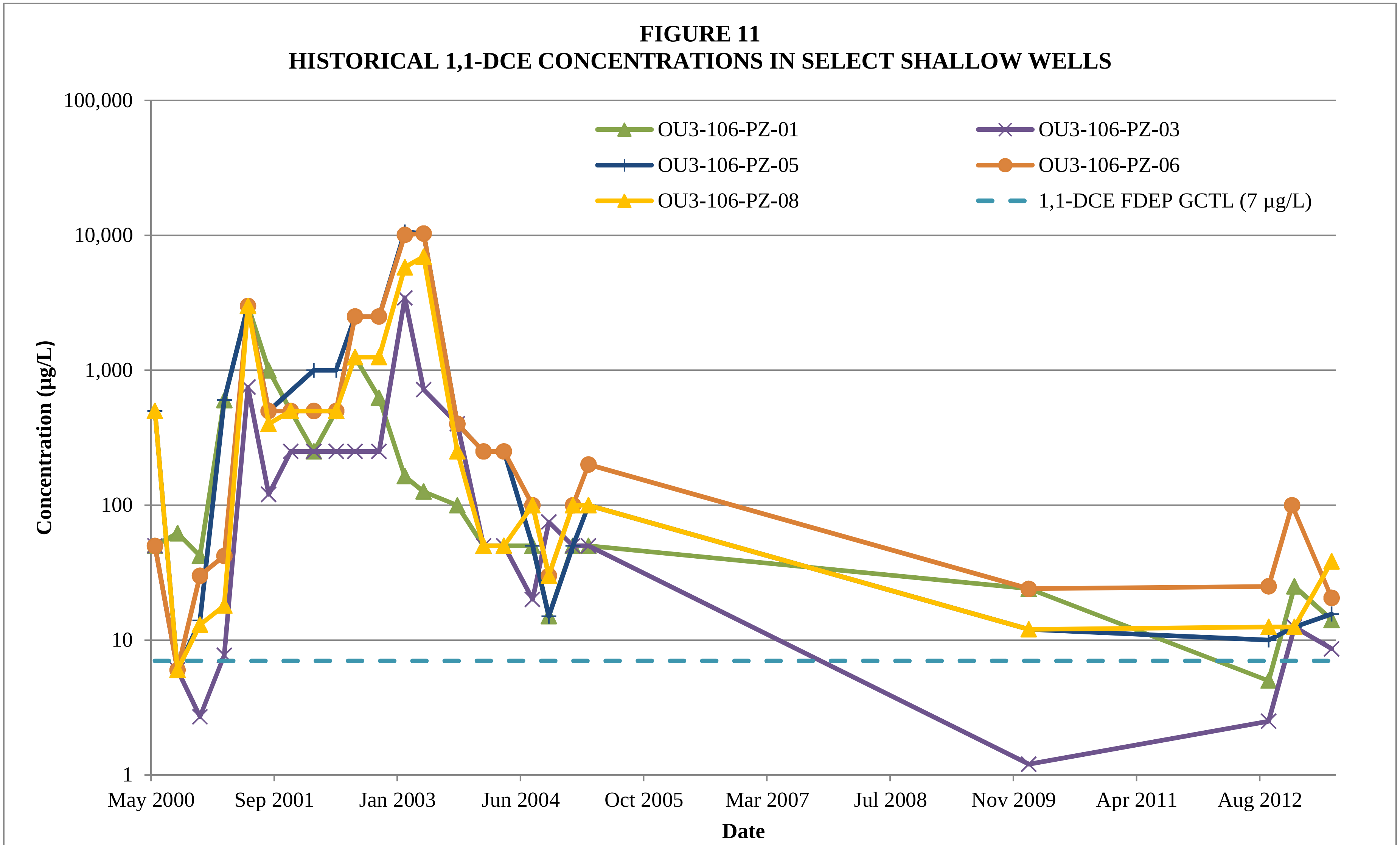


Note: Non-detects are not included in the graph.

FIGURE 10
HISTORICAL VC CONCENTRATIONS IN SELECT SHALLOW WELLS



Note: Non-detects are not included in the graph.



Note: Non-detects are not included in the graph.

E-3

OU 5

Table 3-4
Groundwater Detections Exceeding Regulatory Criteria
Oil Disposal Area

Remedial Investigation/Feasibility Study for PSC 51
Naval Air Station Jacksonville
Jacksonville, Florida

Detected Constituent	**Regulatory Criteria**		**NASJAX Background Concentrations[1] µg/L**	**Well ID and Sample Date**				
	FDEP GGCs µg/L	**EPA MCLs µg/L**		MW-03	MW-04 4/21/1997	MW-05 8/6/1997	MW-06 8/6/1997	MW-07 8/6/1997
Volatile Organic Compounds (µg/L)								
1,2-DCE	70	70	--	NS	**81**	37	**120**	2 J
Benzene	1	5	--	NS	**130**	**34**	**240**	4 J
TCE	3	5	--	NS	1 J	**23**	**17**	**14**
Vinyl Chloride	1	2	--	NS	10 U	10 U	**10 J**	10 U
Semivolatile Organic Compounds (µg/L)								
Naphthalene	6.8	--	--	NS	**26**	NA	NA	NA
Inorganics (µg/L)								
Aluminum	200	200	147,659	NS	**548**	NA	NA	NA
Iron	300	300	68,292	NS	**7350**	NA	NA	NA
Manganese	50	50	204	NS	**72**	NA	NA	NA

Notes:

NS - Not sampled due to the presence of floating free product
U - Not detected
J - Estimated value
NA - Sample not analyzed for this constituent
-- no value listed for this constituent.
Bolded values indicate concentration exceeds the regulatory criteria.
[1] - Background concentrations adopted from a basewide background sampling program performed by ABB -ES as documented in the OU 1 RI/FS, March 1, 1996.

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				UPGRADIENT								
Well ID	Milestone Objective	PRGs	FDEP GCTL	PSC51-DPT-03								
Sample Date				10/28/04	4/29/05	4/28/06	5/1/07	5/5/08	4/29/09	5/27/10	6/14/11	8/2/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	<0.2	<1	<0.2	<0.2	<0.23	<0.35	<0.27	<0.27	<0.20
1,1-DCE	NE	7	7	**2.34**	**8.03**	**170.7**	<0.2	<0.36	<0.5	<0.21	<0.21	<0.23
cis-1,2-DCE	NE	70	70	<0.1	<1	<0.2	<0.2	<0.45	<0.41	<0.22	<0.22	<0.26
trans-1,2-DCE	NE	100	100	<0.2	<1	<0.2	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	<0.3	<1	<0.3	<0.3	<0.34	<0.43	<0.26	<0.26	<0.20
Toluene	126	40	40	<0.2	<1	<0.2	<0.2	<0.28	<0.43	<0.30	<0.30	<0.20
TCE	38	3	3	<0.3	<1	<0.3	<0.3	<0.26	<0.39	<0.24	<0.24	<0.26
Vinyl Chloride	18	1	1	<0.4	<1	<0.4	<0.4	<0.52	<0.48	<0.33	<0.33	<0.22
Xylenes (total)	92	20	20	<0.5	<3	<0.5	<0.3	<0.38	<0.85	<0.50	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	20	14	<0.06	<0.5	<0.02	**0.05 I**	**0.06 I**	**0.08 I**	<0.023	<0.049	<0.77
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**0.002**	**0.0011**	**0.001**	**0.002**	**0.0006 I**	**0.0006 I**	<0.0002	**0.00124**	**1.0**
Ethane	NE	NE	NE	<0.0003	<0.001	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<2.5
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<2.0	<0.020	**0.02**	<0.003	**0.015 I**	<0.01	<0.010	<0.0073	**0.078 I**
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**7.1**	**6.2**	**4.34**	**4.6**	**6.2**	**6.8**	**5.2**	**6.6**	**6.6**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	<0.02	<0.10	NS	NS	NS	NS	**0.0221 I**	**0.0685**	<.035
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**0.0124 I**	**0.0102 I**	<.035
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0012 I**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.0017 I**	**1.45 i**	**0.00167 I**	**0.00167 I**	**0.0013 I**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.04**	<0.10	**0.03**	**0.094**	**0.36 I**	<0.5 i	**0.073**	**0.14 I**	**0.32**
Nitrite	NE	NE	NE	<1.0	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	<1.0	**6.1**	**5.98**	**3.7**	**5.7**	**6.3**	**5.2**	**6**	**5.3**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	<2.0	<0.030	<0.02	<0.02	NS	NS	NS	NS	**0.029 I**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<0.30
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**2 V**	**6.8**	**4**	**1.4**	**2.1**	**0.5 I**	**0.66 I**	**0.77 I**	**0.72 I**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				**UPGRADIENT**								
Well ID	**Milestone Objective**	**PRGs**	**FDEP GCTL**	**PSC51-MW-15S**								
Sample Date				10/28/04	4/28/05	4/28/06	5/1/07	5/6/08	4/29/09	5/27/10	6/14/11	8/2/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	<0.2	<1	<0.2	**0.6 I**	<0.23	<0.35	<0.27	<0.27	<0.20
1,1-DCE	NE	7	7	<0.2	<1	<0.2	<0.2	<0.36	<0.5	<0.21	<0.21	<0.23
cis-1,2-DCE	NE	70	70	<0.1	<1	<0.2	<0.2	<0.45	<0.41	<0.22	<0.22	<0.26
trans-1,2-DCE	NE	100	100	<0.2	<1	<0.2	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	<0.3	<1	<0.3	<0.3	<0.34	<0.43	<0.26	<0.26	<0.20
Toluene	126	40	40	<0.2	<1	<0.2	**1.4**	<0.28	<0.43	<0.30	<0.30	<0.20
TCE	38	3	3	<0.3	<1	<0.3	<0.3	<0.26	<0.39	<0.24	<0.24	<0.26
Vinyl Chloride	18	1	1	<0.4	<1	<0.4	<0.4	<0.52	<0.48	<0.33	<0.33	<0.22
Xylenes (total)	92	20	20	<0.5	<3	<0.5	<0.3	<0.38	<0.85	<0.50	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	<0.06	<0.5	<0.2	**0.05 I**	<0.02	**0.06 I**	<0.023	**0.070 I**	<0.76
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**0.005**	**0.0042**	**0.003**	**0.0006**	**0.005**	**0.021**	<0.0002	**0.00587**	**4.03**
Ethane	NE	NE	NE	<0.0003	<0.001	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**3.0 I**
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<0.002	<0.020	**0.03**	<0.003	**0.024**	**0.021**	<0.010	<0.0073	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**14**	**12.2**	**10.4**	**8.8**	**12**	**12**	**12**	**13**	**16.4**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**0.33**	**0.26**	NS	NS	NS	NS	**0.561**	**1.29**	**0.544**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**0.237**	**0.263**	**0.112 I**
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0022 I**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.00146 I**	**1.85 i**	**0.00204 I**	**0.00204 I**	**0.0022 I**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.02**	<0.10	**0.07**	**0.085**	<0.004	<0.02	**0.031 I**	<0.052	**0.082 I**
Nitrite	NE	NE	NE	**0.01**	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	**2 I**	**7.4**	**6.69**	**5.6**	**8**	**8.3**	**10**	**9.6**	**11.3**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	**0.03**	<0.030	<0.02	**0.036**	NS	NS	NS	NS	**0.084 I**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<0.30
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**4 V**	**4.0**	**8.0**	**3.4**	**2.6**	**2.3**	**2.3**	**2**	**1.9**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				SOURCE AREA								
Well ID	**Milestone Objective**	**PRGs**	**FDEP GCTL**	PSC51-MW-04								
Sample Date				10/28/04	4/29/05	4/28/06	5/1/07	5/6/08	4/29/09	5/27/10	6/14/11	8/1/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	**73**	**38**	**52.1**	**58.6**	**36**	**30**	**40**	**33**	**0.76 I**
1,1-DCE	NE	7	7	**1.1**	<1	**0.9 I**	**0.9 I**	**0.55 I**	**0.52 I**	<0.21	**0.92 I**	<0.23
cis -1,2-DCE	NE	70	70	**34**	**13**	**25**	**23.6**	**15**	**17**	**23**	**20**	<0.26
trans -1,2-DCE	NE	100	100	**0.2 I**	<1	**0.2 I**	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	**4.2**	**2**	**2.9**	**1**	**0.48 I**	**0.53 I**	**0.69 I**	<0.26	<0.20
Toluene	126	40	40	**0.4 I**	<1	**0.5 I**	**0.4 I**	<0.28	<0.43	<0.30	**0.38 I**	<0.20
TCE	38	3	3	**18**	**16**	**23.6**	**22.6**	**20**	**14**	**15**	**13**	<0.26
Vinyl Chloride	18	1	1	**0.8 I**	**2**	**2.8**	**4**	**2.2**	**2.2**	**7.8**	**6.9**	<0.22
Xylenes (total)	92	20	20	**3.6**	<3	**5.1**	**0.8 I**	**0.48 I**	<0.85	**1**	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	**2.9**	**0.8**	**2.01**	**0.54**	**0.39**	**0.69**	**1.2**	<0.049	<0.78
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**1.2 D1**	**0.86**	**0.8 D**	**1.36 D**	**1.03**	**0.228**	**0.353**	**0.873**	**31.7**
Ethane	NE	NE	NE	<0.0003	<0.01	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.002	<0.01	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**49.6**
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<0.002	<0.020	**0.02**	**0.006 I**	**0.044**	<0.01	<0.010	<0.0073	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**14**	**15**	**10.2**	**10**	**12**	**12**	**15**	**12**	**12.5**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**1.2**	**0.33**	NS	NS	NS	NS	**0.617**	**0.689**	**2.480**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**0.25**	**0.321**	**2.370**
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0228**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.0122**	**9.97 I**	**0.00924 I**	**0.00706 I**	**0.0212**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.02**	<0.10	**0.08**	**0.09**	<0.004	<0.02	**0.34**	<0.052	**0.068 I**
Nitrite	NE	NE	NE	<0.01	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	**8**	**12.7**	**7.12**	**8.1**	**9.5**	**9.9**	**11**	**7.7**	**7.2**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	**0.02 I**	<0.30	<0.02	<0.02	NS	NS	NS	NS	**0.49**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.92 I**
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**9**	**14.6**	**17**	**7.6**	**7.6**	**5.9**	**7.4**	**4.9**	**9.5**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				SOURCE AREA								
Well ID	Milestone Objective	PRGs	FDEP GCTL	PSC51-MW-06								
Sample Date				10/28/04	4/29/05	4/28/06	5/1/07	5/5/08	4/29/09	5/27/10[1]	6/14/11	8/1/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	**52**	**31**	**176**	**84.4**	**140**	**61**	**5.1**	**37**	**0.61 I**
1,1-DCE	NE	7	7	**0.7 I**	<1	**2.3**	**0.9 I**	**1 I**	<0.5	<0.21	<0.42	<0.23
cis -1,2-DCE	NE	70	70	**24**	**11**	**79.5**	**31.7**	**53**	**26**	1	**18**	<0.26
trans -1,2-DCE	NE	100	100	**0.2 I**	<1	**0.5 I**	<0.2	<0.82	<0.47	<0.30	<0.60	<0.35
Ethylbenzene	41	30	30	**7.5**	**4**	**21.8**	**6.4**	**14**	**6.3**	<0.26	<0.52	<0.20
Toluene	126	40	40	**1.5**	**2**	**5.8**	**2.5**	**6.1**	**4.4**	<0.30	<0.60	<0.20
TCE	38	3	3	**1.1**	<1	**4.6**	**1.4**	**2.9**	**2.3**	<0.24	<0.48	<0.26
Vinyl Chloride	18	1	1	**3.6**	**2**	**9.2**	**6**	**6**	**2.6**	**1.9**	**2**	<0.22
Xylenes (total)	92	20	20	**21.7**	**9**	**104.4**	**23.5**	**92**	**21**	<0.50	<1	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	**3**	**1**	**8.46**	**3.1**	**4.6**	**0.45**	0.32	**0.050 I**	<0.76
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**1.3 DI**	**0.88**	**3.42 D**	**1.45 D**	**1.24**	**0.429**	0.23	**1.34**	**16.6**
Ethane	NE	NE	NE	<0.0003	<0.001	**0.001 I**	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	**0.002**	<0.0002	**0.001 I**	<0.0004	<0.0004	**0.00176 I**	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**50.2**
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<0.002	<0.020	**0.006 I**	**0.034**	**0.025**	<0.01	<0.010	**0.25**	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**20**	**16.8**	**20**	**19**	**21**	**13**	6.9	**9.9**	**13.1**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**0.93**	**0.84**	NS	NS	NS	NS	**0.797**	**3.42**	**0.0851 I**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**0.438**	**2.89**	<.035
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0034 I**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.012**	**6.92 I**	**0.00543 I**	**0.0163**	**0.0045 I**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.02**	<0.10	**0.02 I**	**0.088**	<0.004	<0.02	**0.41**	<0.052	**0.50**
Nitrite	NE	NE	NE	<0.01	<0.10	<0.05	<0.05	<0.002	<0.012	**0.0098 I**	<0.011	<0.050
Sulfate	NE	NE	NE	**9**	11.2	**6.88**	**12**	**11**	**9.4**	**6.7**	**7.7**	**9.6**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	**0.05**	**0.18**	**0.04**	**0.042**	NS	NS	NS	NS	**0.051 I**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.80 I**
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**15 V**	**21.3**	**44**	**14**	**17**	**10**	**9.6**	**11**	**13.8**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				SOURCE AREA								
Well ID	Milestone Objective	PRGs	FDEP GCTL	PSC51-DPT-04								
Sample Date				10/28/04	4/29/05	4/28/06	5/1/07	5/6/08	4/29/09	5/27/10	6/14/11	8/1/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	**0.7 I**	<1	**0.7 I**	**66.3**	**1.3**	**42**	**4.2**	**6.4**	**1.9**
1,1-DCE	NE	7	7	<0.3	<1	<0.2	**0.5 I**	<0.36	**0.55 I**	<0.21	<0.21	<0.23
cis-1,2-DCE	NE	70	70	**2.2**	**2**	**3**	**18.3**	**3.8**	**20**	**6.7**	**7.7**	**0.83 I**
trans-1,2-DCE	NE	100	100	<0.2	<1	<0.2	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	<0.3	<1	<0.3	**3.1**	<0.34	**1.7**	<0.26	<0.26	<0.20
Toluene	126	40	40	<0.2	<1	<0.2	**1.2**	<0.28	**0.53 I**	<0.30	<0.30	<0.20
TCE	38	3	3	<0.3	<1	<0.3	**0.8 I**	<0.26	<0.39	<0.24	<0.24	<0.26
Vinyl Chloride	18	1	1	<0.4	<1	**0.4 I**	**18.2**	**0.84 I**	**4.6**	**3.2**	**3.4**	<0.22
Xylenes (total)	92	20	20	<0.5	<3	<0.5	**4.9**	<0.38	<0.85	<0.50	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	<0.06	<0.5	<0.02	**1.38**	**0.04 I**	**0.68**	<0.023	<0.049	<0.76
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**0.08**	**0.069**	**0.05**	**2.12 D**	**0.176**	**0.058**	**0.074**	**0.477**	**99.7**
Ethane	NE	NE	NE	<0.0003	<0.001	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**42.5**
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<2.0	<0.020	<0.003	**0.032**	**0.028**	**0.014 I**	<0.010	<0.0073	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**11**	**10.7**	**8.48**	**8.9**	**10**	**10**	**9.4**	**11**	**5.5**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**1.8**	**1.4**	NS	NS	NS	NS	**1.72**	**1.44**	**0.372**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**1.43**	**1.47**	**0.242 I**
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0306**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.00802 I**	**10.5**	**0.00855 I**	**0.00819 I**	**0.0298**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.02**	<0.10	**0.06**	**0.36**	<0.004	**0.4 I**	**0.51**	<0.052	**0.11**
Nitrite	NE	NE	NE	<1.0	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	**3 I**	**8.7**	**7.28**	**6.4**	**8.2**	**8.1**	**8.4**	**7.6**	**4.9**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	<2.0	<0.030	**0.04**	**0.17**	NS	NS	NS	NS	**0.11**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.1**
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**5 V**	**17.8**	**5**	**12**	**1.9**	**5.8**	**2.4**	**2.3**	**10.4**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				**DOWNGRADIENT**								
Well ID	**Milestone Objective**	**PRGs**	**FDEP GCTL**	**PSC51-MW-08S**								
Sample Date				10/28/04	4/28/05	4/28/06	5/1/07	5/6/08	4/29/09	5/27/10[1]	6/14/11	8/2/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	**9.6**	**7**	**4.4**	**1.4**	**2.3**	**2.8**	**2.9**	<0.27	**1.3**
1,1-DCE	NE	7	7	**0.5 I**	<1	**0.4 I**	<0.2	<0.36	<0.5	<0.21	<0.21	<0.23
cis -1,2-DCE	NE	70	70	**6.6**	**5**	**5.3**	**3.2**	**3.7**	**5.8**	**6.3**	**1.6**	**1.2**
trans -1,2-DCE	NE	100	100	<0.2	<1	<0.2	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	<0.3	<1	<0.3	<0.3	<0.34	<0.43	<0.26	<0.26	<0.20
Toluene	126	40	40	<0.2	<1	<0.2	**0.5 I**	<0.28	<0.43	<0.30	<0.30	<0.20
TCE	38	3	3	**1.7**	**2**	**1.7**	**0.8 I**	**1**	**1.2**	**1.1**	<0.24	<0.26
Vinyl Chloride	18	1	1	**3.1**	**3**	**4.8**	**3.3**	**2.2**	**2.4**	**4.2**	<0.33	**0.60 I**
Xylenes (total)	92	20	20	<0.5	<3	<0.5	**0.6 I**	<0.38	<0.85	<0.50	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	<0.06	<0.5	**0.12**	**0.05 I**	**0.07 I**	**0.04 I**	<0.023	<0.049	<0.76
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**0.16**	**0.074**	**0.054**	**0.063**	**0.119**	**0.027**	**0.03**	**0.125**	**49.1**
Ethane	NE	NE	NE	<0.0003	<0.001	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**14.1**
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	<0.02	<0.020	**0.007 I**	**0.037**	**0.026**	**0.022**	<0.010	<0.0073	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**12**	**10.4**	**8.83**	**6.9**	**9.2**	**9.3**	**7.6**	**7.6**	**7.3**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**1.6**	**1.8**	NS	NS	NS	NS	**3.52**	**1.88**	**4.060**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**1.41**	**1.53**	**1.180**
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0064 I**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	**0.00651 I**	**7.2 I**	**0.00745 I**	**0.00864 I**	**0.0077 I**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.02**	**<0.10**	**0.02 I**	**0.1**	**<0.004**	**0.4 I**	**0.028 I**	**0.14 I**	**0.073 I**
Nitrite	NE	NE	NE	<0.01	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	**3 i**	**8.2**	**7.1**	**5.7**	**8.4**	**9.9**	**8.2**	**7.5**	**6.0**
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	**0.02 I**	**0.48**	**0.02 I**	**0.026 I**	NS	NS	NS	NS	**0.12**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<0.30
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**5 V**	**10.6**	**4**	**2.9**	**2.3**	**14**	**2.5**	**1.8**	**2.2**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION				DEEP								
Well ID	Milestone Objective	PRGs	FDEP GCTL	PSC51-MW-10D								
Sample Date				10/28/04	4/28/05	4/28/06	5/1/07	5/6/08	4/29/09	5/27/10[1]	6/14/11	8/2/2012
Volatile Organic Compounds (8260B) µg/L												
Benzene	49	1	1	**0.9 I**	<1	<0.2	**0.4 I**	<0.23	<0.35	<0.27	<0.27	<0.20
1,1-DCE	NE	7	7	<0.3	<1	<0.2	<0.2	<0.36	NA	<0.21	<0.21	<0.23
cis -1,2-DCE	NE	70	70	**0.2 I**	<1	<0.2	<0.2	<0.45	<0.41	<0.22	<0.22	<0.26
trans -1,2-DCE	NE	100	100	<0.2	<1	<0.2	<0.2	<0.41	<0.47	<0.30	<0.30	<0.35
Ethylbenzene	41	30	30	<0.3	<1	<0.3	<0.3	<0.34	<0.43	<0.26	<0.26	<0.20
Toluene	126	40	40	<0.2	<1	<0.2	**1 I**	<0.28	<0.43	<0.30	<0.30	<0.20
TCE	38	3	3	<0.3	<1	<0.3	<0.3	<0.26	<0.39	<0.24	<0.24	<0.26
Vinyl Chloride	18	1	1	<0.4	<1	<0.4	<0.4	**0.52**	<0.48	<0.33	<0.33	<0.22
Xylenes (total)	92	20	20	<0.5	<3	<0.5	**0.7 I**	<0.38	<0.85	<0.50	<0.50	<0.52
Naphthalene (8310) µg/L												
Naphthalene	40	NE	14	<0.06	<0.5	**0.18**	**0.1**	**0.07 I**	**0.07 I**	<0.023	<0.049	<0.77
Methane, Ethane, Ethene (RSK 175) µg/L												
Methane	NE	NE	NE	**0.03**	**0.0018**	**0.008**	**0.252**	**0.001**	**0.035**	**0.002**	<0.000720	**155**
Ethane	NE	NE	NE	**0.003**	<0.001	<0.0003	<0.0003	<0.001	<0.0004	<0.0004	<0.00230	<0.32
Ethene	NE	NE	NE	<0.0002	<0.001	<0.0002	<0.0002	<0.0009	<0.0004	<0.0004	<0.00100	<0.43
Alkalinity (310.2) mg/L												
Alkalinity	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<2.5
Ammonia (350.1) mg/L												
Ammonia	NE	NE	3	**0.02**	<0.020	<0.003	**0.062**	**0.011 I**	<0.01	<0.010	<0.0073	<0.050
Chloride (300.0) mg/L												
Chloride	NE	NE	250	**21**	**20.1**	**15.4**	**14**	**17**	**16**	**16**	**17**	**18.6**
Metals (6010C) mg/L												
Iron (total)	NE	NE	NE	**0.02**	<0.10	NS	NS	NS	NS	**0.0101 I**	<0.010	**0.461**
Iron (dissolved)	NE	NE	NE	NS	NS	NS	NS	NS	NS	**0.0118 I**	<0.010	**0.0473 I**
Manganese (total)	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0195**
Manganese (dissolved)	NE	NE	NE	NS	NS	NS	NS	<0.00018	<0.54	<0.00069	<0.000690	**0.0207**
Nitrate, Nitrite, Sulfate (300.0) mg/L												
Nitrate	NE	NE	NE	**0.05**	**0.22**	**0.1**	**0.12**	**0.21 I**	**0.45 I**	**0.31**	**0.15 I**	**0.11**
Nitrite	NE	NE	NE	**0.09**	<0.10	<0.05	<0.05	<0.002	<0.012	<0.0019	<0.011	<0.050
Sulfate	NE	NE	NE	<1.0	**2.9**	**2.24**	**0.82 I**	**1.8 I**	**3 I**	<1.2	**1.4 I**	<1.0
Orthophosphate (365.3) mg/L												
Orthophosphate	NE	NE	NE	<0.02	<0.030	<0.02	**0.063**	NS	NS	NS	NS	**0.12**
Sulfide (SM18 4500) mg/L												
Sulfide	NE	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.1**
Total Organic Carbon (SM18 5310B) mg/L												
TOC	NE	NE	NE	**4 V**	**11.6**	**5**	**4.1**	**2.3**	**2.7**	**2.4**	**2.1**	**3.2**

TABLE 2

SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES:

1. Volatile Organic Compounds were re-collected on 6/22/22010.

Milestone Objectives for natural attenuation of groundwater contaminants during year 8 of long-term monitoring as established in the RI / FS for OU-5 PSC 51 and provided in the Year 7 Annual Monitoring Report, September 2011 (Aerostar, 2011)

PRG = Preliminary Remedial Goal as established by the ROD

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level

µg/L = Micrograms per liter

Bold results indicate a reported concentration above the laboratory detection limit.

I = Result is above the laboratory method detection limit but below the practical quantitation limit

Shaded cells indicate a reported concentration above the FDEP GCTL or PRG.

NE = Not established

NA = Not available

mg/L = Milligram per liter

NS = Not sampled

V = Analyte detected in method blank above the laboratory minimum detection limit

TABLE 3

SUMMARY OF GROUNDWATER FIELD PARAMETERS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	pH (SU)	DO (mg/L)	Conductivity (µS/cm)	ORP (mV)	Temperature (ºC)	Turbidity (NTU)	Carbon Dioxide (ppm)	Sulfide (ppm)	Hydrogen Sulfide[1] (ppm)	Ferrous Iron (ppm)
UPGRADIENT											
PSC51-DPT-03	6/14/2011	6.47	1.99	0.081	227.7	27.21	12.4	NA	NA	NA	NA
	8/2/2012	4.48	0.7	47	120	25.7	19	50	0	0	1.0
PSC51-MW-15S	6/14/2011	6.44	1.5	0	190	28.1	9	NA	NA	NA	NA
	8/2/2012	4.99	0.3	95	180	27.1	4.3	35	0.1	0.16	0.2
SOURCE AREA											
PSC51-MW-04	6/14/2011	7.06	2.89	0.147	93.7	29.13	6.54	NA	NA	NA	NA
	8/1/2012	5.72	0.4	131	15	26.0	14.1	30	0	0	2.5
PSC51-MW-06	6/14/2011	6.41	3.8	0	-18	29.6	9.1	NA	NA	NA	NA
	8/1/2012	6.08	0.7	181	61	26.3	11.4	18	0	0	0
PSC51-DPT-04	6/14/2011	6.67	3.54	0.085	132.3	26.48	8.01	NA	NA	NA	NA
	8/1/2012	5.98	0.7	104	105	25.5	17.1	16	0	0	0.3
DOWNGRADIENT											
PSC51-MW-08S	6/14/2011	6.99	0.77	0.098	58	26.8	6.54	NA	NA	NA	NA
	8/2/2012	5.29	0.3	76	66	26.3	33	60	0	0	1.5
DEEP											
PSC51-MW-10D	6/14/2011	6.08	2.56	0.612	68.2	25.62	1.29	NA	NA	NA	NA
	8/2/2012	7.13	0.4	636	-74	23.7	3.3	25	0	0	0.8

NOTES:
1. Hydrogen sulfide values determined using the equation: Hydrogen Sulfide = Sulfide * 1.06
ORP = Oxidation/reduction potential
DO = Dissolved oxygen
SU = Standard Unit
mg/L = Milligrams per liter
µS/cm = MicroSiemens per centimeter
mV = MillVolts
ppm = Parts per million

TABLE 4

SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample ID	**PRGs**	**FDEP SWCTL**	**PSC51-SW-01**								
Sample Date			10/28/04	4/28/05	4/28/06	5/1/07	5/5/08	4/29/09	5/27/10[1]	6/14/11	8/1/12
Volatile Organic Compounds (8260B) µg/L											
Benzene	NE	71.28	<0.2	<1	NS	NS	NS	<0.35	<0.27	NS	<0.20
1,1-DCE	NE	3.2	<0.3	<1	NS	NS	NS	<0.5	<0.21	NS	<0.23
cis-1,2-DCE	NE	NE	<0.1	<1	NS	NS	NS	<0.41	<0.22	NS	<0.26
trans-1,2-DCE	NE	11,000	<0.2	<1	NS	NS	NS	<0.47	<0.30	NS	<0.35
Ethylbenzene	605	610	<0.3	<1	NS	NS	NS	<0.43	<0.26	NS	<0.20
Toluene	475	480	<0.2	<1	NS	NS	NS	<0.43	<0.30	NS	**1.0**
TCE	80.7	80.7	<0.3	<1	NS	NS	NS	<0.39	<0.24	NS	<0.26
Vinyl Chloride	525	2.4	<0.4	<1	NS	NS	NS	<0.48	<0.33	NS	<0.22
Xylenes (total)	370	370	<0.5	<3	NS	NS	NS	<0.85	<0.50	NS	<0.52
Naphthalene (8310) µg/L											
Naphthalene	26	26	<0.06	<0.5	NS	NS	NS	**0.03 I**	**0.072 I**	NS	<0.77
Methane, Ethane, Ethene (RSK 175) µg/L											
Methane	NE	NE	**0.017**	**0.0050**	NS	NS	NS	**0.009**	**0.009**	NS	**163**
Ethane	NE	NE	< 0.0003	<0.001	NS	NS	NS	<0.0004	<0.0004	NS	<0.32
Ethene	NE	NE	< 0.0002	<0.001	NS	NS	NS	<0.0004	<0.0004	NS	<0.43
Alkalinity (310.2) mg/L											
Alkalinity	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**71.3**
Ammonia (350.1) mg/L											
Ammonia	NE	NE	**1.1**	**0.62**	NS	NS	NS	NS	NS	NS	**0.086 I**
Chloride (300.0) mg/L											
Chloride	NE	NE	**26**	**32.1**	NS	NS	NS	**91**	**69**	NS	**20.6**
Metals (6010C) mg/L											
Iron (total)	NE	NE	**1.9**	**2.0**	NS	NS	NS	NS	**1.13**	NS	**1.610**
Iron (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.080**
Manganese (total)	NE	NE	**0.0397**	**0.056**	NS	NS	NS	**80.6**	**0.0328**	NS	**0.0708**
Manganese (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0687**
Nitrate, Nitrite, Sulfate (300.0) mg/L											
Nitrate	NE	NE	**0.66**	<0.10	NS	NS	NS	**0.5 I**	**0.23**	NS	**0.15 I**
Nitrite	NE	NE	**0.66**	<0.10	NS	NS	NS	<0.012	**0.23**	NS	<0.10
Sulfate	NE	NE	<10	**35.3**	NS	NS	NS	**42**	**45**	NS	**7.9**
Orthophosphate (365.3) mg/L											
Orthophosphate	NE	NE	<0.020	<0.030	NS	NS	NS	NS	NS	NS	**0.064 I**
Sulfide (SM18 4500) mg/L											
Sulfide	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.2**
Total Organic Carbon (SM18 5310B) mg/L											
TOC	NE	NE	**10 V**	**21.0**	NS	NS	NS	**3.8**	**7**	NS	**27.8**

TABLE 4

SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample ID	PRGs	FDEP SWCTL	PSC51-SW-02								
Sample Date			10/28/04	4/28/05	4/28/06	5/1/07	5/5/08	4/29/09	5/27/10[1]	6/14/11	8/1/12
Volatile Organic Compounds (8260B) µg/L											
Benzene	NE	71.28	<0.2	<1	<0.2	NS	NS	<0.35	<0.27	NS	<0.20
1,1-DCE	NE	3.2	<0.3	<1	<0.2	NS	NS	<0.5	<0.21	NS	<0.23
cis-1,2-DCE	NE	NE	<0.1	<1	**0.2 I**	NS	NS	<0.41	<0.22	NS	<0.26
trans-1,2-DCE	NE	11,000	<0.2	<1	<0.2	NS	NS	<0.47	<0.30	NS	<0.35
Ethylbenzene	605	610	<0.3	<1	<0.3	NS	NS	<0.43	<0.26	NS	<0.20
Toluene	475	480	<0.2	<1	<0.2	NS	NS	**0.51 I**	<0.30	NS	**0.28**
TCE	80.7	80.7	<0.3	<1	<0.3	NS	NS	<0.39	<0.24	NS	<0.26
Vinyl Chloride	525	2.4	<0.4	<1	<0.4	NS	NS	<0.48	<0.33	NS	<0.22
Xylenes (total)	370	370	<0.5	<3	<0.5	NS	NS	<0.85	<0.50	NS	<0.52
Naphthalene (8310) µg/L											
Naphthalene	26	26	<0.06	<0.5	**0.23**	NS	NS	**0.04 I**	**0.27**	NS	<0.77
Methane, Ethane, Ethene (RSK 175) µg/L											
Methane	NE	NE	**0.017**	**0.0076**	**0.006**	NS	NS	**0.057**	**0.256**	NS	**10.3**
Ethane	NE	NE	< 0.0003	<0.001	<0.0003	NS	NS	<0.0004	<0.0004	NS	<0.32
Ethene	NE	NE	< 0.0002	<0.001	<0.0002	NS	NS	<0.0004	<0.0004	NS	<0.43
Alkalinity (310.2) mg/L											
Alkalinity	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	<2.5
Ammonia (350.1) mg/L											
Ammonia	NE	NE	**0.52**	**0.64**	NS	NS	NS	NS	NS	NS	**0.078 I**
Chloride (300.0) mg/L											
Chloride	NE	NE	**28**	**31.7**	**13.1**	NS	NS	**84**	**73**	NS	**10.5**
Metals (6010C) mg/L											
Iron (total)	NE	NE	**1.2**	**1.4**	NS	NS	NS	NS	**2.93**	NS	**1.650**
Iron (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.580**
Manganese (total)	NE	NE	**0.046**	<0.050	**0.0265**	NS	NS	**168**	**0.119**	NS	**0.0417**
Manganese (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0431**
Nitrate, Nitrite, Sulfate (300.0) mg/L											
Nitrate	NE	NE	**0.03**	**0.17**	**0.09**	NS	NS	<0.02	**0.054**	NS	**0.37 I**
Nitrite	NE	NE	**0.03 I**	**0.17**	**0.09**	NS	NS	<0.012	**0.054**	NS	<0.25
Sulfate	NE	NE	<10	**34.0**	**19.3**	NS	NS	**28**	**12**	NS	<5.0
Orthophosphate (365.3) mg/L											
Orthophosphate	NE	NE	**0.02 I**	**0.042**	**0.03**	NS	NS	NS	NS	NS	<0.020
Sulfide (SM18 4500) mg/L											
Sulfide	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**1.1**
Total Organic Carbon (SM18 5310B) mg/L											
TOC	NE	NE	**12.0**	**20.2**	**4**	NS	NS	**7.8**	**17**	NS	**67.1**

TABLE 4

SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample ID	**PRGs**	**FDEP SWCTL**	**PSC51-SW-03**								
Sample Date			10/28/04	4/28/05	4/28/06	5/1/07	5/5/08	4/29/09	5/27/10[1]	6/14/11	8/1/12
Volatile Organic Compounds (8260B) µg/L											
Benzene	NE	71.28	<0.2	<1	<0.2	NS	<0.23	<0.35	<0.27	NS	<0.20
1,1-DCE	NE	3.2	<0.3	<1	<0.2	NS	<0.36	<0.5	<0.21	NS	<0.23
cis-1,2-DCE	NE	NE	<0.1	<1	<0.2	NS	<0.45	<0.41	<0.22	NS	<0.26
trans-1,2-DCE	NE	11,000	<0.2	<1	<0.2	NS	<0.41	<0.47	<0.30	NS	<0.35
Ethylbenzene	605	610	<0.3	<1	<0.3	NS	<0.34	<0.43	<0.26	NS	<0.20
Toluene	475	480	<0.2	<1	**1.5**	NS	<0.28	<0.43	<0.30	NS	**0.63**
TCE	80.7	80.7	<0.3	<1	<0.3	NS	<0.26	<0.39	<0.24	NS	<0.26
Vinyl Chloride	525	2.4	<0.4	<1	<0.4	NS	<0.52	<0.48	<0.33	NS	<0.22
Xylenes (total)	370	370	<0.5	<3	<0.5	NS	<0.38	<0.85	<0.50	NS	<0.52
Naphthalene (8310) µg/L											
Naphthalene	26	26	<0.06	<0.5	**0.07 I**	NS	**0.06 I**	<0.02	**0.26**	NS	<0.76
Methane, Ethane, Ethene (RSK 175) µg/L											
Methane	NE	NE	**0.058**	**0.041**	**0.22**	NS	**0.056**	**0.013**	**0.038**	NS	**144**
Ethane	NE	NE	<0.0003	<0.001	<0.0003	NS	<0.001	<0.0004	<0.0004	NS	<0.32
Ethene	NE	NE	<0.0002	<0.001	<0.0002	NS	<0.0009	<0.0004	<0.0004	NS	<0.43
Alkalinity (310.2) mg/L											
Alkalinity	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**65.3**
Ammonia (350.1) mg/L											
Ammonia	NE	NE	**0.57**	**0.66**	NS	NS	NS	NS	NS	NS	<0.050
Chloride (300.0) mg/L											
Chloride	NE	NE	**28**	**33.4**	**32.3**	NS	**50**	**33**	**27**	NS	**23.7**
Metals (6010C) mg/L											
Iron (total)	NE	NE	**1.0**	**0.82**	NS	NS	NS	NS	**1.26**	NS	**2.990**
Iron (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese (total)	NE	NE	**0.033**	<0.050	**0.153**	NS	**0.053**	**30.1**	**0.0256**	NS	**0.0637**
Manganese (dissolved)	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**0.0494**
Nitrate, Nitrite, Sulfate (300.0) mg/L											
Nitrate	NE	NE	**0.03**	<0.10	**0.08**	NS	**0.16 I**	<0.02	**0.036 I**	NS	<0.10
Nitrite	NE	NE	**0.03**	<0.10	**0.08**	NS	<0.002	<0.012	**0.036 I**	NS	<0.10
Sulfate	NE	NE	**29**	**30.1**	**7.46**	NS	**17**	**23**	**20**	NS	**7.5**
Orthophosphate (365.3) mg/L											
Orthophosphate	NE	NE	**0.04**	**0.042**	**0.8**	NS	NS	NS	NS	NS	**0.047 I**
Sulfide (SM18 4500) mg/L											
Sulfide	NE	NE	NS	NS	NS	NS	NS	NS	NS	NS	**2.4**
Total Organic Carbon (SM18 5310B) mg/L											
TOC	NE	NE	**12.0**	**19.3**	**25**	NS	**11**	**7.8**	**10**	NS	**25.4**

TABLE 4

SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
OU-5 PSC 51
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES:

1. Volatile Organic Compounds were re-collected on 6/22/22010.

PRG = Preliminary Remedial Goal as established by the ROD

FDEP SWCTL = Florida Department of Environmental Protection Surface Water Cleanup Target Level

μg/L = Micrograms per liter

NE = Not established

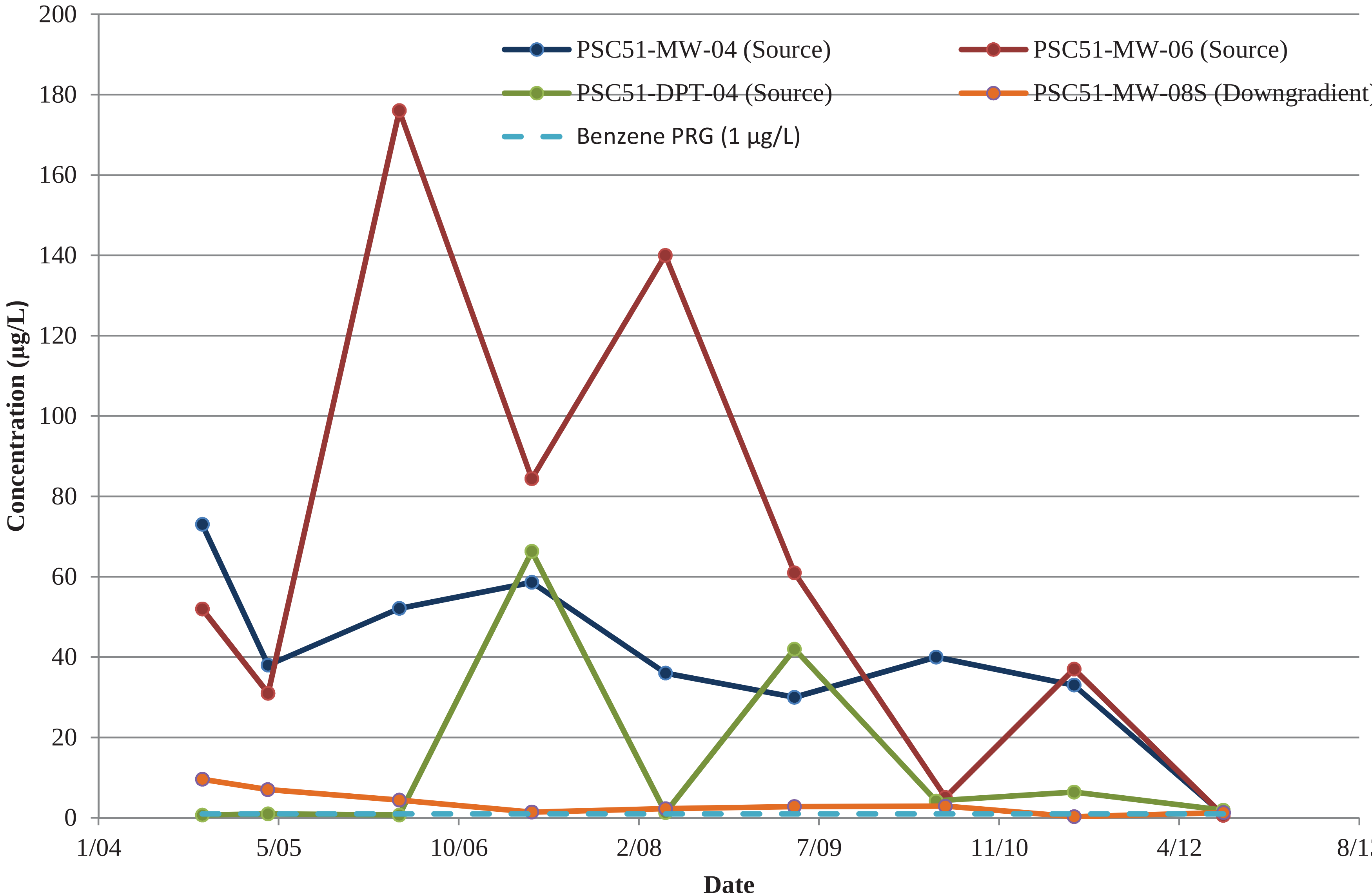
NS = Not sampled

Bold results indicate a reported concentration above the laboratory detection limit.

I = Result is above the laboratory method detection limit but below the practical quantitation limit

mg/L = Milligrams per liter

FIGURE 5
HISTORICAL BENZENE CONCENTRATIONS IN SELECT WELLS



E-4

OU 6

TABLE 3-3

SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 1 OF 6

Parameter	GCTL	Source Well H10MW08							Upgradient Well H10MW10						Source Well H10MW14						
		7/29/2009	11/6/2009	3/4/2010	8/5/2010	8/5/2010 (DUP)	4/16/2012	10/17/2012	7/29/2009	11/5/2009	3/4/2010	8/5/2010	4/16/2012	10/17/2012	7/29/2009	11/6/2009	3/3/2010	8/4/2010	4/17/2012	4/17/2012 (DUP)	10/16/2012
Volatile Organics (µg/L)																					
1,1,1-TRICHLOROETHANE	200	6600	940	370	353	293	5550 J	25 U	0.22 J	0.17 U	1 U	0.29 U	0.25 UJ	0.25 U	10	0.48 J	1 U	0.559 J	33.3	30.7	30.6
1,1,2,2-TETRACHLOROETHANE	0.2	6 U	10 U	20 U	5.75 U	5.75 U	NA	NA	0.30 U	0.1 U	1 U	0.23 U	NA	NA	0.30 U	0.1 U	1 U	0.23 U	NA	NA	NA
1,1,2-TRICHLOROETHANE	5	20 U	10 U	20 U	6.5 U	6.5 U	25 U	25 U	1 U	0.1 U	1 U	0.26 U	0.25 U	0.25 U	1 U	0.1 U	1 U	0.26 U	2.5 U	2.5 U	5 U
1,1,2-TRICHLOROTRIFLUOROETHANE	210000	500	150	59.6	41.1	31.1	NA	NA	0.70 J	1.1	0.752 J	1.07	NA	NA	1 U	140	7.25	88.9	NA	NA	NA
1,1-DICHLOROETHANE	70	2100	850	467	482	429	1230	941	1 U	0.12 U	1 U	0.24 U	0.25 U	0.25 U	28	5.3	2.76	35.1	612	580	469
1,1-DICHLOROETHENE	7	2000	490	257	126	98.8	1310	981	1 U	0.15 U	1 U	0.28 U	0.25 U	0.25 U	79	13	2.26	47.6	546	532	601
1,2,4-TRICHLOROBENZENE	70	20 U	10 U	20 U	7 U	7 U	NA	NA	1 U	0.1 U	1 U	0.28 U	NA	NA	1 U	0.1 U	1 U	0.28 U	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	0.2	6.6 U	11 U	40 U	13.8 U	13.8 U	NA	NA	0.33 U	0.11 U	2 U	0.55 U	NA	NA	0.33 U	0.11 U	2 U	0.55 U	NA	NA	NA
1,2-DIBROMOETHANE	0.02	6 U	10 U	20 U	6 U	6 U	NA	NA	0.30 U	0.1 U	1 U	0.24 U	NA	NA	0.30 U	0.1 U	1 U	0.24 U	NA	NA	NA
1,2-DICHLOROBENZENE	600	20 U	10 U	20 U	4 U	4 U	NA	NA	1 U	0.1 U	1 U	0.16 U	NA	NA	1 U	0.1 U	1 U	0.16 U	NA	NA	NA
1,2-DICHLOROETHANE	3	20 U	10 U	20 U	5.5 U	5.5 U	25 U	25 U	1 U	0.1 U	1 U	0.22 U	0.25 U	0.25 U	0.43 J	0.1 U	1 U	0.22 U	8.8 J	8.4 J	6.8 J
1,2-DICHLOROPROPANE	5	20 U	10 U	20 U	6.75 U	6.75 U	NA	NA	1 U	0.1 U	1 U	0.27 U	NA	NA	1 U	0.1 U	1 U	0.27 U	NA	NA	NA
1,3-DICHLOROBENZENE	210	20 U	13 U	20 U	6.25 U	6.25 U	NA	NA	1 U	0.13 U	1 U	0.25 U	NA	NA	1 U	0.13 U	1 U	0.25 U	NA	NA	NA
1,4-DICHLOROBENZENE	75	20 U	10 U	20 U	6.25 U	6.25 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA	NA
2-BUTANONE	4200	200 U	100 U	200 UR	40 U	40 U	NA	NA	10 U	1 U	10 UR	1.6 U	NA	NA	10 U	1 U	10 UR	1.6 U	NA	NA	NA
2-HEXANONE	280	100 U	30 U	100 U	12.5 U	12.5 U	NA	NA	5 U	0.3 U	5 U	0.50 U	NA	NA	5 U	0.3 U	5 U	0.50 U	NA	NA	NA
4-METHYL-2-PENTANONE	560	100 U	29 U	100 U	12.5 U	12.5 U	NA	NA	5 U	0.29 U	5 U	0.50 U	NA	NA	5 U	0.29 U	5 U	0.50 U	NA	NA	NA
ACETONE	6300	200 U	84 U	200 UR	45 U	56.5 U	NA	NA	10 U	1.7 U	10 UR	2.37 U	NA	NA	10 U	4.7 J	10 UR	2.89 U	NA	NA	NA
BENZENE	1	2.3 J	11 U	20 U	3.5 U	3.5 U	25 U	25 U	1 U	0.11 U	1 U	0.14 U	0.25 U	0.25 U	1 U	0.11 U	1 U	0.186 J	2.5 U	2.5 U	5 U
BROMODICHLOROMETHANE	0.6	12 U	10 U	20 U	4.5 U	4.5 U	NA	NA	0.60 U	0.1 U	1 U	0.18 U	NA	NA	0.60 U	0.1 U	1 U	0.18 U	NA	NA	NA
BROMOFORM	4.4	20 U	10 U	20 U	12.5 U	12.5 U	NA	NA	1 U	0.1 U	1 U	0.50 U	NA	NA	1 U	0.1 U	1 U	0.50 U	NA	NA	NA
BROMOMETHANE	9.8	40 U	32 U	40 U	8 U	8 U	NA	NA	2 U	0.32 U	2 U	0.32 U	NA	NA	2 U	0.32 U	2 U	0.32 U	NA	NA	NA
CARBON DISULFIDE	700	20 U	13 U	15.8 J	17.3 J	6.5 U	NA	NA	1 U	0.13 U	1 U	0.26 U	NA	NA	1 U	0.13 U	1 U	0.26 U	NA	NA	NA
CARBON TETRACHLORIDE	3	20 U	15 U	20 U	6 U	6 U	NA	NA	1 U	0.15 U	1 U	0.24 U	NA	NA	1 U	0.15 U	1 U	0.24 U	NA	NA	NA
CHLOROBENZENE	100	20 U	10 U	20 U	5.25 U	5.25 U	NA	NA	1 U	0.1 U	1 U	0.21 U	NA	NA	1 U	0.1 U	1 U	0.21 U	NA	NA	NA
CHLORODIBROMOMETHANE	0.4	8 U	10 U	20 U	4.5 U	4.5 U	NA	NA	0.40 U	0.1 U	1 U	0.18 U	NA	NA	0.40 U	0.1 U	1 U	0.18 U	NA	NA	NA
CHLOROETHANE	12	40 U	18 U	40 U	6.75 U	6.75 U	50 U	50 U	2 U	0.18 U	2 U	0.27 U	0.5 U	0.5 U	2 U	0.18 U	2 U	0.27 U	5 U	5 U	10 U
CHLOROFORM	70	20 U	11 U	20 U	5.75 U	5.75 U	NA	NA	1 U	0.11 U	1 U	0.23 U	NA	NA	1 U	0.11 U	1 U	0.23 U	NA	NA	NA
CHLOROMETHANE	2.7	40 U	29 U	40 UJ	9 U	9 U	NA	NA	2 U	0.29 U	2 UJ	0.36 U	NA	NA	2 U	0.29 U	2 UJ	0.36 U	NA	NA	NA
CIS-1,2-DICHLOROETHENE	70	20000	7200	4510	3900	3400	15800	10800	1 U	0.13 U	1 U	0.45 U	0.25 U	0.25 U	1.9	18	35.1	445	2.5 U	2.5 U	5 U
CIS-1,3-DICHLOROPROPENE	NC	8 U	11 U	20 U	3.75 U	3.75 U	NA	NA	0.40 U	0.11 U	1 U	0.15 U	NA	NA	0.40 U	0.11 U	1 U	0.15 U	NA	NA	NA
CYCLOHEXANE	NC	40 U	20 U	40 U	5 U	5 U	NA	NA	2 U	0.2 U	2 U	0.20 U	NA	NA	2 U	0.2 U	2 U	0.20 U	NA	NA	NA
DICHLORODIFLUOROMETHANE	1400	40 U	22 U	40 U	6.5 U	6.5 U	NA	NA	2 U	0.22 U	2 U	0.26 U	NA	NA	2 U	0.22 U	2 U	0.26 U	NA	NA	NA
ETHYLBENZENE	30	20 J	13 U	4.45 J	5.28 J	4.52 J	NA	NA	1 U	0.13 U	1 U	0.15 U	NA	NA	1 U	0.13 U	1 U	0.15 U	NA	NA	NA
ISOPROPYLBENZENE	0.8	4.1 J	15 U	20 U	3.75 U	3.75 U	NA	NA	0.80 U	0.15 U	1 U	0.15 U	NA	NA	0.80 U	0.15 U	1 U	0.15 U	NA	NA	NA
METHYL ACETATE	3000	20 U	30 U	40 U	14.8 U	14.8 U	NA	NA	1 U	0.3 U	2 U	0.59 U	NA	NA	1 U	0.3 U	2 U	0.59 U	NA	NA	NA
METHYL CYCLOHEXANE	NC	20 U	17 U	20 U	4.5 U	4.5 U	NA	NA	1 U	0.17 U	1 U	0.18 U	NA	NA	1 U	0.17 U	1 U	0.18 U	NA	NA	NA
METHYL TERT-BUTYL ETHER	20	20 U	10 U	20 U	6.25 U	6.25 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA	NA

TABLE 3-3

**SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 2 OF 6**

Parameter	GCTL	Source Well H10MW08							Upgradient Well H10MW10						Source Well H10MW14						
		7/29/2009	11/6/2009	3/4/2010	8/5/2010	8/5/2010 (DUP)	4/16/2012	10/17/2012	7/29/2009	11/5/2009	3/4/2010	8/5/2010	4/16/2012	10/17/2012	7/29/2009	11/6/2009	3/3/2010	8/4/2010	4/17/2012	4/17/2012 (DUP)	10/16/2012
Volatile Organics (µg/L)																					
METHYLENE CHLORIDE	5	40 U	82 J	40 U	14.2 U	12.9 U	NA	NA	2 U	0.14 U	2 U	0.27 U	NA	NA	2 U	0.14 U	2 U	0.27 U	NA	NA	NA
STYRENE	100	20 U	10 U	20 U	6 U	6 U	NA	NA	1 U	0.1 U	1 U	0.24 U	NA	NA	1 U	0.1 U	1 U	0.24 U	NA	NA	NA
TETRACHLOROETHENE	3	39	15 U	20 U	4.25 U	4.25 U	30 J	25 U	1 U	0.15 U	1 U	0.17 U	0.25 U	0.25 U	0.23 J	0.19 J	0.258 J	0.17 U	2.5 U	2.5 U	5 U
TOLUENE	40	240	86 J	47.9	44.1	33.9	NA	NA	1 U	0.1 U	1 U	0.19 U	NA	NA	0.66 J	0.11 J	1 U	1.18	NA	NA	NA
TOTAL 1,2-DICHLOROETHENE	63	NA	NA	NA	NA	NA	15800	10800	NA	NA	NA	NA	0.5 U	0.5 U	NA	NA	NA	NA	5 U	5 U	10 U
TOTAL XYLENES	20	100	49 J	19.1 J	24.9 J	14.6 J	NA	NA	1 U	0.22 U	1 U	0.22 U	NA	NA	0.45 J	0.22 U	1 U	0.22 U	NA	NA	NA
TRANS-1,2-DICHLOROETHENE	100	17 J	13 U	20 U	13.2 UJ	116 J	25 U	25 U	1 U	0.13 U	1 U	0.53 U	0.25 U	0.25 U	1 U	0.14 J	1 U	3.07	2.5 U	2.5 U	5 U
TRANS-1,3-DICHLOROPROPENE	NC	8 U	10 U	20 U	4.25 U	4.25 U	NA	NA	0.40 U	0.1 U	1 U	0.17 U	NA	NA	0.40 U	0.1 U	1 U	0.17 U	NA	NA	NA
TRICHLOROETHENE	3	22	46 J	20 U	12.5 U	12.5 U	25 U	25 U	0.22 J	0.23 J	1 U	0.50 U	0.25 U	0.25 U	11	6.9	4.9	4.82	45.5	43	28
TRICHLOROFLUOROMETHANE	2100	40 U	17 U	40 U	6.25 U	6.25 U	NA	NA	2 U	0.17 U	2 U	0.25 U	NA	NA	2 U	0.17 U	2 U	0.25 U	NA	NA	NA
VINYL CHLORIDE	1	20 U	18 U	20 U	5 U	5 U	25 U	25 UJ	1 U	0.18 U	1 U	0.20 U	0.25 U	0.25 UJ	1 U	0.18 U	1 U	1.01	2.5 U	2.5 U	5 U
Volatile Organic Gases (µg/L)																					
ETHANE	NC	2.7 J	1.50 J	1.5 J	1 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U
ETHENE	NC	1.7	1.29 J	1.61 J	1 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U
METHANE	NC	1300	776 J	751	562 J	456 J	1180	922	70	98.9 J	176	69.5 J	73.1	23	130	185 J	172	104 J	203	181	143
Semivolatile Organics (µg/L)																					
3&4-METHYLPHENOL	NC	270	NA	24	NA	NA	151	NA	3.2 U	NA	3.5 U	NA	1.16 U	NA	3.5 U	NA	3.24 U	NA	12.6	12.1	NA
3-METHYLPHENOL	35	NA	64	NA	8.65	9.25	NA	NA	NA	0.71 U	NA	0.713 U	NA	NA	NA	0.71 U	NA	0.713 U	NA	NA	NA
4-METHYLPHENOL	3.5	NA	64	NA	8.65	9.25	NA	149	NA	0.71 U	NA	0.713 U	NA	1.16 U	NA	0.71 U	NA	0.713 U	NA	NA	11.6
NAPHTHALENE	14	620	140	92.2	188	170	397	545	4.6 U	0.42 U	5 U	0.417 U	1.16 U	1.16 U	0.86 J	0.42 U	4.63 U	0.417 U	1.18 U	1.18 U	1.16 U
Miscellaneous Parameters (mg/L)																					
ALKALINITY (MG/L)	NC	147	71.3	NA	69.7	67.6	135	116	62.3	NA	NA	29.9	39.8	73.9	27.9	8.28	NA	16.4	59.3	59.7	60.1
CHLORIDE (MG/L) (1)	250	41.1	26	20.8	18	18	30.2	23.4	13	12.7	13.6	12.7	13.4	10.2	14.1	14.2	15.3	17.7	28.9	29.1	24.9
NITRATE-N (MG/L) (1)	10	0.033 UR	0.0330 U	0.042 J	0.033 U	0.033 U	0.066 U	0.033 U	0.553 J	1.39	0.95	0.635	0.709	1.62	0.091 J	0.702	0.1 J	0.071 J	0.04 J	0.041 J	0.033 U
NITRITE-N (MG/L) (1)	1	0.033 UR	0.0330 U	0.2 U	0.033 U	0.033 U	0.066 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 U
ORTHOPHOSPHATE-P (MG/L)	NC	0.0365	NA	0.03 U	0.016 J	0.02 J	0.0162 J	0.0452	0.0205	NA	0.03 U	0.01 U	0.01 U	0.0188 J	0.0205	NA	0.03 U	0.011 J	0.0124 J	0.0124 J	0.0282 J
SULFATE (MG/L) (1)	250	1 U	0.663	1.87	0.985 J	1.09	1.26 J	0.33 U	13	21.7	15.1	14.9	16.8	18.7	12.8	17.9	28.8	2.99	1.4 J	1.38 J	1.45 J
SULFIDE (MG/L)	NC	3.86	3.53	2.03	3.39	1.36 J	0.807 J	2.17 J	0.741 U	0.678 U	2.03 U	0.678 U	0.678 U	0.811 J	0.741 U	0.678 U	0.88 J	0.69 J	0.807 J	0.947 J	0.678 J
TOTAL ORGANIC CARBON (MG/L)	NC	43.1	19	10.6	8.64	7.59	35.6	24.2	4.71	4.1	4.1	4.31	4.38	3.48	3.95	3.66	4.07	3.64	6.3	6.48	6.21
TOTAL PHOSPHORUS-P (MG/L)	NC	NA	0.0200 U	NA	NA	NA	NA	NA	NA	0.0200 U	NA	NA	NA	NA	NA	0.0200 U	NA	NA	NA	NA	NA

TABLE 3-3

**SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 3 OF 6**

Parameter	GCTL	Source Well						Source Well						Downgradient Well					
		H10MW19						H10MW22						H10MW23					
		7/30/2009	11/6/2009	3/3/2010	8/4/2010	4/17/2012	10/16/2012	7/29/2009	11/6/2009	3/3/2010	8/5/2010	4/17/2012	10/16/2012	7/30/2009	11/6/2009	3/3/2010	8/4/2010	4/16/2012	10/16/2012
Volatile Organics (µg/L)																			
1,1,1-TRICHLOROETHANE	200	1 U	0.17 U	0.406 J	0.29 U	0.73 J	0.25 U	0.36 J	0.34 U	2 U	2.9 U	2.5 U	2.5 U	1 U	0.17 U	1 U	0.29 U	0.25 UJ	0.25 U
1,1,2,2-TETRACHLOROETHANE	0.2	0.30 U	0.1 U	1 U	0.23 U	NA	NA	0.30 U	0.2 U	2 U	2.3 U	NA	NA	0.30 U	0.1 U	1 U	0.23 U	NA	NA
1,1,2-TRICHLOROETHANE	5	0.54 J	0.26 J	0.718 J	0.26 U	0.64 J	0.31 J	1 U	0.2 U	2 U	2.6 U	2.5 U	2.5 U	1 U	0.1 U	1 U	0.26 U	0.25 U	0.25 U
1,1,2-TRICHLOROTRIFLUOROETHANE	210000	58	72	115	129	NA	NA	400	180	110	48.3	NA	NA	1 U	0.18 U	1 U	0.33 U	NA	NA
1,1-DICHLOROETHANE	70	70	38	22	19.9	27.6	15.9	140	70	70.4	97	192	196	1 U	0.12 U	1 U	0.24 U	0.25 U	0.25 U
1,1-DICHLOROETHENE	7	93	56	51.7	34.8	54.8	28.9	160	130	139	137	328	378	1 U	0.15 U	1 U	0.28 U	0.25 U	0.25 U
1,2,4-TRICHLOROBENZENE	70	1 U	0.1 U	1 U	0.28 U	NA	NA	1 U	0.2 U	2 U	2.8 U	NA	NA	1 U	0.1 U	1 U	0.28 U	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	0.2	0.33 U	0.11 U	2 U	0.55 U	NA	NA	0.33 U	0.22 U	4 U	5.5 U	NA	NA	0.33 U	0.11 U	2 U	0.55 U	NA	NA
1,2-DIBROMOETHANE	0.02	0.30 U	0.1 U	1 U	0.24 U	NA	NA	0.30 U	0.2 U	2 U	2.4 U	NA	NA	0.30 U	0.1 U	1 U	0.24 U	NA	NA
1,2-DICHLOROBENZENE	600	1 U	0.1 U	1 U	0.16 U	NA	NA	1 U	0.2 U	2 U	1.6 U	NA	NA	1 U	0.1 U	1 U	0.16 U	NA	NA
1,2-DICHLOROETHANE	3	0.74 J	0.55 J	1 U	0.22 U	0.27 J	0.25 U	1.7	0.56 J	0.524 J	2.2 U	2.9 J	2.5 U	1 U	0.1 U	1 U	0.22 U	0.25 U	0.25 U
1,2-DICHLOROPROPANE	5	1 U	0.1 U	1 U	0.27 U	NA	NA	1 U	0.2 U	2 U	2.7 U	NA	NA	1 U	0.1 U	1 U	0.27 U	NA	NA
1,3-DICHLOROBENZENE	210	1 U	0.13 U	1 U	0.25 U	NA	NA	1 U	0.26 U	2 U	2.5 U	NA	NA	1 U	0.13 U	1 U	0.25 U	NA	NA
1,4-DICHLOROBENZENE	75	1 U	0.1 U	1 U	0.25 U	NA	NA	1 U	0.2 U	2 U	2.5 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA
2-BUTANONE	4200	10 U	1 U	10 UR	1.6 U	NA	NA	10 U	2 U	20 UR	16 U	NA	NA	10 U	1 U	10 UR	1.6 U	NA	NA
2-HEXANONE	280	5 U	0.3 U	5 U	0.50 U	NA	NA	5 U	0.6 U	10 U	5 U	NA	NA	5 U	0.3 U	5 U	0.50 U	NA	NA
4-METHYL-2-PENTANONE	560	5 U	0.29 U	5 U	0.50 U	NA	NA	5 U	0.58 U	10 U	5 U	NA	NA	5 U	0.29 U	5 U	0.50 U	NA	NA
ACETONE	6300	10 U	0.84 U	10 UR	2.3 U	NA	NA	10 U	3.1 J	20 UR	19 U	NA	NA	10 U	1.8 J	10 UR	2.67 U	NA	NA
BENZENE	1	1 U	0.11 U	1 U	0.14 U	0.25 U	0.25 U	0.62 J	0.31 J	0.389 J	1.4 U	2.5 U	2.5 U	1 U	0.11 U	1 U	0.14 U	0.25 U	0.25 U
BROMODICHLOROMETHANE	0.6	0.60 U	0.1 U	1 U	0.18 U	NA	NA	0.60 U	0.2 U	2 U	3.96 J	NA	NA	0.60 U	0.1 U	1 U	0.18 U	NA	NA
BROMOFORM	4.4	1 U	0.1 U	1 U	0.50 U	NA	NA	1 U	0.2 U	2 U	5 U	NA	NA	1 U	0.1 U	1 U	0.50 U	NA	NA
BROMOMETHANE	9.8	2 U	0.32 U	2 U	0.32 U	NA	NA	2 U	0.64 U	4 U	3.2 U	NA	NA	2 U	0.32 U	2 U	0.32 U	NA	NA
CARBON DISULFIDE	700	1 U	0.13 U	1 U	0.26 U	NA	NA	1 U	0.26 U	18	2.6 U	NA	NA	1 U	0.13 U	1 U	0.26 U	NA	NA
CARBON TETRACHLORIDE	3	1 U	0.15 U	1 U	0.24 U	NA	NA	1 U	0.3 U	2 U	2.4 U	NA	NA	1 U	0.15 U	1 U	0.24 U	NA	NA
CHLOROBENZENE	100	1 U	0.1 U	1 U	0.21 U	NA	NA	1 U	0.2 U	2 U	2.1 U	NA	NA	1 U	0.1 U	1 U	0.21 U	NA	NA
CHLORODIBROMOMETHANE	0.4	0.40 U	0.1 U	1 U	0.18 U	NA	NA	0.40 U	0.2 U	2 U	1.8 U	NA	NA	0.40 U	0.1 U	1 U	0.18 U	NA	NA
CHLOROETHANE	12	2 U	0.18 U	2 U	0.27 U	0.5 U	0.5 U	2 U	0.36 U	4 U	2.7 U	5 U	5 U	2 U	0.18 U	2 U	0.27 U	0.5 U	0.5 U
CHLOROFORM	70	1 U	0.11 U	1 U	0.23 U	NA	NA	1 U	0.22 U	2 U	2.3 U	NA	NA	1 U	0.11 U	1 U	0.23 U	NA	NA
CHLOROMETHANE	2.7	2 U	0.29 U	2 UJ	0.36 U	NA	NA	2 U	0.58 U	4 UJ	3.6 U	NA	NA	2 U	0.29 U	2 UJ	0.36 U	NA	NA
CIS-1,2-DICHLOROETHENE	70	34	14	4.46	6.46	35.7	34.7	780	820	714	873	863	829	1 U	0.13 U	1 U	0.45 U	0.25 U	0.25 U
CIS-1,3-DICHLOROPROPENE	NC	0.40 U	0.11 U	1 U	0.15 U	NA	NA	0.40 U	0.22 U	2 U	1.5 U	NA	NA	0.40 U	0.11 U	1 U	0.15 U	NA	NA
CYCLOHEXANE	NC	2 U	0.2 U	2 U	0.20 U	NA	NA	2 U	0.4 U	4 U	2 U	NA	NA	2 U	0.2 U	2 U	0.20 U	NA	NA
DICHLORODIFLUOROMETHANE	1400	2 U	0.22 U	2 U	0.26 U	NA	NA	2 U	0.44 U	4 U	2.6 U	NA	NA	2 U	0.22 U	2 U	0.26 U	NA	NA
ETHYLBENZENE	30	1 U	0.13 U	1 U	0.15 U	NA	NA	0.21 J	0.26 U	2 U	1.5 U	NA	NA	1 U	0.13 U	1 U	0.15 U	NA	NA
ISOPROPYLBENZENE	0.8	0.80 U	0.15 U	1 U	0.15 U	NA	NA	0.80 U	0.3 U	2 U	1.5 U	NA	NA	0.80 U	0.15 U	1 U	0.15 U	NA	NA
METHYL ACETATE	3000	1 U	0.3 U	2 U	0.59 U	NA	NA	1 U	0.6 U	4 U	5.9 U	NA	NA	1 U	0.3 U	2 U	0.59 U	NA	NA
METHYL CYCLOHEXANE	NC	1 U	0.17 U	1 U	0.18 U	NA	NA	0.20 J	0.34 U	2 U	1.8 U	NA	NA	1 U	0.17 U	1 U	0.18 U	NA	NA
METHYL TERT-BUTYL ETHER	20	1 U	0.1 U	1 U	0.25 U	NA	NA	1 U	0.2 U	2 U	2.5 U	NA	NA	1 U	0.1 U	1 U	0.25 U	NA	NA

TABLE 3-3

**SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 4 OF 6**

Parameter	GCTL	Source Well H10MW19						Source Well H10MW22						Downgradient Well H10MW23					
		7/30/2009	11/6/2009	3/3/2010	8/4/2010	4/17/2012	10/16/2012	7/29/2009	11/6/2009	3/3/2010	8/5/2010	4/17/2012	10/16/2012	7/30/2009	11/6/2009	3/3/2010	8/4/2010	4/16/2012	10/16/2012
Volatile Organics (µg/L)																			
METHYLENE CHLORIDE	5	2 U	0.14 U	2 U	0.27 U	NA	NA	2 U	1.6 J	4 U	6.27 U	NA	NA	2 U	0.14 U	2 U	0.27 U	NA	NA
STYRENE	100	1 U	0.1 U	1 U	0.24 U	NA	NA	1 U	0.2 U	2 U	2.4 U	NA	NA	1 U	0.1 U	1 U	0.24 U	NA	NA
TETRACHLOROETHENE	3	0.28 J	0.2 J	0.418 J	0.295 J	0.58 J	0.44 J	2.7	2.4	2.55	2.41 J	2.5 U	2.5 U	1 U	0.15 U	1 U	0.17 U	0.25 U	0.25 U
TOLUENE	40	0.32 J	0.28 J	1 U	0.19 U	NA	NA	3.5	1.8 J	1.8 J	2.14 J	NA	NA	1 U	0.1 U	1 U	0.19 U	NA	NA
TOTAL 1,2-DICHLOROETHENE	63	NA	NA	NA	NA	35.7	34.7	NA	NA	NA	NA	863	829	NA	NA	NA	NA	0.5 U	0.5 U
TOTAL XYLENES	20	1 U	0.22 U	1 U	0.22 U	NA	NA	0.83 J	0.44 U	2 U	2.2 U	NA	NA	1 U	0.22 U	1 U	0.22 U	NA	NA
TRANS-1,2-DICHLOROETHENE	100	1 U	0.13 U	1 U	0.53 U	0.25 U	0.25 U	3.2	1.1 J	1.48 J	5.3 U	2.5 U	2.5 U	1 U	0.13 U	1 U	0.53 U	0.25 U	0.25 U
TRANS-1,3-DICHLOROPROPENE	NC	0.40 U	0.1 U	1 U	0.17 U	NA	NA	0.40 U	0.2 U	2 U	1.7 U	NA	NA	0.40 U	0.1 U	1 U	0.17 U	NA	NA
TRICHLOROETHENE	3	35	32	38.7	14.9	32.3	14.2	170	320	382	380	19.6	31.2	1 U	0.13 U	1 U	0.50 U	0.25 U	0.25 U
TRICHLOROFLUOROMETHANE	2100	2 U	0.17 U	2 U	0.25 U	NA	NA	2 U	0.34 U	4 U	2.5 U	NA	NA	2 U	0.17 U	2 U	0.25 U	NA	NA
VINYL CHLORIDE	1	2.6	2.1	0.627 J	0.347 J	0.64 J	0.82 J	1.5	1.3 J	1.33 J	2 U	2.5 U	2.5 U	1 U	0.18 U	1 U	0.20 U	0.25 U	0.25 U
Volatile Organic Gases (µg/L)																			
ETHANE	NC	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
ETHENE	NC	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
METHANE	NC	1.3 U	253 J	55.1	36.4 J	115	41.6	610	1030 J	843	584 J	832	527	9.1	22.8 J	10.1	3.89 J	10.4	4.62
Semivolatile Organics (µg/L)																			
3&4-METHYLPHENOL	NC	3.5 U	NA	3.24 U	NA	1.18 U	NA	3.5 U	NA	3.24 U	NA	1.18 U	NA	3.3 U	NA	3.27 U	NA	1.16 U	NA
3-METHYLPHENOL	35	NA	0.75 U	NA	0.713 U	NA	NA	NA	0.75 U	NA	0.713 U	NA	NA	NA	0.71 U	NA	0.713 U	NA	NA
4-METHYLPHENOL	3.5	NA	0.75 U	NA	0.713 U	NA	1.16 U	NA	0.75 U	NA	0.713 U	NA	1.16 U	NA	0.71 U	NA	0.713 U	NA	1.16 U
NAPHTHALENE	14	5 U	0.44 U	4.63 U	0.417 U	1.18 U	1.16 U	2.3 J	2.3 J	1.81 J	2.27 J	2.21 J	2.34 J	4.7 U	0.42 U	4.67 U	0.417 U	1.16 U	1.16 U
Miscellaneous Parameters (mg/L)																			
ALKALINITY (MG/L)	NC	54.1	2.3	NA	4.1	20.3	47.2	67.9	15.6	NA	47.5	68.6	65.8	8.59	10.6	NA	4.1	9.74	10.9
CHLORIDE (MG/L) (1)	250	14.8	13.8	16	13.5	16.2	12.6	27.2	23.5	24.7	25	28.8	28.3	14.6	6.55	7.72	5.57	6.01	11.4
NITRATE-N (MG/L) (1)	10	0.113 J	0.0330 U	0.055 J	0.17	0.033 U	0.054 J	0.033 UR	0.0330 U	0.2 U	0.033 U	0.033 U	0.033 U	0.601 J	0.229	0.452	0.084 J	0.133 J	0.3
NITRITE-N (MG/L) (1)	1	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U
ORTHOPHOSPHATE-P (MG/L)	NC	0.013	NA	0.03 U	0.01 U	0.01 U	0.0169 J	0.0454	NA	0.013 J	0.017 J	0.035 J	0.0527	0.015	NA	0.03 U	0.01 U	0.0539	0.015 J
SULFATE (MG/L) (1)	250	13.2	12.2	17	16.5	18.3	22.3	1 U	0.330 U	0.787 J	0.33 U	0.33 U	0.33 U	45.8	24.8	28.2	23.2	27.7	26.7
SULFIDE (MG/L)	NC	0.714 U	0.741 U	2.03 U	0.678 U	0.891 J	0.678 U	0.741 U	0.769	0.82 J	0.949 J	1.08 J	0.947 J	0.714 U	0.678 U	2.03 U	0.69 U	0.678 J	0.678 U
TOTAL ORGANIC CARBON (MG/L)	NC	3.39	3.19	3.17	3.29	3.65	3.37	3.21	3.36	3.25	3.15	3.81	3.63	2.21	2.03	2.02	1.89	2.25	1.95 J
TOTAL PHOSPHORUS-P (MG/L)	NC	NA	0.0200 U	NA	NA	NA	NA	NA	0.02	NA	NA	NA	NA	NA	0.0200 U	NA	NA	NA	NA

TABLE 3-3

**SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 5 OF 6**

Parameter	SWCTL	Surface Water					
		H10SW01					
		7/30/2009	11/6/2009	3/4/2010	8/6/2010	4/17/2012	10/16/2012
Volatile Organics (µg/L)							
1,1,1-TRICHLOROETHANE	270	1 U	0.17 U	1 U	0.29 U	0.25 U	1.25 U
1,1,2,2-TETRACHLOROETHANE	10.8	0.30 U	0.1 U	1 U	0.23 U	NA	NA
1,1,2-TRICHLOROETHANE	16	1 U	0.1 U	1 U	0.26 U	0.25 U	1.25 U
1,1,2-TRICHLOROTRIFLUOROETHANE	NC	1.8	0.46 J	1.4	0.349 J	NA	NA
1,1-DICHLOROETHANE	NC	0.68 J	0.22 J	0.373 J	0.24 U	0.25 U	1.25 U
1,1-DICHLOROETHENE	3.2	0.73 J	0.15 U	0.404 J	0.28 U	0.25 U	1.25 U
1,2,4-TRICHLOROBENZENE	23	1 U	0.1 U	1 U	0.28 U	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE	NC	0.33 U	0.11 U	2 U	0.55 UJ	NA	NA
1,2-DIBROMOETHANE	13	0.30 U	0.1 U	1 U	0.24 U	NA	NA
1,2-DICHLOROBENZENE	99	1 U	0.1 U	1 U	0.16 U	NA	NA
1,2-DICHLOROETHANE	37	1 U	0.1 U	1 U	0.22 U	0.25 U	1.25 U
1,2-DICHLOROPROPANE	14	1 U	0.1 U	1 U	0.27 U	NA	NA
1,3-DICHLOROBENZENE	85	1 U	0.13 U	1 U	0.25 U	NA	NA
1,4-DICHLOROBENZENE	3	1 U	0.1 U	1 U	0.25 U	NA	NA
2-BUTANONE	120000	10 U	1 U	10 UR	1.6 U	NA	NA
2-HEXANONE	NC	5 U	0.3 U	5 U	0.50 U	NA	NA
4-METHYL-2-PENTANONE	23000	5 U	0.29 U	5 U	0.50 U	NA	NA
ACETONE	1700	10 U	3.6 J	13.9 J	15.9 U	NA	NA
BENZENE	71.28	1 U	0.11 U	1 U	0.14 U	0.25 U	1.25 U
BROMODICHLOROMETHANE	22	0.60 U	0.1 U	1 U	0.18 U	NA	NA
BROMOFORM	360	1 U	0.1 U	1 U	0.50 U	NA	NA
BROMOMETHANE	35	2 U	0.32 U	2 U	0.32 U	NA	NA
CARBON DISULFIDE	110	1 U	0.13 U	1 U	0.26 U	NA	NA
CARBON TETRACHLORIDE	4.42	1 U	0.15 U	1 U	0.24 U	NA	NA
CHLOROBENZENE	17	1 U	0.1 U	1 U	0.21 U	NA	NA
CHLORODIBROMOMETHANE	34	0.40 U	0.1 U	1 U	0.18 U	NA	NA
CHLOROETHANE	NC	2 U	0.18 U	2 U	0.27 U	0.5 U	2.5 U
CHLOROFORM	470.8	1 U	0.11 U	1 U	0.23 U	NA	NA
CHLOROMETHANE	470.8	2 U	0.29 U	2 UJ	0.36 U	NA	NA
CIS-1,2-DICHLOROETHENE	NC	1.5	0.76 J	1.28	0.65 J	0.25 U	1.25 U
CIS-1,3-DICHLOROPROPENE	NC	0.40 U	0.11 U	1 U	0.15 U	NA	NA
CYCLOHEXANE	NC	2 U	0.2 U	2 U	0.20 U	NA	NA
DICHLORODIFLUOROMETHANE	NC	2 U	0.22 U	2 U	0.26 U	NA	NA
ETHYLBENZENE	610	1 U	0.13 U	1 U	0.15 U	NA	NA
ISOPROPYLBENZENE	260	0.80 U	0.15 U	1 U	0.15 U	NA	NA
METHYL ACETATE	NC	1 U	0.3 U	2 U	0.59 U	NA	NA
METHYL CYCLOHEXANE	NC	1 U	0.17 U	1 U	0.18 U	NA	NA
METHYL TERT-BUTYL ETHER	34000	1 U	0.1 U	1 U	0.25 U	NA	NA

TABLE 3-3

**SUMMARY OF GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA
PAGE 6 OF 6**

Parameter	SWCTL	Surface Water					
		H10SW01					
		7/30/2009	11/6/2009	3/4/2010	8/6/2010	4/17/2012	10/16/2012
Volatile Organics (µg/L)							
METHYLENE CHLORIDE	1580	2 U	0.14 U	2 U	0.27 U	NA	NA
STYRENE	460	1 U	0.1 U	1 U	0.24 U	NA	NA
TETRACHLOROETHENE	8.85	1 U	0.15 U	1 U	0.17 U	0.25 U	1.25 U
TOLUENE	480	1 U	0.1 U	1 U	0.19 U	NA	NA
TOTAL 1,2-DICHLOROETHENE	7000	NA	NA	NA	NA	0.5 U	2.5 U
TOTAL XYLENES	370	1 U	0.22 U	1 U	0.22 U	NA	NA
TRANS-1,2-DICHLOROETHENE	11000	1 U	0.13 U	1 U	0.53 U	0.25 U	1.25 U
TRANS-1,3-DICHLOROPROPENE	NC	0.40 U	0.1 U	1 U	0.17 U	NA	NA
TRICHLOROETHENE	80.7	0.69 J	0.38 J	0.688 J	0.50 U	0.25 U	1.25 U
TRICHLOROFLUOROMETHANE	NC	2 U	0.17 U	2 U	0.25 U	NA	NA
VINYL CHLORIDE	2.4	1 U	0.18 U	1 U	0.20 U	0.25 U	1.25 U
Volatile Organic Gases (µg/L)							
ETHANE	NC	NA	NA	NA	1 U	1 U	1 U
ETHENE	NC	NA	NA	NA	1 U	1 U	1 U
METHANE	NC	NA	NA	NA	99.7 J	95.2	64.2
Semivolatile Organics (µg/L)							
3&4-METHYLPHENOL	NC	3.3 U	NA	3.5 UR	NA	1.18 U	NA
3-METHYLPHENOL	450	NA	0.75 U	NA	0.716 U	NA	NA
4-METHYLPHENOL	70	NA	0.75 U	NA	0.716 U	NA	1.16 U
NAPHTHALENE	26	4.7 U	0.44 U	4.9 UJ	0.419 U	1.18 U	1.16 U
Miscellaneous Parameters (mg/L)							
ALKALINITY (MG/L)	NC	NA	NA	NA	52.4	93.8	112
CHLORIDE (MG/L) (1)	NC	NA	NA	NA	8.69	10.2	8.29
NITRATE-N (MG/L) (1)	NC	NA	NA	NA	0.26	0.473	0.982
NITRITE-N (MG/L) (1)	NC	NA	NA	NA	0.033 U	0.033 U	0.033 U
ORTHOPHOSPHATE-P (MG/L)	NC	NA	NA	NA	0.01 U	0.01 U	0.0207 J
SULFATE (MG/L) (1)	NC	NA	NA	NA	16.6	26.9	19
SULFIDE (MG/L)	NC	NA	NA	NA	0.678 U	0.678 J	0.678 U
TOTAL ORGANIC CARBON (MG/L)	NC	NA	NA	NA	9.09	5.9	7.88
TOTAL PHOSPHORUS-P (MG/L)	NC	NA	NA	NA	NA	NA	NA

Notes:
(1) = The criteria value for this parameter has been converted to match the reported result.
(2) = The criteria units and the result units for this parameter do not match, and a unit conversion mapping has not been established. Exceedance shading was not performed.

Data Qualifiers:
Blank (i.e., no qualifier) = the chemical was detected.
J = The chemical was detected but the concentration reported is an estimated value.
U = The chemical was not detected.
R = The chemical was rejected.
NC = no criteria available for this parameter
NA = not analyzed

TABLE 3-4

SUMMARY OF GEOCHEMICAL AND NATURAL ATTENUATION PARAMETER FINDINGS
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Parameter	Source Well						Upgradient Well						Source Well					
	H10MW08						H10MW10						H10MW14					
	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/16/2012	10/17/2012	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/16/2012	10/17/2012	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/17/2012	10/16/2012
Ethane (µg/L)	2.7 J	1.50 J	1.5 J	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
Ethene (µg/L)	1.7	1.29 J	1.61 J	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
Methane (µg/L)	1300	776 J	751	562 J	1180	922	70	98.9 J	176	69.5 J	73.1	23	130	185 J	172	104 J	203	143
Alkalinity (mg/L)	147	71	NA	70	135	116	62	NA	NA	30	40	74	28	8	NA	16	59	60
Nitrate (mg/L)	0.033 UR	0.0330 U	0.042 J	0.033 U	0.066 U	0.033 U	0.553 J	1.39	0.95	0.64	0.71	1.62	0.091 J	0.70	0.1 J	0.071 J	0.04 J	0.033 U
Nitrite (mg/L)	0.033 UR	0.0330 U	0.2 U	0.033 U	0.066 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U
Sulfate (mg/L)	1 U	0.66	1.87	0.985 J	1.26 J	0.33 U	13.00	21.70	15.10	14.90	16.80	18.70	12.80	17.90	28.80	2.99	1.4 J	1.45 J
Sulfide (mg/L)	0.8	0.16	0.8	2	0.807 J	2.17 J	0	U	0.01	0	0.678 U	0.811 J	0.16	0.09	0.16	0.2	0.807 J	0.678 J
Chloride (mg/L)	41	26	21	18	30	23	13	13	14	13	13	10	14	14	15	18	29	25
Total Organic Carbon (mg/L)	43.1	19	10.6	8.64	35.6	24.2	4.71	4.1	4.1	4.31	4.38	3.48	3.95	3.66	4.07	3.64	6.3	6.21
Orthophospate (mg/L)	1 U	0.663	1.87	0.985 J	1.26 J	0.33 U	13	21.7	15.1	14.9	16.8	18.7	12.8	17.9	28.8	2.99	1.4 J	1.45 J
Dissolved Oxygen (mg/L)	2	0.15	0.58	0.3	0.41	0.11	1	0.7	3	0.7	0.72	1.65	0.8	0.6	0.7	0.9	0.72	0.16
Carbon Dioxide (mg/L)	90	90	50	90	110	50	70	65	50	0.75	80	42	65	100	100	75	80	72
Ferrous Iron (mg/L)	1.23	0.87	0.63	0.9	1.3	1.43	1.8	0.31	0.36	0.65	0.45	0.12	2.46	1.52	1.36	2.43	3	3.02
Hydrogen Sulfide (mg/L)	2	5	5	5	2	3	0	U	0	0	0	0	0.1	U	0.5	0.2	0.3	0.3
Temperature (°Celsius)	27.01	26.55	18.02	27.3	24.71	26.84	26.1	26.17	20.93	27.02	24.49	26.47	27.51	27.86	22.23	27.4	25.7	27.14
pH	6.11	6.58	6.8	6.07	6.1	6.01	5.8	5.95	5.98	5.59	5.77	6.02	5.38	5.78	5.61	5.36	5.9	5.22
Specific Conductivity. (mS/cm	0.519	0.407	0.389	0.342	0.304	0.377	0.22	0.236	0.192	0.211	0.184	0.265	0.157	0.175	0.169	0.159	0.257	0.262
Turbidity (NTU)	1.2	2.48	0.93	0.28	0.71	0.78	0.31	0.03	0.69	0.38	1.37	2.58	2.91	3.86	2.43	1.93	2.62	2.61
ORP (Eh)	NA	-203.1	-49.2	-144.6	-121.5	NA	NA	-22.1	64.7	136.8	114.1	-72.1	NA	-53.7	-27.5	18.7	-7.3	-85.2

Parameter	Source Well						Source Well						Downgradient Well					
	H10MW19						H10MW22						H10MW23					
	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/17/2012	10/16/2012	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/17/2012	10/16/2012	7/29/2009	11/6/2009	3/4/2010	8/5/2010	4/16/2012	10/16/2012
Ethane (µg/L)	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
Ethene (µg/L)	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U	1 U	1.00 U	3 U	1 U	1 U	1 U
Methane (µg/L)	1.3 U	253 J	55.1	36.4 J	115	41.6	610	1030 J	843	584 J	832	527	9.1	22.8 J	10.1	3.89 J	10.4	4.62
Alkalinity (mg/L)	54.1	2.3	NA	4.1	20.3	47.2	67.9	15.6	NA	47.5	68.6	65.8	8.59	10.6	NA	4.1	9.74	10.9
Nitrate (mg/L)	0.113 J	0.0330 U	0.055 J	0.17	0.033 U	0.054 J	0.033 UR	0.0330 U	0.2 U	0.033 U	0.033 U	0.033 U	0.601 J	0.229	0.452	0.084 J	0.133 J	0.3
Nitrite (mg/L)	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U	0.033 UR	0.0330 U	0.1 U	0.033 U	0.033 U	0.033 U
Sulfate (mg/L)	13.2	12.2	17	16.5	18.3	22.3	1 U	0.330 U	0.787 J	0.33 U	0.33 U	0.33 U	45.8	24.8	28.2	23.2	27.7	26.7
Sulfide (mg/L)	0.03	U	0.13	0	0.891 J	0.678 U	U	0.13	0.26	0	1.08 J	0.947 J	U	U	0	0	0.678 J	0.678 U
Chloride (mg/L)	14.8	13.8	16	13.5	16.2	12.6	27.2	23.5	24.7	25	28.8	28.3	14.6	6.55	7.72	5.57	6.01	11.4
Total Organic Carbon (mg/L)	3.39	3.19	3.17	3.29	3.65	3.37	3.21	3.36	3.25	3.15	3.81	3.63	2.21	2.03	2.02	1.89	2.25	1.95 J
Orthophospate (mg/L)	0.013	NA	0.03 U	0.01 U	0.01 U	0.0169 J	0.0454	NA	0.013 J	0.017 J	0.035 J	0.0527	0.015	NA	0.03 U	0.01 U	0.0539	0.015 J
Dissolved Oxygen (mg/L)	1.5	0.8	0.8	0.5	0.72	0.31	1.4	0.3	0.6	0.2	0.12	0.12	1	0.6	1	1	5.09	0.49
Carbon Dioxide (mg/L)	85	100	70	80	90	80	70	100	0	0	90	52	70	100	0	70	75	65
Ferrous Iron (mg/L)	0.97	1.87	1.48	2.4	3.03	1.74	2.12	NA	1.77	3.3	0	2.44	0.81	1.15	0.53	0.81	1.72	1.21
Hydrogen Sulfide (mg/L)	U	U	0	0	0	0	0.5	0.2	0.5	0.3	0.3	0.1	U	U	0	0	0	0
Temperature (°Celsius)	27.96	26.8	18.39	29.49	24.94	27.59	26.77	26.77	22.23	28.12	26.5	27.72	25.23	24.91	18.39	25.49	23.7	23.6
pH	5.69	6.09	5.58	5.23	5.36	5.69	5.9	6.16	5.91	5.96	5.97	5.78	5.12	4.96	5.09	4.99	5.1	4.68
Specific Conductivity. (mS/cm	0.24	0.151	0.155	0.156	0.148	0.237	0.268	0.288	0.217	0.28	0.24	0.26	0.219	0.116	0.113	0.101	0.115	0.163
Turbidity (NTU)	4.2	10.04	2.53	9.39	9.36	6.88	0.7	0.33	0.93	5.97	0.88	1.69	3.9	7.24	6.98	8.21	16.3	8.89
ORP (Eh)	NA	-56.2	71.9	24.9	64.6	-21.8	NA	-131.6	12.9	-97.4	-27.3	-79.7	NA	-30.6	133	123.7	121	NA

Notes
NA - Not analyzed
U = less than method detection limit
J = estimated value
ORP = oxidation reduction potential

mg/L - milligram per liter
µg/L - microgram per liter
mS/cm - millisiemens per centimeter

TABLE 3-5

**MANN-KENDALL TREND ANALYSIS SUMMARY
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA**

Location	Trends of COC Concentrations (95% Confidence Level)												
	1,1,1-TCA	1,1-DCA	1,1-DCE	1,1,2-TCA	1.2-DCA	PCE	TCE	Total 1,2-DCE	Vinyl Chloride	Benzene	3-Methylphenol	4-Methylphenol	Naphthalene
H10MW10	Significant Downward Trend	Stable	Stable	Stable	Stable	Stable	Significant Downward Trend	Stable	Stable	Stable	Stable	Stable	Stable
H10MW08	Stable	Significant Upward Trend	Stable	Significant Downward Trend	Stable	No Trend	Significant Downward Trend	Stable	No Trend	No Trend	Stable	Stable	Stable
H10MW14	Stable	Stable	Stable	Significant Downward Trend	No Trend	No Trend	Significant Downward Trend	No Trend	No Trend	Stable	No Trend	No Trend	No Trend
H10MW22	No Trend	Significant Downward Trend	Significant Downward Trend	Significant Downward Trend	Significant Downward Trend	Significant Downward Trend	Significant Downward Trend	Significant Upward Trend	No Trend	No Trend	Stable	Stable	Significant Downward Trend
H10MW19	No Trend	Significant Downward Trend	Significant Downward Trend	Stable	No Trend	Stable	Significant Downward Trend	Significant Downward Trend	Stable	Stable	Stable	Stable	No Trend
H10MW23	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	No Trend

Notes:
Alpha = 0.05 (95% confidence level)

Blue	Concentrations remained below GCTLs since 2009
Light green	Significant Downward Trend
Yellow	Stable Trend - a flat trend with small variation in time (Coefficient of variation no greater than 1)
Pink	Significant Upward Trend
White	No Trend

Null Hypothesis:
Alternative Hypotheses:

If p-value is less than alpha, then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

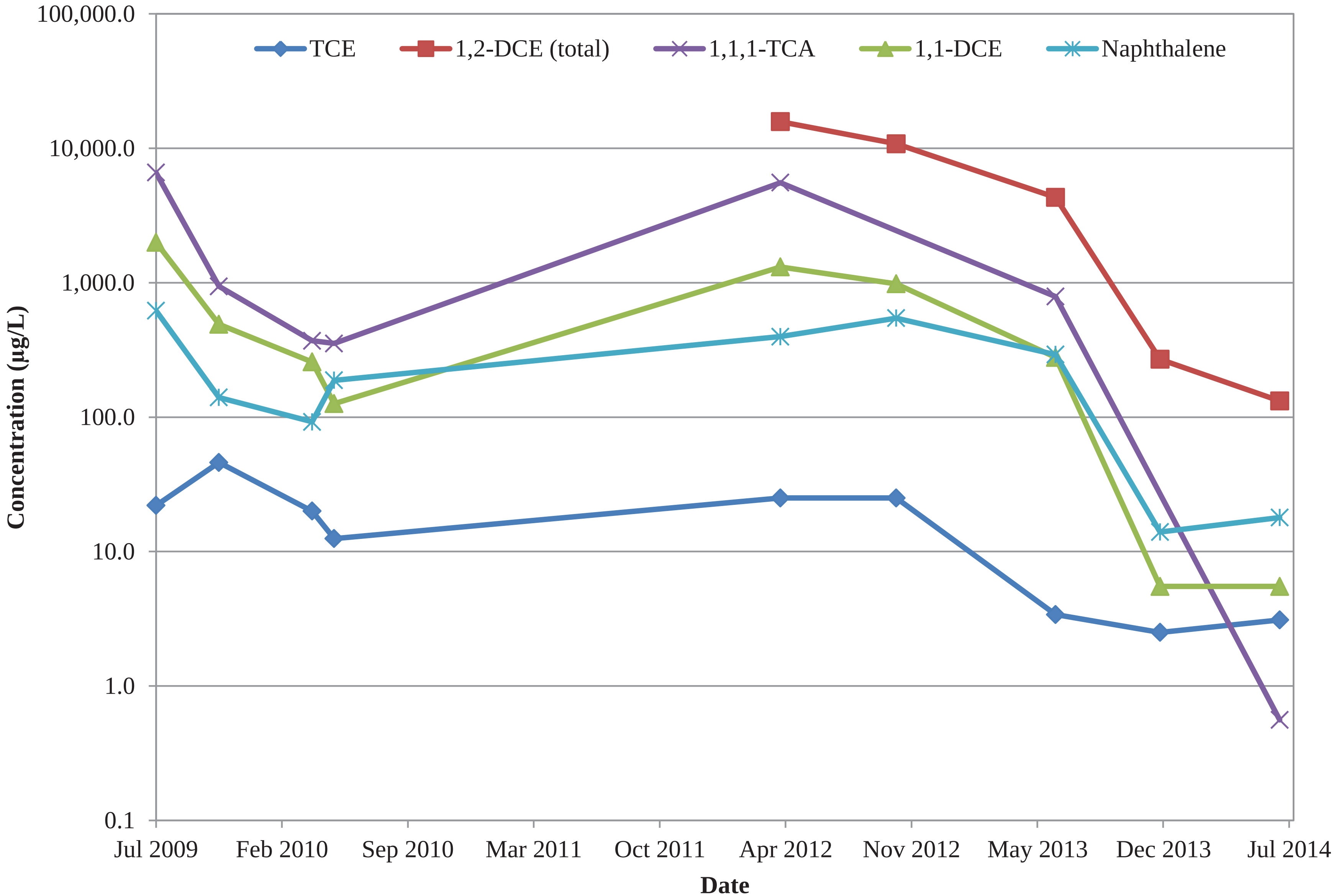
TABLE 3-6

MILESTONE OBJECTIVES EVALUATION
HANGAR 1000
ANNUAL MONITORED NATURAL ATTENUATION EVALUATION REPORT
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Compound	FDEP GCTLs (µg/L)	USEPA MCLs (µg/L)	FDEP NADSC (µg/L)	Year 3 2012	Apr-12 H10MW08 (µg/L)	Oct-12 H10MW08 (µg/L)	Apr-12 H10MW14 (µg/L)	Oct-12 H10MW14 (µg/L)	Apr-12 H10MW19 (µg/L)	Oct-12 H10MW19 (µg/L)	Apr-12 H10MW22 (µg/L)	Oct-12 H10MW22 (µg/L)
Benzene	1	5	100	--	**25 U**	**25 U**	**2.5 U**	**5 U**	0.25 U	0.25 U	**2.5 U**	**2.5 U**
1,1-DCA	70	NL	700	534	**1230**	**941**	**612**	469	27.6	15.9	192	196
1,2-DCA	3	5	300	8.2	**25 U**	**25 U**	**8.8**	6.8	0.27	0.25 U	2.9	2.5 U
1,1-DCE	7	NL	700	1251	**1310**	981	546	601	54.8	28.9	328	378
1,2-DCE (total)	63	NL	630	2327	**15800**	**10800**	5 U	10 U	35.7	34.7	863	829
1,1,1-TCA	200	200	2000	6139	5550	25 U	33.3	30.6	0.73	0.25 U	2.5 U	2.5 U
1,1,2-TCA	5	5	500	--	**25 U**	**25 U**	2.5 U	5 U	0.64	0.31	2.5 U	2.5 U
Trichloroethene	3	5	300	7259	25 U	25 U	45.5	28	32.3	14.2	19.6	31.2
Tetrachloroethene	3	NL	300	28.5	**30**	25 U	2.5 U	5 U	0.58	0.44	2.5 U	2.5 U
Vinyl Chloride	1	2	100	13.3	**25 U**	**25**	2.5 U	5 U	0.64	0.82	2.5 U	2.5 U
3-Methylphenol	35	NL	350	--	**151**	**149**	12.6	11.6	1.18 U	1.16 U	1.18 U	1.16 U
4-Methylphenol	3.5	NL	35	--	**151**	**149**	**12.6**	**11.6**	1.18 U	1.16 U	1.18 U	1.16 U
Naphthalene	14	NL	140	--	**397.0**	**545**	1.18 U	1.16 U	1.18 U	1.16 U	2.21	2.34

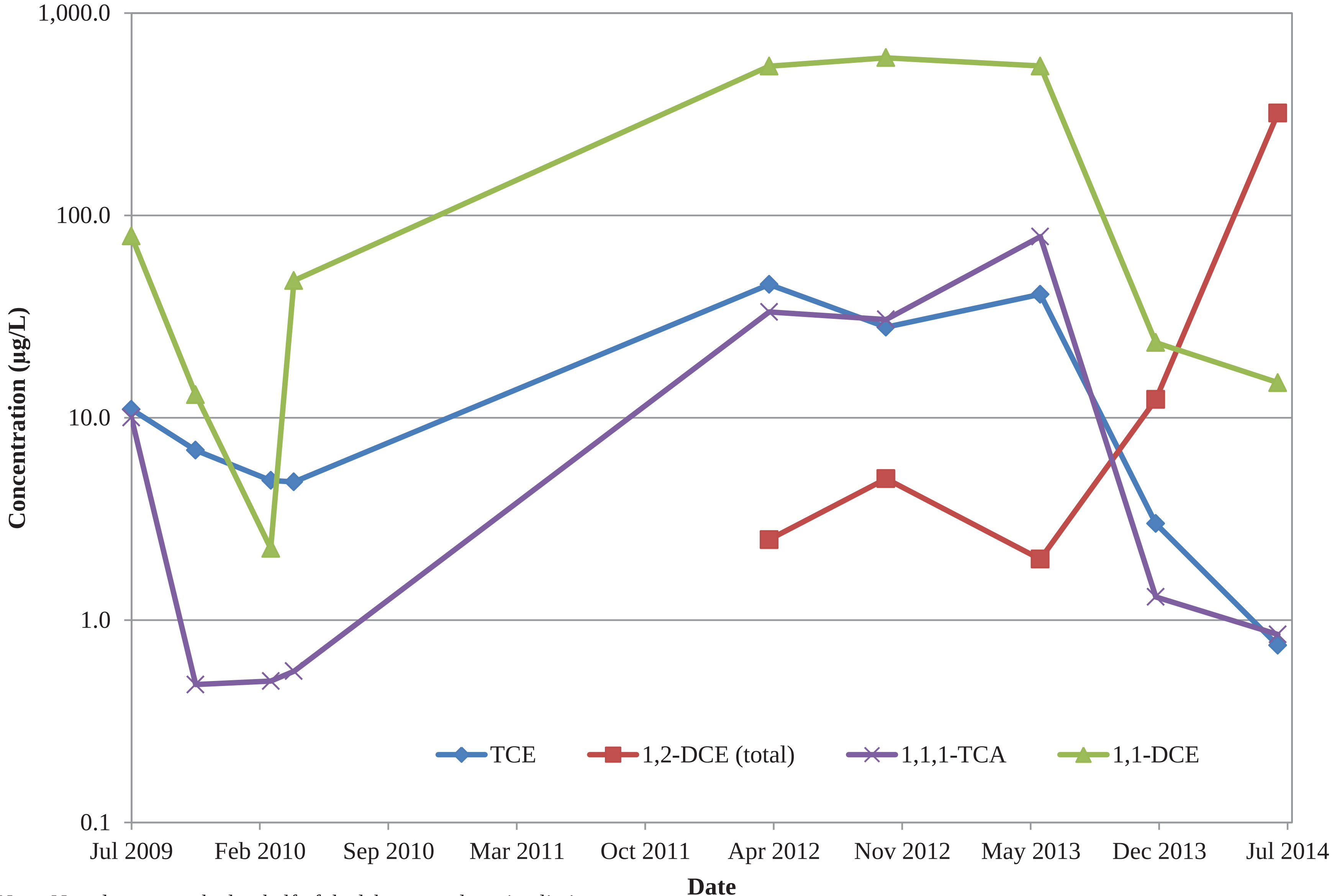
Notes:
Bold and shaded concentrations failed to meet target mIlestone objectives.
All concentrations are micrograms per liter (µg/L).
-- = none established
MCL = Maximum Contaminant Level
NADSC = Natural Attenuation Default Source Concentration
NL = not listed

FIGURE 5
HISTORICAL COC CONCENTRATIONS IN JAX-H10MW08



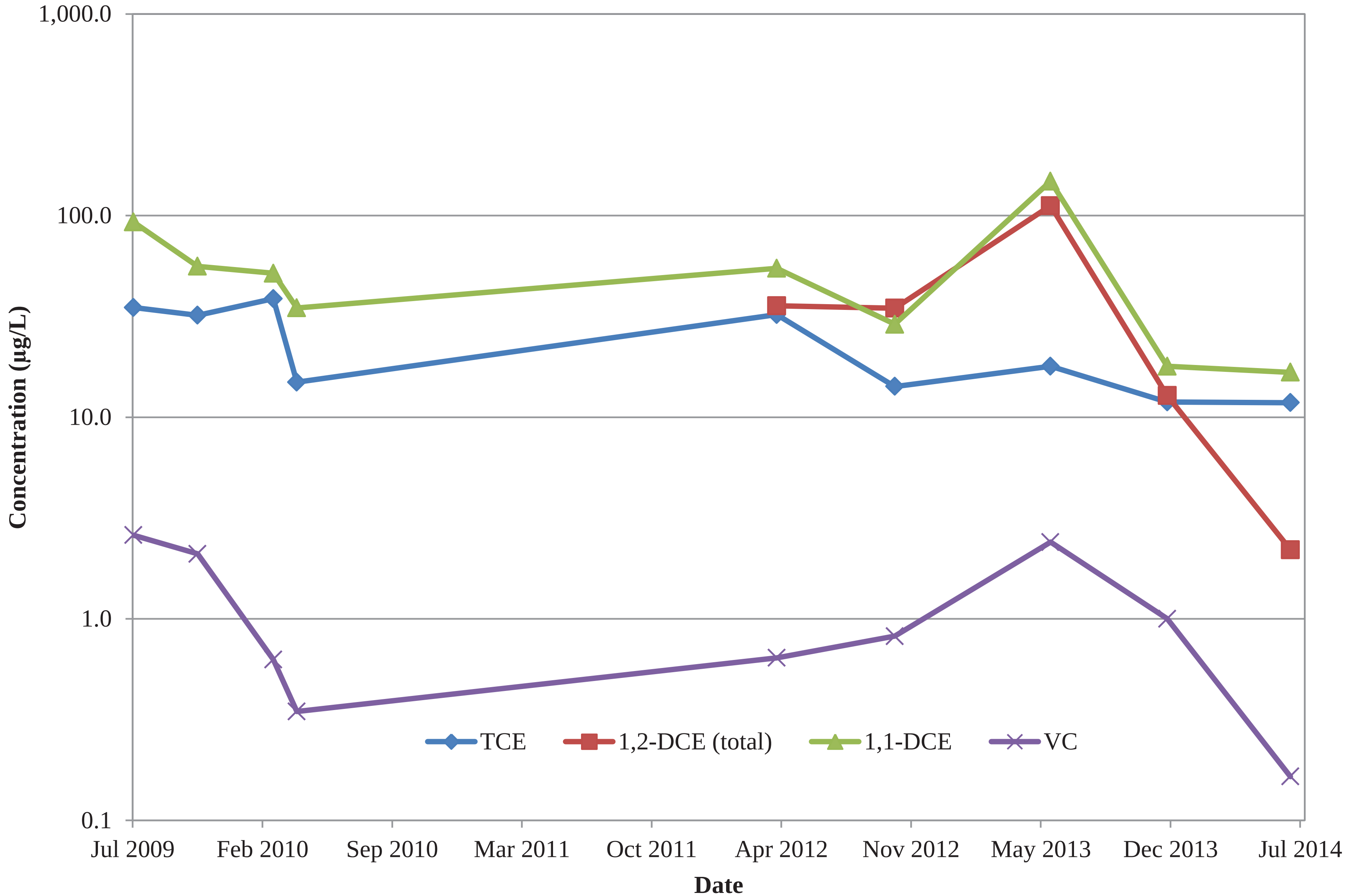
Note: Non-detects are not included in the graph.

FIGURE 6
HISTORICAL COC CONCENTRATIONS IN JAX-H10MW14



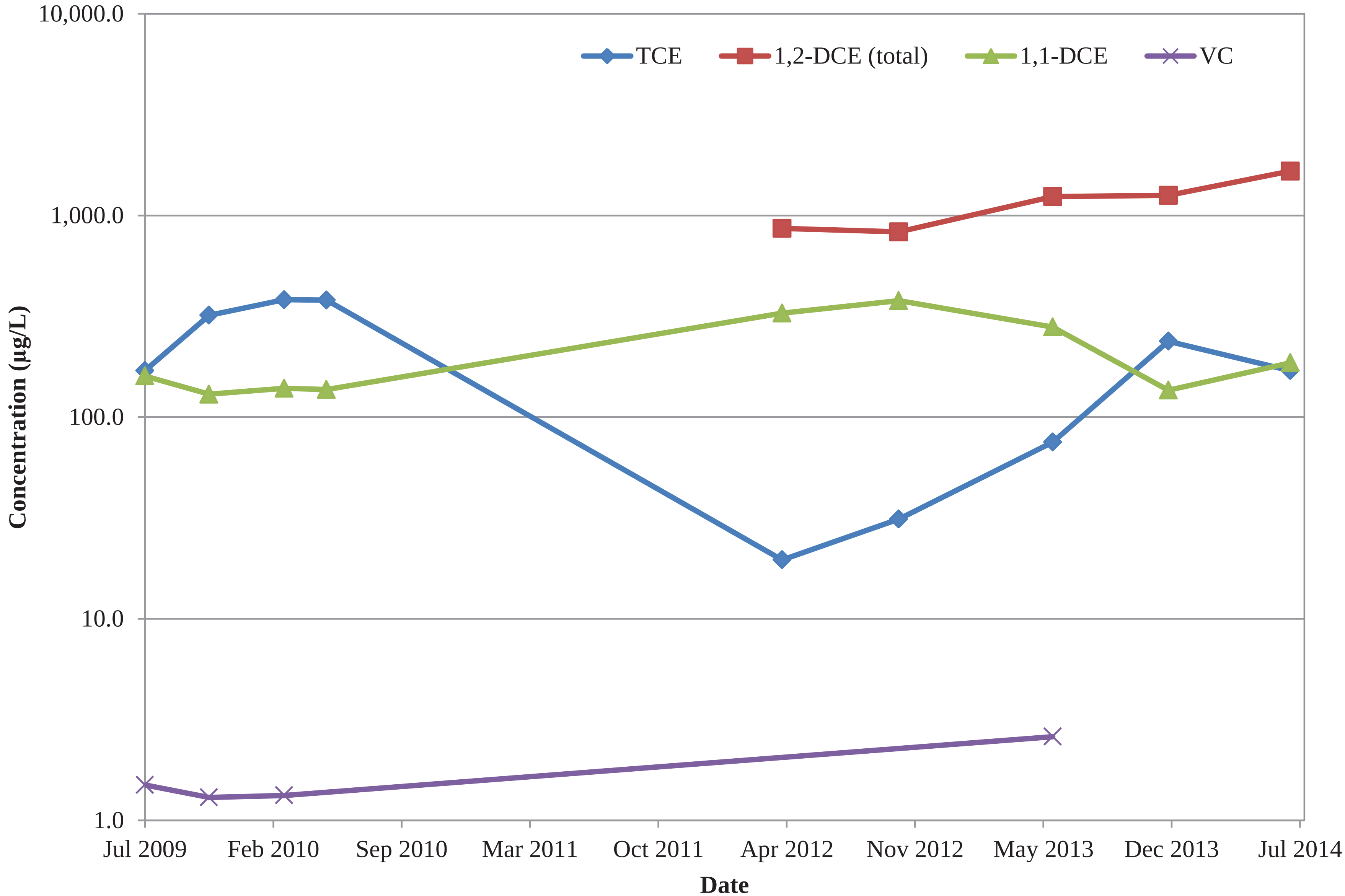
Note: Non-detects graphed as half of the laboratory detection limit.

FIGURE 7
HISTORICAL COC CONCENTRATIONS IN JAX-H10MW19



Note: Non-detects graphed as half of the laboratory detection limit.

FIGURE 8
HISTORICAL COC CONCENTRATIONS IN JAX-H10MW22



Note: Non-detects are not included in the graph.

TABLE 2
SUMMARY OF GROUNDWATER FIELD PARAMETERS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	pH (SU)	DO (mg/L)	Specific Conductance (µS/cm)	ORP (mV)	Temperature (°C)	Turbidity (NTU)
JAX-H10MW08	7/29/2009	6.1	2.0	519	NA	27.0	1
	11/6/2009	6.6	0.2	407	-203	26.6	2
	3/4/2010	6.8	0.6	389	-49	18.0	1
	8/5/2010	6.1	0.3	342	-145	27.3	0
	4/16/2012	6.1	0.4	304	-122	24.7	1
	10/17/2012	6.0	0.1	377	NA	26.8	1
	6/27/2013	6.6	0.7	364	-252	25.3	1
	12/10/2013	6.0	0.1	162	-83	23.1	4
	6/18/2014	6.2	0.2	346	-95	27.3	2
JAX-H10MW10	7/29/2009	5.8	1.0	220	NA	26.1	0
	11/6/2009	6.0	0.7	236	-22	26.2	0
	3/4/2010	6.0	3.0	192	65	20.9	1
	8/5/2010	5.6	0.7	211	137	27.0	0
	4/16/2012	5.8	0.7	184	114	24.5	1
	10/17/2012	6.0	1.7	265	-72	26.5	3
	6/13/2013	5.9	0.7	218	91	24.9	2
	12/10/2013	6.1	4.3	271	64	23.6	4
	6/18/2014	5.9	1.6	302	96	26.7	4
JAX-H10MW14	7/29/2009	5.4	0.8	157	NA	27.5	3
	11/6/2009	5.8	0.6	175	-54	27.9	4
	3/4/2010	5.6	0.7	169	-28	22.2	2
	8/5/2010	5.4	0.9	159	19	27.4	2
	4/17/2012	5.9	0.7	257	-7	25.7	3
	10/16/2012	5.2	0.2	262	-85	27.1	3
	6/13/2013	5.5	0.2	211	0	25.9	1
	12/10/2013	5.5	0.2	149	14	25.2	5
	6/18/2014	5.7	0.2	181	21	25.9	4
JAX-H10MW19	7/29/2009	5.7	1.5	240	NA	28.0	4
	11/6/2009	6.1	0.8	151	-56	26.8	10
	3/4/2010	5.6	0.8	155	72	18.4	3
	8/5/2010	5.2	0.5	156	25	29.5	9
	4/17/2012	5.4	0.7	148	65	24.9	9
	10/16/2012	5.7	0.3	237	-22	27.6	7
	6/13/2013	5.7	0.3	246	44	28.0	8
	12/10/2013	5.8	0.4	116	-18	23.4	4
	6/18/2014	5.9	0.5	215	-10	27.0	5
JAX-H10MW22	7/29/2009	5.9	1.4	268	NA	26.8	1
	11/6/2009	6.2	0.3	288	-132	26.8	0
	3/4/2010	5.9	0.6	217	13	22.2	1
	8/5/2010	6.0	0.2	280	-97	28.1	6
	4/17/2012	6.0	0.1	240	-27	26.5	1
	10/16/2012	5.8	0.1	260	-80	27.7	2
	6/13/2013	5.2	0.4	255	30	26.3	1
	12/10/2013	5.5	0.1	145	-61	22.5	2
	6/18/2014	5.6	0.2	245	-33	25.9	15

TABLE 2
SUMMARY OF GROUNDWATER FIELD PARAMETERS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well ID	Date	pH (SU)	DO (mg/L)	Specific Conductance (µS/cm)	ORP (mV)	Temperature (ºC)	Turbidity (NTU)
JAX-H10MW23	7/29/2009	5.1	1.0	219	NA	25.2	4
	11/6/2009	5.0	0.6	116	-31	24.9	7
	3/4/2010	5.1	1.0	113	133	18.4	7
	8/5/2010	5.0	1.0	101	124	25.5	8
	4/16/2012	5.1	5.1	115	121	23.7	16
	10/16/2012	4.7	0.5	163	NA	23.6	9
	6/13/2013	4.2	0.2	97	183	26.9	17
	12/10/2013	5.0	0.2	77	101	23.3	19
	6/18/2014	4.7	0.2	114	95	23.0	20

NOTES:
SU = Standard Unit
DO = Dissolved oxygen
mg/L = Milligrams per liter
µS/cm = MicroSiemens per centimeter
ORP = Oxidation/reduction potential
mV = Millivolts
ºC = Degrees Celsius
NTU = Nephelometric turbidity units
Data prior to June 2013 was provided by previous consutlant.

TABLE 3
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION			SOURCE									UPGRADIENT								
WELL ID			JAX-H10MW08									JAX-H10MW10								
Sample Date	FDEP GCTL	NADC	07/29/09	11/06/09	03/04/10	08/05/10	04/16/12	10/17/12	06/27/13	12/10/13	06/18/14	07/29/09	11/05/09	03/04/10	08/05/10	04/16/12	10/17/12	06/13/13	12/10/13	06/18/14
Volatile Organic Compounds (8260B) µg/L																				
Benzene	1	100	2.3 J	<11	<20	<3.5	<25	<25	<2.1	<1.1	<0.24	<1	<0.11	<1	<0.14	<0.25	<0.25	<0.21	<0.21	<0.24
1,1-Dichloroethene	7	700	2,000	490	257	126	1,310	981	278	5.5	5.5	<1	<0.15	<1	<0.28	<0.25	<0.25	<0.20	<0.20	<0.25
1,2-Dichloroethane	3	300	<20	<10	<20	<5.5	<25	<25	<2.2	<1.1	<0.24	<1	<0.1	<1	<0.22	<0.25	<0.25	<0.22	<0.22	<0.24
1,2-Dichloroethene (total)	63	630	NA	NA	NA	NA	15,800	10,800	4,320	269	132	NA	NA	NA	NA	<0.5	<0.5	<0.46	<0.46	<0.67
1,1,1-Trichloroethane	200	2,000	6,600	940	370	353	5,550 J	<25	789	<1.0	0.56 I	0.22 J	<0.17	<1	<0.29	<0.25	<0.25	<0.20	<0.20	<0.34
1,1,2-Trichloroethane	5	500	<20	<10	<20	<6.5	<25	<25	<2.0	<1.0	<0.32	<1	<0.1	<1	<0.26	<0.25	<0.25	<0.20	<0.20	<0.32
Tetrachloroethene	3	300	39	<15	<20	<4.25	30 J	<25	4.4	<1.6	1.1	<1	<0.15	<1	<0.17	<0.25	<0.25	<0.32	<0.32	<0.26
Trichloroethene	3	300	22	46 J	<20	<12.5	<25	<25	3.4	2.5	3.1	0.22 J	0.23 J	<1	<0.50	<0.25	<0.25	<0.31	<0.31	<0.30
Vinyl Chloride	1	100	<20	<18	<20	<5	<25	<25	<4.4	<2.2	<0.33	<1	<0.18	<1	<0.20	<0.25	<0.25	<0.44	<0.44	<0.33
Semivolatile Organic Compounds (8270D) µg/L																				
3&4-Methylphenol	NE	NE	270	NA	24	NA	151	NA	21.1	<1.4	<1.1	<3.2	NA	<3.5	NA	<1.16	NA	<1.3	<1.3	<1.1
3-Methylphenol	35	350	NA	64	NA	8.65	NA	NA	NA	NA	NA	NA	<0.71	NA	<0.713	NA	NA	NA	NA	NA
4-Methylphenol	3.5	35	NA	64	NA	8.65	NA	149	NA	NA	NA	NA	<0.71	NA	<0.713	NA	<1.16	NA	NA	NA
Naphthalene	14	140	620	140	92.2	188	397	545	292	14.0	17.9	<4.6	<0.42	<5	<0.417	<1.16	<1.16	<0.61	<0.61	<0.48
Methane, Ethane, Ethene (RSK 175) µg/L																				
Methane	NE	NE	1,300	776 J	751	562 J	1,180	922	859	288	183	70	98.9 J	176	69.5 J	73.1	23	158	173	394
Ethane	NE	NE	2.7 J	1.50 J	1.5 J	<1	<1	<1	0.66 I	<0.32	<0.32	<1	<1.00	<3	<1	<1	<1	<0.32	<0.32	<0.32
Ethene	NE	NE	1.7	1.29 J	1.61 J	<1	<1	<1	0.59 I	<0.43	<0.43	<1	<1.00	<3	<1	<1	<1	<0.43	<0.43	<0.34
Alkalinity (SM19 2320B) mg/L																				
Alkalinity	NE	NE	147	71.3	NA	69.7	135	116	142	126	138	62.3	NA	NA	29.9	39.8	73.9	70.4	68.7	88.6
Chloride (300.0) mg/L																				
Chloride	250	2,500	41.1	26	20.8	18	30.2	23.4	17.8	10.7	9.8	13	12.7	13.6	12.7	13.4	10.2	14.1	13.0	13.6
Nitrate, Nitrite, Sulfate (300.0) mg/L																				
Nitrate-N	10,000	100,000	<0.033	<0.0330	0.042 J	<0.033	<0.066	<0.033	<0.05	<0.050	<0.050	0.553 J	1.39	0.95	0.635	0.709	1.62	0.90	1.2	0.93
Nitrite-N	1,000	10,000	<0.033	<0.0330	<0.2	<0.033	<0.066	<0.033	<0.05	<0.050	<0.050	<0.033	<0.0330	<0.1	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050
Sulfate	250	2,500	<1	0.663	1.87	0.985 J	1.26 J	<0.33	5.7	12.9	15.6	13	21.7	15.1	14.9	16.8	18.7	16.9	24.7	27.8
Sulfide (SM20 4500S) mg/L																				
Sulfide	NE	NE	3.86	3.53	2.03	3.39	0.807 J	2.17 J	2.9	1.6	2.9	<0.741	<0.678	<2.03	<0.678	<0.678	0.811 J	1.2	<0.23	1.1
Total Organic Carbon (SM19 5310B) mg/L																				
Total Organic Carbon	NE	NE	43.1	19	10.6	8.64	35.6	24.2	13.2	6.5	5.5	4.71	4.1	4.1	4.31	4.38	3.48	5.5	4.5	6.1
Orthophosphate (365.3) mg/L																				
Orthophosphate-P	NE	NE	0.0365	NA	<0.03	0.016 J	0.0162 J	0.0452	0.028 I	<0.020	0.034 I	0.0205	NA	<0.03	<0.01	<0.01	0.0188 J	0.046 I	<0.020	<0.020
Total Phosphorous-P	NE	NE	NA	<0.0200	NA	NA	NA	NA	NA	NA	NA	NA	<0.0200	NA	NA	NA	NA	NA	NA	NA
Miscellaneous Parameters ppm																				
Carbon Dioxide	NE	NE	90	90	50	90	110	50	65	40	70	70	65	50	0.75	80	42	105	40	85
Ferrous Iron	NE	NE	1.23	0.87	0.63	0.9	1.3	1.43	1.0	1.0	0.6	1.8	0.31	0.36	0.65	0.45	0.12	1.0	0.3	0.9
Hydrogen Sulfide	NE	NE	2	5	5	5	2	3	5.0	0.7	2.0	ND	ND	ND	ND	ND	ND	0	0	0

TABLE 3
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION			SOURCE									DOWNGRADIENT								
WELL ID			JAX-H10MW14									JAX-H10MW19								
Sample Date	FDEP GCTL	NADC	07/29/09	11/06/09	03/03/10	08/04/10	04/17/12	10/16/12	06/13/13[1]	12/10/13	06/18/14	07/30/09	11/06/09	03/03/10	08/04/10	04/17/12	10/16/12	06/13/13	12/10/13	06/18/14
Volatile Organic Compounds (8260B) µg/L																				
Benzene	1	100	<1	<0.11	<1	**0.186 J**	<2.5	<5	<0.21	<0.21	<1.2	<1	<0.11	<1	<0.14	<0.25	<0.25	<0.21	<0.21	<0.24
1,1-Dichloroethene	7	700	**79**	**13**	**2.26**	**47.6**	**546**	**601**	**547**	**23.5**	**14.9**	**93**	**56**	**51.7**	**34.8**	**54.8**	**28.9**	**148**	**17.9**	**16.7**
1,2-Dichloroethane	3	300	**0.43 J**	<0.1	<1	<0.22	**8.8 J**	**6.8 J**	**5.2**	<0.22	<1.2	**0.74 J**	**0.55 J**	<1	<0.22	**0.27 J**	<0.25	**1.3**	<0.22	**1.0**
1,2-Dichloroethene (total)	63	630	NA	NA	NA	NA	<5	<10	**2.0**	**12.3**	**320**	NA	NA	NA	NA	**35.7**	**34.7**	**112**	**12.8**	**2.2**
1,1,1-Trichloroethane	200	2,000	**10**	**0.48 J**	<1	**0.559 J**	**33.3**	**30.6**	**78.5**	**1.3**	<1.7	<1	<0.17	**0.406 J**	<0.29	**0.73 J**	<0.25	<0.20	<0.20	<0.34
1,1,2-Trichloroethane	5	500	<1	<0.1	<1	<0.26	<2.5	<5	<0.20	<0.20	<1.6	**0.54 J**	**0.26 J**	**0.718 J**	<0.26	**0.64 J**	**0.31 J**	<0.20	<0.20	<0.32
Tetrachloroethene	3	300	**0.23 J**	**0.19 J**	**0.258 J**	<0.17	<2.5	<5	<0.32	<0.32	<1.3	**0.28 J**	**0.2 J**	**0.418 J**	**0.295 J**	**0.58 J**	**0.44 J**	<0.32	<0.32	**0.30 I**
Trichloroethene	3	300	**11**	**6.9**	**4.9**	**4.82**	**45.5**	**28**	**40.7**	**3.0**	<1.5	**35**	**32**	**38.7**	**14.9**	**32.3**	**14.2**	**17.9**	**11.9**	**11.8**
Vinyl Chloride	1	100	<1	<0.18	<1	**1.01**	<2.5	<5	**0.79**	<0.44	<1.6	**2.6**	**2.1**	**0.627 J**	**0.347 J**	**0.64 J**	**0.82 J**	**2.4**	**1.0**	<0.33
Semivolatile Organic Compounds (8270D) µg/L																				
3&4-Methylphenol	NE	NE	<3.5	NA	<3.24	NA	**12.6**	NA	**50.1**	<1.3	<1.1	<3.5	NA	<3.24	NA	<1.18	NA	<1.3	<1.3	<1.1
3-Methylphenol	35	350	NA	<0.71	NA	<0.713	NA	NA	NA	NA	NA	NA	<0.75	NA	<0.713	NA	NA	NA	NA	NA
4-Methylphenol	3.5	35	NA	<0.71	NA	<0.713	NA	**11.6**	NA	NA	NA	NA	<0.75	NA	<0.713	NA	<1.16	NA	NA	NA
Naphthalene	14	140	**0.86 J**	<0.42	<4.63	<0.417	<1.18	<1.16	**0.85**	<0.62	<0.48	<5	<0.44	<4.63	<0.417	<1.18	<1.16	<0.61	<0.61	<0.48
Methane, Ethane, Ethene (RSK 175) µg/L																				
Methane	NE	NE	**130**	**185 J**	**172**	**104 J**	**203**	**143**	**348**	**164**	**340**	<1.3	**253 J**	**55.1**	**36.4 J**	**115**	**41.6**	**169**	**98.3**	**12.5**
Ethane	NE	NE	<1	<1.00	<3	<1	<1	<1	**0.55**	<0.32	**0.40 I**	<1	<1.00	<3	<1	<1	<1	**0.36**	<0.32	<0.32
Ethene	NE	NE	<1	<1.00	<3	<1	<1	<1	<0.43	<0.43	<0.43	<1	<1.00	<3	<1	<1	<1	<0.43	<0.43	<0.43
Alkalinity (SM19 2320B) mg/L																				
Alkalinity	NE	NE	**27.9**	**8.28**	NA	**16.4**	**59.3**	**60.1**	**55.2**	**33.2**	**40.1**	**54.1**	**2.3**	NA	**4.1**	**20.3**	**47.2**	**65.2**	**56.1**	**45.9**
Chloride (300.0) mg/L																				
Chloride	250	2,500	**14.1**	**14.2**	**15.3**	**17.7**	**28.9**	**24.9**	**24.5**	**14.5**	**19.1**	**14.8**	**13.8**	**16**	**13.5**	**16.2**	**12.6**	**18.0**	**12.5**	**13.2**
Nitrate, Nitrite, Sulfate (300.0) mg/L																				
Nitrate-N	10,000	100,000	**0.091 J**	**0.702**	**0.1 J**	**0.071 J**	**0.04 J**	<0.033	<0.05	<0.050	**0.12**	**0.113 J**	<0.0330	**0.055 J**	**0.17**	<0.033	**0.054 J**	**0.079 I**	**0.067 I**	<0.050
Nitrite-N	1,000	10,000	<0.033	<0.0330	<0.1	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050	<0.033	<0.0330	<0.1	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050
Sulfate	250	2,500	**12.8**	**17.9**	**28.8**	**2.99**	**1.4 J**	**1.45 J**	**3.4**	**4.9**	**17.2**	**13.2**	**12.2**	**17**	**16.5**	**18.3**	**22.3**	**14.8**	**16.4**	**47.5**
Sulfide (SM20 4500S) mg/L																				
Sulfide	NE	NE	<0.741	<0.678	**0.88 J**	**0.69 J**	**0.807 J**	**0.678 J**	**1.6**	**0.34 I**	**0.53 I**	<0.714	<0.741	<2.03	<0.678	**0.891 J**	<0.678	**0.48 I**	<0.24	**0.43 I**
Total Organic Carbon (SM19 5310B) mg/L																				
Total Organic Carbon	NE	NE	**3.95**	**3.66**	**4.07**	**3.64**	**6.3**	**6.21**	**8.6**	**4.6**	**4.5**	**3.39**	**3.19**	**3.17**	**3.29**	**3.65**	**3.37**	**4.0**	**4.2**	**3.5**
Orthophosphate (365.3) mg/L																				
Orthophosphate-P	NE	NE	**0.0205**	NA	<0.03	**0.011 J**	**0.0124 J**	**0.0282 J**	**0.078 I**	<0.020	<0.020	**0.013**	NA	<0.03	<0.01	<0.01	**0.0169 J**	<0.02	<0.20	<0.020
Total Phosphorous-P	NE	NE	NA	<0.0200	NA	NA	NA	NA	NA	NA	NA	NA	<0.0200	NA	NA	NA	NA	NA	NA	NA
Miscellaneous Parameters ppm																				
Carbon Dioxide	NE	NE	**65**	**100**	**100**	**75**	**80**	**72**	**150**	**50**	**60**	**85**	**100**	**70**	**80**	**90**	**80**	**70**	**40**	**70**
Ferrous Iron	NE	NE	**2.46**	**1.52**	**1.36**	**2.43**	**3**	**3.02**	**7**	**2.5**	**4.5**	**0.97**	**1.87**	**1.48**	**2.4**	**3.03**	**1.74**	**1.0**	**2.0**	**1.0**
Hydrogen Sulfide	NE	NE	**0.1**	ND	**0.5**	**0.2**	**0.3**	**0.3**	**0.5**	**0.2**	**0.1**	ND	ND	ND	ND	ND	ND	0	0	**0.3**

TABLE 3
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

WELL LOCATION			SOURCE									DOWNGRADIENT								
WELL ID			JAX-H10MW22									JAX-H10MW23								
Sample Date	FDEP GCTL	NADC	07/29/09	11/06/09	03/03/10	08/05/10	04/17/12	10/16/12	06/13/13[1]	12/10/13	06/18/14	07/30/09	11/06/09	03/03/10	08/04/10	04/16/12	10/16/12	06/13/13	12/10/13	06/18/14
Volatile Organic Compounds (8260B) µg/L																				
Benzene	1	100	**0.62 J**	**0.31 J**	**0.389 J**	<1.4	<2.5	<2.5	**0.59**	<4.2	<4.9	<1	<0.11	<1	<0.14	<0.25	<0.25	<0.21	<0.21	<0.24
1,1-Dichloroethene	7	700	**160**	**130**	**139**	**137**	**328**	**378**	**280**	**136**	**186**	<1	<0.15	<1	<0.28	<0.25	<0.25	<0.20	<0.20	<0.25
1,2-Dichloroethane	3	300	**1.7**	**0.56 J**	**0.524 J**	<2.2	**2.9 J**	<2.5	**2.7**	<4.4	<4.8	<1	<0.1	<1	<0.22	<0.25	<0.25	<0.22	<0.22	<0.24
1,2-Dichloroethene (total)	63	630	NA	NA	NA	NA	**863**	**829**	**1,240**	**1,260**	**1,660**	NA	NA	NA	NA	<0.5	<0.5	<0.46	<0.46	<0.67
1,1,1-Trichloroethane	200	2,000	**0.36 J**	<0.34	<2	<2.9	<2.5	<2.5	<0.20	<4.0	<6.7	<1	<0.17	<1	<0.29	<0.25	<0.25	<0.20	<0.20	<0.34
1,1,2-Trichloroethane	5	500	1 U	<0.2	<2	<2.6	<2.5	<2.5	<0.20	<4.0	<6.3	<1	<0.1	<1	<0.26	<0.25	<0.25	<0.20	<0.20	<0.32
Tetrachloroethene	3	300	**2.7**	**2.4**	**2.55**	**2.41 J**	<2.5	<2.5	<0.32	<6.4	<5.1	<1	<0.15	<1	<0.17	<0.25	<0.25	<0.32	<0.32	<0.26
Trichloroethene	3	300	**170**	**320**	**382**	**380**	**19.6**	**31.2**	**75.2**	**238**	**170**	<1	<0.13	<1	<0.50	<0.25	<0.25	<0.31	<0.31	<0.30
Vinyl Chloride	1	100	**1.5**	**1.3 J**	**1.33 J**	<2	<2.5	<2.5	**2.6**	<8.8	<6.5	<1	<0.18	<1	<0.20	<0.25	<0.25	<0.44	<0.44	<0.33
Semivolatile Organic Compounds (8270D) µg/L																				
3&4-Methylphenol	NE	NE	<3.5	NA	<3.24	NA	<1.18	NA	<1.3	<1.3	<1.1	<3.3	NA	<3.27	NA	<1.16	NA	<1.3	<1.3	<1.1
3-Methylphenol	35	350	NA	<0.75	NA	<0.713	NA	NA	NA	NA	NA	NA	<0.71	NA	<0.713	NA	NA	NA	NA	NA
4-Methylphenol	3.5	35	NA	<0.75	NA	<0.713	NA	<1.16	NA	NA	NA	NA	<0.71	NA	<0.713	NA	<1.16	NA	NA	NA
Naphthalene	14	140	**2.3 J**	**2.3 J**	**1.81 J**	**2.27 J**	**2.21 J**	**2.34 J**	**1.7**	<0.61	**0.98 I**	<4.7	<0.42	<4.67	<0.417	<1.16	<1.16	<0.61	<0.59	<0.48
Methane, Ethane, Ethene (RSK 175) µg/L																				
Methane	NE	NE	**610**	**1,030 J**	**843**	**584 J**	**832**	**527**	**661**	**1,170**	**1,190**	**9.1**	**22.8 J**	**10.1**	**3.89 J**	**10.4**	**4.62**	**15.2**	**14.0**	**3.6**
Ethane	NE	NE	<1	<1.00	<3	<1	<1	<1	**1.5**	**3.3**	**3.6**	<1	<1.00	<3	<1	<1	<1	<0.32	<0.32	<0.32
Ethene	NE	NE	<1	<1.00	<3	<1	<1	<1	**1.1**	**3.2**	**4.1**	<1	<1.00	<3	<1	<1	<1	<0.43	<0.43	<0.43
Alkalinity (SM19 2320B) mg/L																				
Alkalinity	NE	NE	**67.9**	**15.6**	NA	**47.5**	**68.6**	**65.8**	**68.4**	**72.1**	**73.2**	**8.59**	**10.6**	NA	**4.1**	**9.74**	**10.9**	**8.8**	**9.2**	**7.6**
Chloride (300.0) mg/L																				
Chloride	250	2,500	**27.2**	**23.5**	**24.7**	**25**	**28.8**	**28.3**	**30.4**	**26.1**	**26.7**	**14.6**	**6.55**	**7.72**	**5.57**	**6.01**	**11.4**	**6.8**	**4.7**	**10.3**
Nitrate, Nitrite, Sulfate (300.0) mg/L																				
Nitrate-N	10,000	100,000	<0.033	<0.0330	<0.2	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050	**0.601 J**	**0.229**	**0.452**	**0.084 J**	**0.133 J**	**0.3**	<0.05	<0.050	**0.065 I**
Nitrite-N	1,000	10,000	<0.033	<0.0330	<0.1	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050	<0.033	<0.0330	<0.1	<0.033	<0.033	<0.033	<0.05	<0.050	<0.050
Sulfate	250	2,500	<1	<0.330	**0.787 J**	<0.33	<0.33	<0.33	**0.81 I**	<0.60	**1.5 I**	**45.8**	**24.8**	**28.2**	**23.2**	**27.7**	**26.7**	**20.8**	**15.8**	**40.2**
Sulfide (SM20 4500S) mg/L																				
Sulfide	NE	NE	<0.741	**0.769**	**0.82 J**	**0.949 J**	**1.08 J**	**0.947 J**	**0.86**	<0.24	**0.66 I**	<0.714	<0.678	<2.03	<0.69	**0.678 J**	<0.678	**0.65 I**	**0.85**	**0.28 I**
Total Organic Carbon (SM19 5310B) mg/L																				
Total Organic Carbon	NE	NE	**3.21**	**3.36**	**3.25**	**3.15**	**3.81**	**3.63**	**4.1**	**3.8**	**4.3**	**2.21**	**2.03**	**2.02**	**1.89**	**2.25**	**1.95 J**	**2.5**	**1.9**	**1.8**
Orthophosphate (365.3) mg/L																				
Orthophosphate-P	NE	NE	**0.0454**	NA	**0.013 J**	**0.017 J**	**0.035 J**	**0.0527**	**0.056 I**	<0.20	**0.047 I**	**0.015**	NA	<0.03	<0.01	**0.0539**	**0.015 J**	<0.02	<0.020	<0.020
Total Phosphorous-P	NE	NE	NA	**0.02**	NA	NA	NA	NA	NA	NA	NA	NA	<0.0200	NA	NA	NA	NA	NA	NA	NA
Miscellaneous Parameters ppm																				
Carbon Dioxide	NE	NE	**70**	**100**	ND	ND	**90**	**52**	**70**	**35**	**50**	**70**	**100**	ND	**70**	**75**	**65**	**50**	**25**	**60**
Ferrous Iron	NE	NE	**2.12**	NA	**1.77**	**3.3**	**0**	**2.44**	**6.0**	**4.0**	**0.4**	**0.81**	**1.15**	**0.53**	**0.81**	**1.72**	**1.21**	**1.0**	**1.0**	**1.5**
Hydrogen Sulfide	NE	NE	**0.5**	**0.2**	**0.5**	**0.3**	**0.3**	**0.1**	0	**0.3**	**0.1**	ND	ND	ND	ND	ND	ND	0	**0.1**	0

TABLE 3
SUMMARY OF GROUNDWATER LABORATORY ANALYTICAL RESULTS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

NOTES:

FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentration
µg/L = Micrograms per liter
Bold results indicate a reported concentration above the laboratory detection limit.
Shaded cells (gray) indicate a reported concentration above the FDEP GCTL.
J, I = Analyte was detected at an estimated concentration
Shaded cells (black) indicate a reported concentration above the FDEP GCTL and NADC.
NE = Not established
NA = Not available
ND = Not detected
ppm = parts per million
1. Groundwater samples were re-collected from JAX-H10MW14 and JAX-H10MW22 on 6/27/13 and analyzed for nitrate and nitrite.
Data prior to June 2013 was provided by previous consultant.

TABLE 4
SUMMARY OF SURFACE WATER LABORATORY ANALYTICAL RESULTS
PSC 52 (HANGAR 1000)
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample ID	FDEP SWCTL	JAX-H10SW01								
Sample Date		07/30/09	06/11/09	04/03/10	06/08/10	04/17/12	10/16/12	06/13/13	12/10/13	06/18/14
Volatile Organic Compounds (8260B) µg/L										
Benzene	71.28	<1	<0.11	<1	<0.14	<0.25	<1.25	<0.21	<0.21	<0.24
1,1-Dichloroethene	3.2	**0.73 J**	<0.15	**0.404 J**	<0.28	<0.25	<1.25	<0.20	<0.20	<0.25
1,2-Dichloroethane	37	<1	<0.1	<1	<0.22	<0.25	<1.25	<0.22	<0.22	<0.24
1,2-Dichloroethene (total)	7,000	NA	NA	NA	NA	<0.5	<2.5	<0.46	**0.74 I**	<0.67
1,1,1-Trichloroethane	270	<1	<0.17	<1	<0.29	<0.25	<1.25	<0.20	<0.20	<0.34
1,1,2-Trichloroethane	16	<1	<0.1	<1	<0.26	<0.25	<1.25	<0.20	<0.20	<0.32
Tetrachloroethene	8.85	<1	<0.15	<1	<0.17	<0.25	<1.25	<0.32	<0.32	<0.26
Trichloroethene	80.7	**0.69 J**	**0.38 J**	**0.688 J**	<0.50	<0.25	<1.25	<0.31	<0.31	<0.30
Vinyl Chloride	2.4	<1	<0.18	<1	<0.20	<0.25	<1.25	<0.44	<0.44	<0.33
Semivolatile Organic Compounds (8270D) µg/L										
3&4-Methylphenol	NE	<3.3	NA	<3.5	NA	<1.18	NA	<1.3	<1.4	<1.1
3-Methylphenol	450	NA	<0.75	NA	<0.716	NA	NA	NA	NA	NA
4-Methylphenol	70	NA	<0.75	NA	<0.716	NA	<1.16	NA	NA	NA
Naphthalene	26	<4.7	<0.44	<4.9	<0.419	<1.18	<1.16	<0.61	<0.64	<0.48

NOTES:

FDEP SWCTL = Florida Department of Environmental Protection Freshwater Surface Water Cleanup Target Level
µg/L = Micrograms per liter
Bold results indicate a reported concentration above the laboratory detection limit.
J, I = Analyte was detected at an estimated concentration
NA = Not available
NE = Not established
Data prior to June 2013 was provided by previous consultant.

E-5

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TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW01S	MW02S	MW03S	MW04S	MW10S	MW11S		MW12S	MW13S		MW14S	MW15S	MW19S	MW25S	MW26S		MW27S	MW30S	MW32S	MW33S	MW34S	MW35S
Sample ID			JM40-JAX47-937-MW01S-1011	JM40-JAX47-937-MW02S-1011	JM40-JAX47-937-MW03S-1011	JM40-JAX47-937-MW04S-1011	JM40-JAX47-MW10S-1011	JM40-JAX47-FD02-1011	JM40-JAX47-MW11S-1011	JM40-JAX47-MW12S-1011	JM40-JAX47-FD01-1011	JM40-JAX47-MW13S-1011	JM40-JAX47-MW14S-1011	JM40-JAX47-MW15S-1011	JM40-JAX47-MW19S-1011	JM40-JAX47-MW25S-1011	JM40-JAX47-FD03-1011	JM40-JAX47-MW26S-1011	JM40-JAX47-MW27S-1011	JM40-JAX47-MW30S-1011	JM40-JAX47-MW32S-1011	JM40-JAX47-MW33S-1011	JM40-JAX47-MW34S-1011	JM40-JAX47-MW35S-1011
Sample Date			10/31/2011	11/1/2011	10/31/2011	10/31/2011	10/27/2011	10/27/2011	10/27/2011	11/2/2011	10/25/2011	10/25/2011	10/28/2011	11/1/2011	11/3/2011	11/1/2011	10/27/2011	10/27/2011	11/1/2011	11/3/2011	11/2/2011	11/2/2011	11/2/2011	10/28/2011
Analyte	**GCTL[1]**	**NADC**																						
METAL (UG/L)																								
Arsenic	10	100	**106**	**15800**	**16400**	5.31 J	6.62 U	4.25 J	5.23 J	6.62 U	5.24 J	5.68 J	6.62 U	5.22 J	7.23 J	5.07 J	6.62 U	6.62 U	NA	6.62 U	6.62 U	6.62 U	6.62 U	6.62 U
Iron	300	3000	**14800 B**	NA	NA	**22700 B**	NA	NA	**378 B**	NA	NA	**703 B**	NA	NA	NA	75.8 B	NA	NA	NA	NA	**598 B**	NA	24.4 B	NA
Manganese	50	500	32.4	NA	NA	**146**	NA	NA	15.8	NA	NA	9.9 J	NA	NA	NA	13	NA	NA	NA	NA	15.2	NA	11.5	NA
SM3500FE-D (UG/L)																								
Ferrous Iron	--	--	3720	NA	NA	4980	NA	NA	447	NA	NA	800	NA	NA	NA	153 J	NA	NA	NA	NA	670	NA	184 U	NA
SM4500SF (UG/L)																								
Sulfide	--	--	8000 J	NA	NA	4000 J	NA	NA	600 J	NA	NA	400 J	NA	NA	NA	400 J	NA	NA	NA	NA	200 J	NA	600 J	NA
SW300.1 (UG/L)																								
Nitrate-N	10000	100000	72 U	NA	NA	72 U	NA	NA	1300	NA	NA	2200	NA	NA	NA	980	NA	NA	NA	NA	89 J	NA	210	NA
Sulfate	250000	2500000	31300	NA	NA	214000	NA	NA	23500	NA	NA	24400	NA	NA	NA	27500 B	NA	NA	NA	NA	13300 B	NA	19400 B	NA
SW8081B (UG/L)																								
4,4'-DDD	0.1	10	0.03 J	**0.5 J**	**12**	0.01 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**0.48**	**0.53**	0.0048 J	0.0023 J	0.0011 U	0.0011 U	0.00082 J	0.0011 U	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0011 U	0.0011 J
4,4'-DDE	0.1	10	**0.22 J**	**0.48 J**	**0.12 J**	**0.34**	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0079 J	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0015 U	0.0016 U	0.0016 U	0.032 J	0.0016 U
4,4'-DDT	0.1	10	0.0045 U	0.023 U	0.0022 U	0.0045 U	0.00045 U	0.00045 U	0.00045 U	0.00045 U	0.1	0.098	0.00045 U	0.00046 U	0.00046 U	0.011 J	0.00046 U	0.00045 U	0.00045 U	0.00045 U	0.00045 U	0.00046 U	0.024	0.00045 U
Aldrin	0.002	0.2	**0.0066 U**	**0.033 U**	**0.0033 U**	**0.0065 U**	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00066 U	0.00067 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00065 U	0.00065 U	0.00067 U	0.00066 U	0.00066 U
alpha-BHC	0.006	0.6	**0.012 U**	**0.062 U**	**0.0061 U**	**0.012 U**	0.0012 U	**2.5**	**3**	**0.03**	**0.95**	**1.2**	0.0012 U	0.0012 U	0.0012 U	**1.5**	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	**0.013**	0.0012 U
alpha-Chlordane	--	--	0.012 U	0.062 U	0.0061 U	0.012 U	0.0012 U	0.0012 U	0.0012 U	0.1 J	0.28	0.31 J	0.0012 U	0.0012 U	0.0012 U	0.014	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.37 J	0.076 J	0.0012 U
beta-BHC	0.02	2	0.0049 U	**0.025 U**	0.0024 U	0.0049 U	0.00049 U	**0.44 J**	**0.63 J**	**0.29**	**0.25**	**0.28**	0.00049 U	0.0005 U	0.0005 U	**0.76**	0.0005 U	0.00049 U	0.00049 U	0.00049 U	0.00049 U	**0.15**	**0.96**	0.00049 U
Chlordane	2	200	0.2 U	1 U	0.1 U	0.2 U	0.021 U	0.021 U	0.02 U	0.02 U	**2.7**	**3**	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.021 U	0.02 U	0.021 U
delta-BHC	2.1	21	0.012 U	0.062 U	0.0061 U	0.012 U	0.0012 U	**2.4**	**2.8**	0.011 J	0.87	1	0.0012 U	0.0012 U	0.0012 U	1.9	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
Dieldrin	0.002	0.2	**0.011 U**	**0.056 U**	**0.0055 U**	**0.011 U**	0.0011 U	0.0011 U	0.0011 U	**0.11**	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**0.005**	**0.22**	**0.071**	0.0011 U
Endosulfan I	42	420	0.018 U	0.089 U	0.0088 U	0.017 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0017 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
Endosulfan II	42	420	0.0066 U	0.033 U	0.0033 U	0.0065 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00066 U	0.00067 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00065 U	0.00065 U	0.00067 U	0.00066 U	0.00066 U
Endosulfan sulfate	42	420	0.0041 U	0.021 U	0.002 U	0.0041 U	0.00041 UJ	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00042 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00042 U	0.00041 U	0.00041 U
Endrin	2	20	0.0074 U	0.037 U	0.0037 U	0.0073 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00073 U	0.00075 U	0.00075 U	0.00074 U	0.00075 U	0.00074 U	0.00073 U	0.00073 U	0.00073 U	0.00075 U	0.00074 U	0.00074 U
Endrin aldehyde	--	--	0.0062 U	0.031 U	0.0031 U	0.0061 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00061 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00061 U	0.00061 U	0.00061 U	0.00062 U	0.00062 U	0.00062 U
Endrin ketone	--	--	0.025 U	0.12 U	0.012 U	0.024 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0024 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0024 U	0.0024 U	0.0024 U	0.072	0.052	0.0025 U
gamma-BHC (Lindane)	0.2	20	**0.45 J**	0.049 U	**0.63 J**	0.0097 U	0.00099 U	**3.4**	**4.2**	0.024	**0.72**	**0.88**	0.00098 U	0.00099 U	0.001 U	**1.5**	0.00099 U	0.00098 U	0.00098 U	0.00097 U	0.00098 U	0.024 J	0.091	0.00099 U
gamma-Chlordane	--	--	0.0098 U	0.049 U	0.0049 U	0.0097 U	0.00099 U	0.00099 U	0.00098 U	0.00098 U	0.23	0.26	0.00098 U	0.00099 U	0.001 U	0.00099 U	0.00099 U	0.00098 U	0.00098 U	0.00097 U	0.00098 U	0.001 U	0.00098 U	0.00099 U
Heptachlor	0.4	40	0.016 U	0.082 U	0.0081 U	0.016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U
Heptachlor epoxide	0.2	20	0.0057 U	0.029 U	0.0028 U	0.0057 U	0.00058 U	0.00058 U	0.00057 U	0.07	0.00058 U	0.00058 U	**0.43 J**	0.00058 U	0.00058 U	0.00058 U	0.01	0.011	0.00057 U	0.00057 U	0.00057 U	**0.28**	0.058 J	0.00058 U
Methoxychlor	40	400	0.0074 U	0.037 U	0.0037 U	0.0073 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00073 U	0.00075 U	0.00075 U	0.00074 U	0.00075 U	0.00074 U	0.00073 U	0.00073 U	0.00073 U	0.00075 U	0.00074 U	0.00074 U
Toxaphene	3	300	0.74 U	**3.7 U**	0.37 U	0.73 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.073 U	0.075 U	0.075 U	0.074 U	0.075 U	0.074 U	0.073 U	0.073 U	0.073 U	0.075 U	0.074 U	0.074 U
SW8270D (UG/L)																								
1,1'-Biphenyl	0.5	5	**1.8 J**	NA	NA	**2.1 J**	**1.6 U**	**9**	**9.4**	NA	**0.96 J**	**1.1 J**	NA	**1.6 U**	**1.6 U**	**6.1**	NA	NA	**1.6 U**	**1.6 U**	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	2.1	21	**4.5 U**	NA	NA	**4.5 U**	**4.5 U**	**4.5 U**	**4.5 U**	NA	**4.5 U**	**4.5 U**	NA	**4.5 U**	**4.5 U**	**4.5 U**	NA	NA	**4.5 U**	**4.5 U**	NA	NA	NA	NA
1,2,4-Trichlorobenzene	70	700	5.3 U	NA	NA	5.3 U	5.4 U	5.3 U	5.4 U	NA	7.2	8	NA	5.4 U	5.3 U	5.3 U	NA	NA	5.3 U	5.4 U	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	10	100	6.7 U	NA	NA	6.7 U	6.8 U	6.7 U	6.8 U	NA	6.8 U	6.7 U	NA	6.8 U	6.7 U	6.7 U	NA	NA	6.7 U	6.8 U	NA	NA	NA	NA
2,4,5-Trichlorophenol	1	10	**6.9 U**	NA	NA	**6.9 U**	**7 U**	**6.9 U**	**7 U**	NA	**7 U**	**6.9 U**	NA	**7 U**	**6.9 U**	**6.9 U**	NA	NA	**6.9 U**	**7 U**	NA	NA	NA	NA
2,4,6-Trichlorophenol	3.2	320	1.7 U	NA	NA	1.7 U	1.7 U	1.7 U	1.7 U	NA	1.7 U	1.7 U	NA	1.7 U	1.7 U	1.7 U	NA	NA	1.7 U	1.7 U	NA	NA	NA	NA
2,4-Dichlorophenol	0.3	3	**6.3 U**	NA	NA	**6.3 U**	**6.4 U**	**6.3 U**	**6.4 U**	NA	**6.4 U**	**6.3 U**	NA	**6.4 U**	**6.3 U**	**6.3 U**	NA	NA	**6.3 U**	**6.4 U**	NA	NA	NA	NA
2,4-Dimethylphenol	140	1400	11.8	NA	NA	2.6 J	4.7 U	4.7 U	4.7 U	NA	4.7 U	4.7 U	NA	4.7 U	4.7 U	4.7 U	NA	NA	4.7 U	4.7 U	NA	NA	NA	NA
2,4-Dinitrophenol	14	140	11.4 U	NA	NA	11.4 U	11.5 U	11.4 U	11.5 U	NA	11.5 U	11.4 U	NA	11.5 U	11.4 U	11.4 U	NA	NA	11.4 U	11.5 U	NA	NA	NA	NA
2,4-Dinitrotoluene	0.05	5	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	**5.7 U**	**5.8 U**	NA	**5.7 U**	**5.7 U**	NA	**5.8 U**	**5.7 U**	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	NA	NA	NA	NA
2,6-Dinitrotoluene	0.05	5	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	**5.7 U**	**5.8 U**	NA	**5.7 U**	**5.7 U**	NA	**5.8 U**	**5.7 U**	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	NA	NA	NA	NA
2-Chloronaphthalene	560	5600	5.7 U	NA	NA	5.7 U	5.8 U	5.7 U	5.8 U	NA	5.7 U	5.7 U	NA	5.8 U	5.7 U	5.7 U	NA	NA	5.7 U	5.8 U	NA	NA	NA	NA
2-Chlorophenol	35	350	5.9 U	NA	NA	5.9 U	6 U	5.9 U	6 U	NA	5.9 U	5.9 U	NA	6 U	5.9 U	5.9 U	NA	NA	5.9 U	6 U	NA	NA	NA	NA
2-Methylphenol	35	350	5.3 U	NA	NA	5.3 U	5.4 U	5.3 U	5.4 U	NA	5.3 U	5.3 U	NA	5.4 U	5.3 U	5.3 U	NA	NA	5.3 U	5.4 U	NA	NA	NA	NA
2-Nitroaniline	21	210	6.1 U	NA	NA	6.1 U	6.2 U	6.1 U	6.2 U	NA	6.2 U	6.1 U	NA	6.2 U	6.1 U	6.1 U	NA	NA	6.1 U	6.2 U	NA	NA	NA	NA
2-Nitrophenol	--	--	1.6 U	NA	NA	1.6 U	1.6 U	1.6 U	1.6 U	NA	1.6 U	1.6 U	NA	1.6 U	1.6 U	1.6 U	NA	NA	1.6 U	1.6 U	NA	NA	NA	NA
3,3'-Dichlorobenzidine	0.08	8	**5.5 U**	NA	NA	**5.5 U**	**5.6 U**	**5.5 U**	**5.6 U**	NA	**5.5 U**	**5.5 U**	NA	**5.6 U**	**5.5 U**	**5.5 U**	NA	NA	**5.5 U**	**5.6 U**	NA	NA	NA	NA
3-Nitroaniline	1.7	170	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	**5.7 U**	**5.8 U**	NA	**5.7 U**	**5.7 U**	NA	**5.8 U**	**5.7 U**	**5.7 U**	NA	NA	**5.7 U**	**5.8 U**	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	--	--	8.2 U	NA	NA	8.1 U	8.2 U	8.1 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.1 U	NA	NA	8.2 U	8.2 U	NA	NA	NA	NA
4-Bromophenyl-phenylether	70	700	4.7 U	NA	NA	4.7 U	4.7 U	4.7 U	4.7 U	NA	4.7 U	4.7 U	NA	4.7 U	4.7 U	4.7 U	NA	NA	4.7 U	4.7 U	NA	NA	NA	NA
4-Chloro-3-methylphenol	63	630	5.5 U	NA	NA	5.5 U	5.6 U	5.5 U	5.6 U	NA	5.5 U	5.5 U	NA	5.6 U	5.5 U	5.5 U	NA	NA	5.5 U	5.6 U	NA	NA	NA	NA
4-Chloroaniline	28	280	6.1 U	NA	NA	6.1 U	6.2 U	6.1 U	6.2 U	NA	6.2 U	6.1 U	NA	6.2 U	6.1 U	6.1 U	NA	NA	6.1 U	6.2 U	NA	NA	NA	NA
4-Chlorophenyl-phenylether	--	--	5.1 U	NA	NA	5.1 U	5.2 U	5.1 U	5.2 U	NA	5.1 U	5.1 U	NA	5.2 U	5.1 U	5.1 U	NA	NA	5.1 U	5.2 U	NA	NA	NA	NA
4-Methylphenol	3.5	35	**12.4 U**	NA	NA	**12.4 U**	**12.6 U**	**12.4 U**	**12.6 U**	NA	**12.5 U**	**12.4 U**	NA	**12.6 U**	**12.4 U**	**12.4 U**	NA	NA	**12.4 U**	**12.6 U**	NA	NA	NA	NA
4-Nitroaniline	1.7	170	**3.1 U**	NA	NA	**3 U**	**3.1 U**	**3 U**	**3.1 U**	NA	**2.7 U**	**2.6 U**	NA	**3.1 U**	**3.1 U**	**3 U**	NA	NA	**3.1 U**	**3.1 U**	NA	NA	NA	NA
4-Nitrophenol	56	560	8.2 U	NA	NA	8.1 U	8.2 U	8.1 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.1 U	NA	NA	8.2 U	8.2 U	NA	NA	NA	NA
Acetophenone	700	7000	8.2 U	NA	NA	8.1 U	8.2 U	8.1 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.1 U	NA	NA	8.2 U	8.2 U	NA	NA	NA	NA
Atrazine	3	300	1.1 U	NA	NA	1.1 U	1.1 U	1.1 U	1.1 U	NA	1.1 U	1.1 U	NA	1.1 U	1.1 U	1.1 U	NA	NA	1.1 U	1.1 U	NA	NA	NA	NA
Benzaldehyde	700	7000	1 U	NA	NA	0.99 U	1 U	0.99 U	1 U	NA	1 U	1 U	NA	1 U	1 U	0.99 U	NA	NA	1 U	1 U	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	--	--	7.1 U	NA	NA	7.1 U	7.2 U	7.1 U	7.2 U	NA	7.2 U	7.1 U	NA	7.2 U	7.1 U	7.1 U	NA	NA	7.1 U	7.2 U	NA	NA	NA	NA
Bis(2-chloroethyl)ether	0.03	3	**6.1 U**	NA	NA	**6.1 U**	**6.2 U**	**6.1 U**	**6.2 U**	NA	**6.2 U**	**6.1 U**	NA	**6.2 U**	**6.1 U**	**6.1 U**	NA	NA	**6.1 U**	**6.2 U**	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	6	600	**9 U**	NA	NA	**10**	**9.1 U**	**10.3**	**9.1 U**	NA	**9 U**	**9 U**	NA	**9.1 U**	**9 U**	**8.9 U**	NA	NA	**9 U**	**9.1 U**	NA	NA	NA	NA

TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW01S	MW02S	MW03S	MW04S	MW10S	MW11S		MW12S	MW13S		MW14S	MW15S	MW19S	MW25S	MW26S		MW27S	MW30S	MW32S	MW33S	MW34S	MW35S
Sample ID			JM40-JAX47-937-MW01S-1011	JM40-JAX47-937-MW02S-1011	JM40-JAX47-937-MW03S-1011	JM40-JAX47-937-MW04S-1011	JM40-JAX47-MW10S-1011	JM40-JAX47-FD02-1011	JM40-JAX47-MW11S-1011	JM40-JAX47-MW12S-1011	JM40-JAX47-FD01-1011	JM40-JAX47-MW13S-1011	JM40-JAX47-MW14S-1011	JM40-JAX47-MW15S-1011	JM40-JAX47-MW19S-1011	JM40-JAX47-MW25S-1011	JM40-JAX47-FD03-1011	JM40-JAX47-MW26S-1011	JM40-JAX47-MW27S-1011	JM40-JAX47-MW30S-1011	JM40-JAX47-MW32S-1011	JM40-JAX47-MW33S-1011	JM40-JAX47-MW34S-1011	JM40-JAX47-MW35S-1011
Sample Date			10/31/2011	11/1/2011	10/31/2011	10/31/2011	10/27/2011	10/27/2011	10/27/2011	11/2/2011	10/25/2011	10/25/2011	10/28/2011	11/1/2011	11/3/2011	11/1/2011	10/27/2011	10/27/2011	11/1/2011	11/3/2011	11/2/2011	11/2/2011	11/2/2011	10/28/2011
Analyte	**GCTL[1]**	**NADC**																						
SW8270D (UG/L)																								
Butylbenzylphthalate	140	1400	6.1 U	NA	NA	6.1 U	6.2 U	6.1 U	6.2 U	NA	6.2 U	6.1 U	NA	6.2 U	6.1 U	6.1 U	NA	NA	6.1 U	6.2 U	NA	NA	NA	NA
Caprolactam	--	--	8.2 UJ	NA	NA	8.1 UJ	8.2 UJ	8.1 UJ	8.2 UJ	NA	8.2 UJ	8.2 UJ	NA	8.2 UJ	8.2 UJ	8.1 UJ	NA	NA	8.2 UJ	8.2 UJ	NA	NA	NA	NA
Carbazole	1.8	180	**6.3 U**	NA	NA	**6.3 U**	**6.4 U**	**6.3 U**	**6.4 U**	NA	**6.4 U**	**6.3 U**	NA	**6.4 U**	**6.3 U**	**6.3 U**	NA	NA	**6.3 U**	**6.4 U**	NA	NA	NA	NA
Dibenzofuran	28	280	5.5 U	NA	NA	5.5 U	5.6 U	5.5 U	5.6 U	NA	5.5 U	5.5 U	NA	5.6 U	5.5 U	5.5 U	NA	NA	5.5 U	5.6 U	NA	NA	NA	NA
Diethylphthalate	5600	56000	12	NA	NA	4.4 J	5.8 U	5.7 U	5.8 U	NA	5.7 U	5.7 U	NA	5.8 U	5.7 U	5.7 U	NA	NA	5.7 U	5.8 U	NA	NA	NA	NA
Dimethylphthalate	70000	700000	6.1 U	NA	NA	6.1 U	6.2 U	6.1 U	6.2 U	NA	6.2 U	6.1 U	NA	6.2 U	6.1 U	6.1 U	NA	NA	6.1 U	6.2 U	NA	NA	NA	NA
Di-n-butylphthalate	700	7000	1.8 U	NA	NA	1.7 U	1.8 U	1.7 U	1.8 U	NA	1.8 U	1.8 U	NA	1.8 U	1.8 U	1.7 U	NA	NA	1.8 U	1.8 U	NA	NA	NA	NA
Di-n-octylphthalate	140	1400	2.2 U	NA	NA	2.2 U	2.3 U	2.2 U	2.3 U	NA	2.2 U	2.2 U	NA	2.3 U	2.2 U	2.2 U	NA	NA	2.2 U	2.3 U	NA	NA	NA	NA
Hexachlorobenzene	1	100	0.84 U	NA	NA	0.83 U	0.84 U	0.83 U	0.84 U	NA	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.83 U	NA	NA	0.84 U	0.84 U	NA	NA	NA	NA
Hexachlorobutadiene	0.4	40	**5.1 U**	NA	NA	**5.1 U**	**5.2 U**	**5.1 U**	**5.2 U**	NA	**5.1 U**	**5.1 U**	NA	**5.2 U**	**5.1 U**	**5.1 U**	NA	NA	**5.1 U**	**5.2 U**	NA	NA	NA	NA
Hexachlorocyclopentadiene	50	500	1.7 U	NA	NA	1.7 U	1.7 U	1.7 U	1.7 U	NA	1.7 U	1.7 U	NA	1.7 U	1.7 U	1.7 U	NA	NA	1.7 U	1.7 U	NA	NA	NA	NA
Hexachloroethane	2.5	250	**5.3 U**	NA	NA	**5.3 U**	**5.4 U**	**5.3 U**	**5.4 U**	NA	**5.3 U**	**5.3 U**	NA	**5.4 U**	**5.3 U**	**5.3 U**	NA	NA	**5.3 U**	**5.4 U**	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.05	5	**3.3 U**	NA	NA	**3.2 U**	**3.3 U**	**3.2 U**	**3.3 U**	NA	**3.3 U**	**3.3 U**	NA	**3.3 U**	**3.3 U**	**3.2 U**	NA	NA	**3.3 U**	**3.3 U**	NA	NA	NA	NA
Isophorone	37	3700	7.8 U	NA	NA	7.7 U	7.8 U	7.7 U	7.8 U	NA	7.8 U	7.8 U	NA	7.8 U	7.8 U	7.7 U	NA	NA	7.8 U	7.8 U	NA	NA	NA	NA
Nitrobenzene	3.5	35	2 U	NA	NA	2 U	2.1 U	2 U	2.1 U	NA	2 U	2 U	NA	2.1 U	2 U	2 U	NA	NA	2 U	2.1 U	NA	NA	NA	NA
N-Nitroso-di-n-propylamine	0.005	0.5	**6.1 U**	NA	NA	**6.1 U**	**6.2 U**	**6.1 U**	**6.2 U**	NA	**6.2 U**	**6.1 U**	NA	**6.2 U**	**6.1 U**	**6.1 U**	NA	NA	**6.1 U**	**6.2 U**	NA	NA	NA	NA
N-Nitrosodiphenylamine	7.1	710	6.9 U	NA	NA	6.9 U	7 U	6.9 U	7 U	NA	7 U	6.9 U	NA	7 U	6.9 U	6.9 U	NA	NA	6.9 U	7 U	NA	NA	NA	NA
Pentachlorophenol	1	100	**2.8 U**	NA	NA	**2.8 U**	**2.9 U**	**2.8 U**	**2.9 U**	NA	**2.9 U**	**2.8 U**	NA	**2.9 U**	**2.8 U**	**2.8 U**	NA	NA	**2.8 U**	**2.9 U**	NA	NA	NA	NA
Phenol	10	100	3.5 U	NA	NA	3.4 U	3.5 U	3.4 U	3.5 U	NA	3.5 U	3.5 U	NA	3.5 U	3.5 U	3.4 U	NA	NA	3.5 U	3.5 U	NA	NA	NA	NA
SW8270D-SIM (UG/L)																								
1-Methylnaphthalene	28	280	8.8	NA	NA	24.7	0.041 U	**47.5**	**45.6**	NA	1.4	1.4	NA	0.041 U	0.041 U	2.1	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
2-Methylnaphthalene	28	280	**28.5**	NA	NA	**38.8**	0.041 U	**91.5**	**87.9**	NA	0.5	0.52	NA	0.041 U	0.041 U	1.5	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Acenaphthene	20	200	0.092	NA	NA	0.069	0.041 U	1.8	1.7	NA	0.65	0.63	NA	0.041 U	0.041 U	0.12	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Acenaphthylene	210	2100	0.038 J	NA	NA	0.03 J	0.041 U	0.47	0.46	NA	0.13	0.13	NA	0.041 U	0.041 U	0.52	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Anthracene	2100	21000	0.073	NA	NA	0.041 U	0.041 UJ	0.041 UJ	0.041 UJ	NA	0.087	0.087	NA	0.041 U	0.041 U	0.08	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Benzo(a)anthracene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Benzo(a)pyrene	0.2	20	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Benzo(b)fluoranthene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Benzo(g,h,i)perylene	210	2100	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Benzo(k)fluoranthene	0.5	50	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 UJ	0.04 UJ	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Chrysene	4.8	480	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Dibenzo(a,h)anthracene	0.005	0.5	**0.041 U**	NA	NA	**0.041 U**	**0.041 U**	**0.041 U**	**0.041 U**	NA	**0.04 U**	**0.04 U**	NA	**0.041 U**	**0.041 U**	**0.041 U**	NA	NA	**0.041 U**	**0.041 U**	NA	NA	NA	NA
Fluoranthene	280	2800	0.041 U	NA	NA	0.041 U	0.041 UJ	0.041 UJ	0.041 UJ	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Fluorene	280	2800	0.15	NA	NA	0.15	0.041 U	1.7	1.6	NA	0.95	0.92	NA	0.041 U	0.041 U	2.8	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.04 U	0.04 U	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Naphthalene	14	140	**55 B**	NA	NA	**61.1 B**	0.041 U	**145**	**142**	NA	0.61 B	0.56 B	NA	0.041 U	0.041 U	**88.7**	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Phenanthrene	210	2100	0.17	NA	NA	0.041 U	0.041 UJ	1.5 J	1.4 J	NA	0.74 J	0.73 J	NA	0.041 U	0.041 U	1.3	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
Pyrene	210	2100	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.023 B	0.034 B	NA	0.041 U	0.041 U	0.041 U	NA	NA	0.041 U	0.041 U	NA	NA	NA	NA
TOC (UG/L)																								
TOC	--	--	18700	NA	NA	18000	NA	NA	8170	NA	NA	4620	NA	NA	NA	4530	NA	NA	NA	NA	3480	NA	2740	NA
VOA (UG/L)																								
1,1,1-Trichloroethane	200	2000	1.4 U	NA	NA	0.28 U	0.28 U	0.28 U	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA	0.28 U	0.28 U	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	0.2	20	**1.3 U**	NA	NA	**0.26 U**	**0.26 U**	**0.26 U**	**0.26 U**	NA	**0.26 U**	**0.26 U**	NA	**0.26 U**	**0.26 U**	**0.26 U**	NA	NA	**0.26 U**	**0.26 U**	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane	210000	2100000	2.3 U	NA	NA	0.46 U	0.46 U	0.46 U	0.46 U	NA	0.46 U	0.46 U	NA	0.46 U	0.46 U	0.46 U	NA	NA	0.46 U	0.46 U	NA	NA	NA	NA
1,1,2-Trichloroethane	5	500	2 U	NA	NA	0.4 U	0.4 U	0.4 U	0.4 U	NA	0.4 U	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA	NA	0.4 U	0.4 U	NA	NA	NA	NA
1,1-Dichloroethane	70	700	1.5 U	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
1,1-Dichloroethene	7	70	1.9 U	NA	NA	0.38 U	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.31 J	NA	NA	0.38 U	0.38 U	NA	NA	NA	NA
1,2,3-Trichlorobenzene	70	700	1.6 U	NA	NA	0.32 U	0.32 U	0.32 U	0.32 U	NA	3.6	3	NA	0.32 U	0.32 U	2.7	NA	NA	0.32 U	0.32 U	NA	NA	NA	NA
1,2,4-Trichlorobenzene	70	700	4 U	NA	NA	0.8 U	0.8 U	1.2	1.3	NA	10.5	10	NA	0.8 U	0.8 U	3.4	NA	NA	0.8 U	0.8 U	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.2	20	**10 U**	NA	NA	**2 U**	**2 U**	**2 U**	**2 U**	NA	**2 U**	**2 U**	NA	**2 U**	**2 U**	**2 U**	NA	NA	**2 U**	**2 U**	NA	NA	NA	NA
1,2-Dibromoethane	0.02	2	**1.1 U**	NA	NA	**0.22 U**	**0.22 U**	**0.22 U**	**0.22 U**	NA	**0.22 U**	**0.22 U**	NA	**0.22 U**	**0.22 U**	**0.22 U**	NA	NA	**0.22 U**	**0.22 U**	NA	NA	NA	NA
1,2-Dichlorobenzene	600	6000	2.5 U	NA	NA	0.5 U	0.5 U	1.6	1.4	NA	4.1	4	NA	0.5 U	0.5 U	1	NA	NA	0.5 U	0.5 U	NA	NA	NA	NA
1,2-Dichloroethane	3	300	1.5 U	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
1,2-Dichloropropane	5	500	1.5 U	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
1,3-Dichlorobenzene	210	2100	1.5 U	NA	NA	0.3 U	0.3 U	0.44 J	0.3 U	NA	2.5	2.5	NA	0.3 U	0.3 U	0.42 J	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
1,4-Dichlorobenzene	75	7500	1.5 U	NA	NA	0.3 U	0.3 U	4.1	3.9	NA	5.7	5.8	NA	0.3 U	0.3 U	3.7	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
2-Butanone	4200	42000	20 U	NA	NA	4 U	4 U	4 U	4 U	NA	4 U	4 U	NA	4 U	4 U	4 U	NA	NA	4 U	4 U	NA	NA	NA	NA
2-Hexanone	280	2800	4.8 U	NA	NA	0.96 U	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA	NA	0.96 U	0.96 U	NA	NA	NA	NA
4-Methyl-2-pentanone	560	5600	10 U	NA	NA	2 U	2 U	2 U	2 U	NA	2 U	2 U	NA	2 U	2 U	2 U	NA	NA	2 U	2 U	NA	NA	NA	NA
Acetone	6300	63000	13 U	NA	NA	2.6 U	2.6 U	2.6 U	7.3 JB	NA	2.6 U	2.6 U	NA	2.6 U	2.6 U	2.6 U	NA	NA	2.6 U	2.6 U	NA	NA	NA	NA
Benzene	1	100	**12.6**	NA	NA	**3.2**	0.34 U	**1.7**	**1.7**	NA	0.63	0.62	NA	0.34 U	0.34 U	0.74	NA	NA	0.34 U	0.34 U	NA	NA	NA	NA
Bromochloromethane	91	910	1.7 U	NA	NA	0.34 U	0.34 U	0.34 U	0.34 U	NA	0.34 U	0.34 U	NA	0.34 U	0.34 U	0.34 U	NA	NA	0.34 U	0.34 U	NA	NA	NA	NA
Bromodichloromethane	0.6	60	**1.5 U**	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA	0.3 U	0.3 U	NA	NA	NA	NA
Bromoform	4.4	440	1.9 U	NA	NA	0.38 U	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.38 U	NA	NA	0.38 U	0.38 U	NA	NA	NA	NA
Bromomethane	9.8	98	4.3 U	NA	NA	0.86 U	0.86 U	0.86 U	0.86 U	NA	0.86 U	0.86 U	NA	0.86 U	0.86 U	0.86 U	NA	NA	0.86 U	0.86 U	NA	NA	NA	NA
Carbon disulfide	700	7000	1.9 U	NA	NA	0.38 U	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.38 U	NA	NA	0.38 U	0.38 U	NA	NA	NA	NA

TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW01S	MW02S	MW03S	MW04S	MW10S	MW11S		MW12S	MW13S		MW14S	MW15S	MW19S	MW25S	MW26S		MW27S	MW30S	MW32S	MW33S	MW34S	MW35S
Sample ID			JM40-JAX47-937-MW01S-1011	JM40-JAX47-937-MW02S-1011	JM40-JAX47-937-MW03S-1011	JM40-JAX47-937-MW04S-1011	JM40-JAX47-MW10S-1011	JM40-JAX47-FD02-1011	JM40-JAX47-MW11S-1011	JM40-JAX47-MW12S-1011	JM40-JAX47-FD01-1011	JM40-JAX47-MW13S-1011	JM40-JAX47-MW14S-1011	JM40-JAX47-MW15S-1011	JM40-JAX47-MW19S-1011	JM40-JAX47-MW25S-1011	JM40-JAX47-FD03-1011	JM40-JAX47-MW26S-1011	JM40-JAX47-MW27S-1011	JM40-JAX47-MW30S-1011	JM40-JAX47-MW32S-1011	JM40-JAX47-MW33S-1011	JM40-JAX47-MW34S-1011	JM40-JAX47-MW35S-1011
Sample Date			10/31/2011	11/1/2011	10/31/2011	10/31/2011	10/27/2011	10/27/2011	10/27/2011	11/2/2011	10/25/2011	10/25/2011	10/28/2011	11/1/2011	11/3/2011	11/1/2011	10/27/2011	10/27/2011	11/1/2011	11/3/2011	11/2/2011	11/2/2011	11/2/2011	10/28/2011
Analyte	**GCTL[1]**	**NADC**																						
VOA (UG/L)																								
Carbon tetrachloride	3	300	1.4 U	NA	NA	0.28 U	0.28 U	0.28 U	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA	0.28 U	0.28 U	NA	NA	NA	NA
Chlorobenzene	100	1000	3.1	NA	NA	0.62	0.32 U	10.2	9.8	NA	4.1	4	NA	0.32 U	0.32 U	4.4	NA	NA	0.32 U	0.32 U	NA	NA	NA	NA
Chloroethane	12	1200	7.2 U	NA	NA	1.4 U	1.4 U	1.4 U	1.4 U	NA	1.4 U	1.4 U	NA	1.4 U	1.4 U	1.4 U	NA	NA	1.4 U	1.4 U	NA	NA	NA	NA
Chloroform	70	700	1.6 U	NA	NA	0.32 U	0.32 U	1.2	1.2	NA	0.32 U	0.32 U	NA	0.32 U	0.32 U	0.32 U	NA	NA	0.32 U	0.32 U	NA	NA	NA	NA
Chloromethane	2.7	270	**3.2 U**	NA	NA	0.64 U	0.64 U	0.64 U	0.64 U	NA	0.64 U	0.64 U	NA	0.64 U	0.64 U	0.64 U	NA	NA	0.64 U	0.64 U	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	700	**544**	NA	NA	**278**	0.38 U	0.82	0.91	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.65	NA	NA	0.38 U	0.38 U	NA	NA	NA	NA
cis-1,3-Dichloropropene	--	--	4 U	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U	NA	0.8 U	0.8 U	NA	0.8 U	0.8 U	0.8 U	NA	NA	0.8 U	0.8 U	NA	NA	NA	NA
Cyclohexane	--	--	2 U	NA	NA	0.4 U	0.4 U	10.4	10.7	NA	0.4 U	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA	NA	0.4 U	0.4 U	NA	NA	NA	NA
Dibromochloromethane	0.4	40	**1.3 U**	NA	NA	0.26 U	0.26 U	0.26 U	0.26 U	NA	0.26 U	0.26 U	NA	0.26 U	0.26 U	0.26 U	NA	NA	0.26 U	0.26 U	NA	NA	NA	NA
Dichlorodifluoromethane	1400	14000	1.7 U	NA	NA	0.34 U	0.34 U	0.34 U	0.34 U	NA	0.34 U	0.34 U	NA	0.34 U	0.34 U	0.34 U	NA	NA	0.34 U	0.34 U	NA	NA	NA	NA
Ethylbenzene	30	300	**126**	NA	NA	**91.9**	0.44 U	0.28 J	0.31 J	NA	0.44 U	0.44 U	NA	0.44 U	0.44 U	0.44 U	NA	NA	0.44 U	0.44 U	NA	NA	NA	NA
Isopropylbenzene	0.8	8	**5.4**	NA	NA	**4.4**	0.28 U	**5.8**	**5.7**	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	**3.4**	NA	NA	0.28 U	0.28 U	NA	NA	NA	NA
Methyl Acetate	3000	30000	3.8 U	NA	NA	0.76 U	0.76 U	0.76 U	0.76 U	NA	0.76 U	0.76 U	NA	0.76 U	0.76 U	0.76 U	NA	NA	0.76 U	0.76 U	NA	NA	NA	NA
Methyl tert-butyl ether	20	200	5 U	NA	NA	1 U	1 U	1 U	1 U	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	NA
Methylcyclohexane	--	--	2.7 U	NA	NA	0.54 U	0.54 U	7.4	7.3	NA	0.54 U	0.54 U	NA	0.54 U	0.54 U	2	NA	NA	0.54 U	0.54 U	NA	NA	NA	NA
Methylene chloride	5	500	**6.6 U**	NA	NA	1.3 U	1.3 U	1.3 U	1.3 U	NA	1.3 U	1.3 U	NA	1.3 U	1.3 U	1.3 U	NA	NA	1.3 U	1.3 U	NA	NA	NA	NA
Styrene	100	1000	1.2 U	NA	NA	0.24 U	0.24 U	0.24 U	0.24 U	NA	0.24 U	0.24 U	NA	0.24 U	0.24 U	0.24 U	NA	NA	0.24 U	0.24 U	NA	NA	NA	NA
Tetrachloroethene	3	300	**11.8**	NA	NA	**10.5**	0.42 U	0.42 U	0.42 U	NA	0.42 U	0.42 U	NA	0.42 U	0.42 U	0.42 U	NA	NA	0.42 U	0.42 U	NA	NA	NA	NA
Toluene	40	400	**44.6**	NA	NA	14	0.28 U	0.28 U	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA	0.28 U	0.28 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	100	1000	2.1 J	NA	NA	1	0.66 U	0.66 U	0.66 U	NA	0.66 U	0.66 U	NA	0.66 U	0.66 U	0.66 U	NA	NA	0.66 U	0.66 U	NA	NA	NA	NA
trans-1,3-Dichloropropene	--	--	3 U	NA	NA	0.6 U	0.6 U	0.6 U	0.6 U	NA	0.6 U	0.6 U	NA	0.6 U	0.6 U	0.6 U	NA	NA	0.6 U	0.6 U	NA	NA	NA	NA
Trichloroethene	3	300	**3.6**	NA	NA	1.4	0.38 U	1.7	1.7	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.35 J	NA	NA	0.38 U	0.38 U	NA	NA	NA	NA
Trichlorofluoromethane	2100	21000	4 U	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U	NA	0.8 U	0.8 U	NA	0.8 U	0.8 U	0.8 U	NA	NA	0.8 U	0.8 U	NA	NA	NA	NA
Vinyl chloride	1	100	**6.4**	NA	NA	0.36 U	0.36 U	0.36 U	0.36 U	NA	0.36 U	0.36 U	NA	0.36 U	0.36 U	0.36 U	NA	NA	0.36 U	0.36 U	NA	NA	NA	NA
Xylene (total)	20	200	**1560**	NA	NA	**582**	1 U	4	3.9	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	NA
WCHEM (UG/L)																								
Ethane	--	--	0.96 U	NA	NA	0.96 U	NA	NA	0.96 U	NA	NA	0.96 U	NA	NA	NA	0.96 U	NA	NA	NA	NA	0.96 U	NA	0.96 U	NA
Ethylene	--	--	1 U	NA	NA	1 U	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	1 U	NA
Methane	--	--	4700	NA	NA	1500	NA	NA	120	NA	NA	23	NA	NA	NA	110	NA	NA	NA	NA	2.6 J	NA	1.4 J	NA
Alkalinity (Total)	--	--	9000	NA	NA	1000 U	NA	NA	2000	NA	NA	5000	NA	NA	NA	2000	NA	NA	NA	NA	5000	NA	3000	NA

Notes:

GCTL - Groundwater Cleanup Target Level

NADC - Natural Attenuation Default Concentration

1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L

B Analyte detected in associated lab blank.

J Analyte positively identified: associated numerical value is approximate.

JB Analyte detected in associated field blank.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ Analyte below the reported sample quantitation limit. However, the reported value is approximate.

NA not analyzed; ug/l micrograms per liter

Values Bolded are analytes not detected by the Lab but are above the **GCTL**

Values Shaded Pale Yellow are analytes not detected by the Lab but are above the **NADC**

Values Bolded and Shaded Pale Yellow are analytes not detected by the Lab but above **GCTL** and **NADC**

Values Bold and Pale Blue exceed the **GCTL**

Values Shaded Grey are hits that exceed the **NADC**

Values Bold and Shaded Grey are hits that exceed both **GCTL** and **NADC**

-- = Not Available at time of rule adoption/ limit does not apply

TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW36S	MW37S	MW38S	MW39S	MW40S	MW41S	MW42S	MW43S
Sample ID			JM40-JAX47-MW36S-1011	JM40-JAX47-MW37S-1011	JM40-JAX47-MW38S-1011	JM40-JAX47-MW39S-1011	JM40-JAX47-MW40S-1011	JM40-JAX47-MW41S-1011	JM40-JAX47-MW42S-1011	JM40-JAX47-MW43S-1011
Sample Date			10/24/2011	10/26/2011	10/25/2011	10/26/2011	10/26/2011	10/25/2011	10/25/2011	11/3/2011
Analyte	**GCTL[1]**	**NADC**								
METAL (UG/L)										
Arsenic	10	100	**143**	7.12 J	6.62 U	6.62 U	6.62 U	6.62 U	5.01 J	**10.6**
Iron	300	3000	NA	**7930**	NA	12.5 B	27.7 B	NA	**761 B**	NA
Manganese	50	500	NA	17.3	NA	2.62 J	1.5 J	NA	9.3 J	NA
SM3500FE-D (UG/L)										
Ferrous Iron	--	--	NA	2990	NA	98 J	184 U	NA	595	NA
SM4500SF (UG/L)										
Sulfide	--	--	NA	600 J	NA	600 J	600 J	NA	800 J	NA
SW300.1 (UG/L)										
Nitrate-N	10000	100000	NA	72 U	NA	2000	660	NA	1000	NA
Sulfate	250000	2500000	NA	34900	NA	19200	8300	NA	21400	NA
SW8081B (UG/L)										
4,4'-DDD	0.1	10	**5.5**	0.0066 J	0.018 J	0.0011 U	0.024	0.0034 J	0.0011 U	0.0011 U
4,4'-DDE	0.1	10	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.013	0.0016 U	0.0016 U
4,4'-DDT	0.1	10	**0.57**	0.00045 U	0.00045 UJ	0.00045 U	0.0021 J	0.0069 J	0.00046 U	0.00046 U
Aldrin	0.002	0.2	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00066 U	0.00067 U
alpha-BHC	0.006	0.6	**0.14**	0.0012 U	**0.17**	0.0012 U	0.0012 U	**0.064**	**3.3**	**2.3**
alpha-Chlordane	--	--	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0041 J	0.0012 U	0.0012 U	0.02
beta-BHC	0.02	2	**0.11**	0.00049 U	**0.061 J**	0.00049 U	0.00049 U	**0.075**	**0.75**	**3.1**
Chlordane	2	200	0.021 U	0.02 U	0.021 U	0.02 U	0.044 J	0.02 U	0.021 U	0.021 U
delta-BHC	2.1	21	0.11	0.0012 U	0.053 J	0.0012 U	0.0012 U	0.023	**3.6**	2.1
Dieldrin	0.002	0.2	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Endosulfan I	42	420	0.034	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
Endosulfan II	42	420	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00065 U	0.00066 U	0.00067 U
Endosulfan sulfate	42	420	0.00041 UJ	0.00041 U	0.00041 UJ	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00042 U
Endrin	2	20	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00073 U	0.00075 U	0.00075 U
Endrin aldehyde	--	--	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00061 U	0.00062 U	0.00062 U
Endrin ketone	--	--	0.0025 UJ	0.0025 U	0.0025 UJ	0.0025 U	0.0025 U	0.0024 U	0.0025 U	0.0025 U
gamma-BHC (Lindane)	0.2	20	0.18	0.00098 U	0.041	0.00098 U	0.00099 U	0.028	**2.8**	**2.4**
gamma-Chlordane	--	--	0.00099 U	0.00098 U	0.00099 UJ	0.00098 U	0.0036 J	0.00098 U	0.00099 U	0.001 U
Heptachlor	0.4	40	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U
Heptachlor epoxide	0.2	20	0.00058 U	0.00057 U	0.069 J	0.00057 U	0.00058 U	0.011 J	0.00058 U	0.035 J
Methoxychlor	40	400	0.00074 U	0.00074 U	0.00074 UJ	0.00074 U	0.00074 U	0.00073 U	0.00075 U	0.00075 U
Toxaphene	3	300	0.074 U	0.074 U	0.074 U	0.074 U	0.074 U	0.073 U	0.075 U	0.075 U
SW8270D (UG/L)										
1,1'-Biphenyl	0.5	5	NA	NA	NA	NA	NA	NA	**9.8**	NA
1,2,4,5-Tetrachlorobenzene	2.1	21	NA	NA	NA	NA	NA	NA	**4.5 U**	NA
1,2,4-Trichlorobenzene	70	700	NA	NA	NA	NA	NA	NA	5.4 U	NA
2,2'-Oxybis(1-chloropropane)	10	100	NA	NA	NA	NA	NA	NA	6.8 U	NA
2,4,5-Trichlorophenol	1	10	NA	NA	NA	NA	NA	NA	**7 U**	NA
2,4,6-Trichlorophenol	3.2	320	NA	NA	NA	NA	NA	NA	1.7 U	NA
2,4-Dichlorophenol	0.3	3	NA	NA	NA	NA	NA	NA	**6.4 U**	NA
2,4-Dimethylphenol	140	1400	NA	NA	NA	NA	NA	NA	4.7 U	NA
2,4-Dinitrophenol	14	140	NA	NA	NA	NA	NA	NA	11.5 U	NA
2,4-Dinitrotoluene	0.05	5	NA	NA	NA	NA	NA	NA	**5.8 U**	NA
2,6-Dinitrotoluene	0.05	5	NA	NA	NA	NA	NA	NA	**5.8 U**	NA
2-Chloronaphthalene	560	5600	NA	NA	NA	NA	NA	NA	5.8 U	NA
2-Chlorophenol	35	350	NA	NA	NA	NA	NA	NA	6 U	NA
2-Methylphenol	35	350	NA	NA	NA	NA	NA	NA	5.4 U	NA
2-Nitroaniline	21	210	NA	NA	NA	NA	NA	NA	6.2 U	NA
2-Nitrophenol	--	--	NA	NA	NA	NA	NA	NA	1.6 U	NA
3,3'-Dichlorobenzidine	0.08	8	NA	NA	NA	NA	NA	NA	**5.6 U**	NA
3-Nitroaniline	1.7	170	NA	NA	NA	NA	NA	NA	**5.8 U**	NA
4,6-Dinitro-2-methylphenol	--	--	NA	NA	NA	NA	NA	NA	8.2 U	NA
4-Bromophenyl-phenylether	70	700	NA	NA	NA	NA	NA	NA	4.7 U	NA
4-Chloro-3-methylphenol	63	630	NA	NA	NA	NA	NA	NA	5.6 U	NA
4-Chloroaniline	28	280	NA	NA	NA	NA	NA	NA	6.2 U	NA
4-Chlorophenyl-phenylether	--	--	NA	NA	NA	NA	NA	NA	5.2 U	NA
4-Methylphenol	3.5	35	NA	NA	NA	NA	NA	NA	**12.6 U**	NA
4-Nitroaniline	1.7	170	NA	NA	NA	NA	NA	NA	**2.7 U**	NA
4-Nitrophenol	56	560	NA	NA	NA	NA	NA	NA	8.2 U	NA
Acetophenone	700	7000	NA	NA	NA	NA	NA	NA	8.2 U	NA
Atrazine	3	300	NA	NA	NA	NA	NA	NA	1.1 U	NA
Benzaldehyde	700	7000	NA	NA	NA	NA	NA	NA	1 U	NA
Bis(2-chloroethoxy)methane	--	--	NA	NA	NA	NA	NA	NA	7.2 U	NA
Bis(2-chloroethyl)ether	0.03	3	NA	NA	NA	NA	NA	NA	**6.2 U**	NA
Bis(2-ethylhexyl)phthalate	6	600	NA	NA	NA	NA	NA	NA	**9.1 U**	NA

TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW36S	MW37S	MW38S	MW39S	MW40S	MW41S	MW42S	MW43S
Sample ID			JM40-JAX47-MW36S-1011	JM40-JAX47-MW37S-1011	JM40-JAX47-MW38S-1011	JM40-JAX47-MW39S-1011	JM40-JAX47-MW40S-1011	JM40-JAX47-MW41S-1011	JM40-JAX47-MW42S-1011	JM40-JAX47-MW43S-1011
Sample Date			10/24/2011	10/26/2011	10/25/2011	10/26/2011	10/26/2011	10/25/2011	10/25/2011	11/3/2011
Analyte	**GCTL**[1]	**NADC**								
SW8270D (UG/L)										
Butylbenzylphthalate	140	1400	NA	NA	NA	NA	NA	NA	6.2 U	NA
Caprolactam	--	--	NA	NA	NA	NA	NA	NA	8.2 UJ	NA
Carbazole	1.8	180	NA	NA	NA	NA	NA	NA	**6.4 U**	NA
Dibenzofuran	28	280	NA	NA	NA	NA	NA	NA	5.6 U	NA
Diethylphthalate	5600	56000	NA	NA	NA	NA	NA	NA	5.8 U	NA
Dimethylphthalate	70000	700000	NA	NA	NA	NA	NA	NA	6.2 U	NA
Di-n-butylphthalate	700	7000	NA	NA	NA	NA	NA	NA	1.8 U	NA
Di-n-octylphthalate	140	1400	NA	NA	NA	NA	NA	NA	2.3 U	NA
Hexachlorobenzene	1	100	NA	NA	NA	NA	NA	NA	0.84 U	NA
Hexachlorobutadiene	0.4	40	NA	NA	NA	NA	NA	NA	**5.2 U**	NA
Hexachlorocyclopentadiene	50	500	NA	NA	NA	NA	NA	NA	1.7 U	NA
Hexachloroethane	2.5	250	NA	NA	NA	NA	NA	NA	**5.4 U**	NA
Indeno(1,2,3-cd)pyrene	0.05	5	NA	NA	NA	NA	NA	NA	**3.3 U**	NA
Isophorone	37	3700	NA	NA	NA	NA	NA	NA	7.8 U	NA
Nitrobenzene	3.5	35	NA	NA	NA	NA	NA	NA	2.1 U	NA
N-Nitroso-di-n-propylamine	0.005	0.5	NA	NA	NA	NA	NA	NA	**6.2 U**	NA
N-Nitrosodiphenylamine	7.1	710	NA	NA	NA	NA	NA	NA	7 U	NA
Pentachlorophenol	1	100	NA	NA	NA	NA	NA	NA	**2.9 U**	NA
Phenol	10	100	NA	NA	NA	NA	NA	NA	3.5 U	NA
SW8270D-SIM (UG/L)										
1-Methylnaphthalene	28	280	NA	NA	NA	NA	NA	NA	**46.5**	NA
2-Methylnaphthalene	28	280	NA	NA	NA	NA	NA	NA	**35**	NA
Acenaphthene	20	200	NA	NA	NA	NA	NA	NA	1.8	NA
Acenaphthylene	210	2100	NA	NA	NA	NA	NA	NA	0.65	NA
Anthracene	2100	21000	NA	NA	NA	NA	NA	NA	0.092	NA
Benzo(a)anthracene	0.05	5	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(a)pyrene	0.2	20	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(b)fluoranthene	0.05	5	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(g,h,i)perylene	210	2100	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(k)fluoranthene	0.5	50	NA	NA	NA	NA	NA	NA	0.041 UJ	NA
Chrysene	4.8	480	NA	NA	NA	NA	NA	NA	0.041 U	NA
Dibenzo(a,h)anthracene	0.005	0.5	NA	NA	NA	NA	NA	NA	**0.041 U**	NA
Fluoranthene	280	2800	NA	NA	NA	NA	NA	NA	0.041 U	NA
Fluorene	280	2800	NA	NA	NA	NA	NA	NA	1.9	NA
Indeno(1,2,3-cd)pyrene	0.05	5	NA	NA	NA	NA	NA	NA	0.041 U	NA
Naphthalene	14	140	NA	NA	NA	NA	NA	NA	**90.4 B**	NA
Phenanthrene	210	2100	NA	NA	NA	NA	NA	NA	1.6 J	NA
Pyrene	210	2100	NA	NA	NA	NA	NA	NA	0.041 U	NA
TOC (UG/L)										
TOC	--	--	NA	5680	NA	1500	1720	NA	6100	NA
VOA (UG/L)										
1,1,1-Trichloroethane	200	2000	NA	NA	NA	NA	NA	NA	0.28 U	NA
1,1,2,2-Tetrachloroethane	0.2	20	NA	NA	NA	NA	NA	NA	**0.26 U**	NA
1,1,2-Trichloro-1,2,2-trifluoroethane	210000	2100000	NA	NA	NA	NA	NA	NA	0.46 U	NA
1,1,2-Trichloroethane	5	500	NA	NA	NA	NA	NA	NA	0.4 U	NA
1,1-Dichloroethane	70	700	NA	NA	NA	NA	NA	NA	0.3 U	NA
1,1-Dichloroethene	7	70	NA	NA	NA	NA	NA	NA	0.38 U	NA
1,2,3-Trichlorobenzene	70	700	NA	NA	NA	NA	NA	NA	0.42 J	NA
1,2,4-Trichlorobenzene	70	700	NA	NA	NA	NA	NA	NA	2.5	NA
1,2-Dibromo-3-chloropropane	0.2	20	NA	NA	NA	NA	NA	NA	**2 U**	NA
1,2-Dibromoethane	0.02	2	NA	NA	NA	NA	NA	NA	**0.22 U**	NA
1,2-Dichlorobenzene	600	6000	NA	NA	NA	NA	NA	NA	2.5	NA
1,2-Dichloroethane	3	300	NA	NA	NA	NA	NA	NA	0.3 U	NA
1,2-Dichloropropane	5	500	NA	NA	NA	NA	NA	NA	0.3 U	NA
1,3-Dichlorobenzene	210	2100	NA	NA	NA	NA	NA	NA	0.59 J	NA
1,4-Dichlorobenzene	75	7500	NA	NA	NA	NA	NA	NA	9.2	NA
2-Butanone	4200	42000	NA	NA	NA	NA	NA	NA	4 U	NA
2-Hexanone	280	2800	NA	NA	NA	NA	NA	NA	0.96 U	NA
4-Methyl-2-pentanone	560	5600	NA	NA	NA	NA	NA	NA	2 U	NA
Acetone	6300	63000	NA	NA	NA	NA	NA	NA	2.6 U	NA
Benzene	1	100	NA	NA	NA	NA	NA	NA	**1.4**	NA
Bromochloromethane	91	910	NA	NA	NA	NA	NA	NA	0.34 U	NA
Bromodichloromethane	0.6	60	NA	NA	NA	NA	NA	NA	0.3 U	NA
Bromoform	4.4	440	NA	NA	NA	NA	NA	NA	0.38 U	NA
Bromomethane	9.8	98	NA	NA	NA	NA	NA	NA	0.86 U	NA
Carbon disulfide	700	7000	NA	NA	NA	NA	NA	NA	0.38 U	NA

TABLE 3-1
Groundwater Analytical Data Summary, October 2011
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW36S	MW37S	MW38S	MW39S	MW40S	MW41S	MW42S	MW43S
Sample ID			JM40-JAX47-MW36S-1011	JM40-JAX47-MW37S-1011	JM40-JAX47-MW38S-1011	JM40-JAX47-MW39S-1011	JM40-JAX47-MW40S-1011	JM40-JAX47-MW41S-1011	JM40-JAX47-MW42S-1011	JM40-JAX47-MW43S-1011
Sample Date			10/24/2011	10/26/2011	10/25/2011	10/26/2011	10/26/2011	10/25/2011	10/25/2011	11/3/2011
Analyte	**GCTL[1]**	**NADC**								
VOA (UG/L)										
Carbon tetrachloride	3	300	NA	NA	NA	NA	NA	NA	0.28 U	NA
Chlorobenzene	100	1000	NA	NA	NA	NA	NA	NA	12.3	NA
Chloroethane	12	1200	NA	NA	NA	NA	NA	NA	1.4 U	NA
Chloroform	70	700	NA	NA	NA	NA	NA	NA	0.32 U	NA
Chloromethane	2.7	270	NA	NA	NA	NA	NA	NA	0.64 U	NA
cis-1,2-Dichloroethene	70	700	NA	NA	NA	NA	NA	NA	0.38 U	NA
cis-1,3-Dichloropropene	--	--	NA	NA	NA	NA	NA	NA	0.8 U	NA
Cyclohexane	--	--	NA	NA	NA	NA	NA	NA	6	NA
Dibromochloromethane	0.4	40	NA	NA	NA	NA	NA	NA	0.26 U	NA
Dichlorodifluoromethane	1400	14000	NA	NA	NA	NA	NA	NA	0.34 U	NA
Ethylbenzene	30	300	NA	NA	NA	NA	NA	NA	1	NA
Isopropylbenzene	0.8	8	NA	NA	NA	NA	NA	NA	**7.6**	NA
Methyl Acetate	3000	30000	NA	NA	NA	NA	NA	NA	0.76 U	NA
Methyl tert-butyl ether	20	200	NA	NA	NA	NA	NA	NA	1 U	NA
Methylcyclohexane	--	--	NA	NA	NA	NA	NA	NA	11.6	NA
Methylene chloride	5	500	NA	NA	NA	NA	NA	NA	1.3 U	NA
Styrene	100	1000	NA	NA	NA	NA	NA	NA	0.24 U	NA
Tetrachloroethene	3	300	NA	NA	NA	NA	NA	NA	0.42 U	NA
Toluene	40	400	NA	NA	NA	NA	NA	NA	0.28 U	NA
trans-1,2-Dichloroethene	100	1000	NA	NA	NA	NA	NA	NA	0.66 U	NA
trans-1,3-Dichloropropene	--	--	NA	NA	NA	NA	NA	NA	0.6 U	NA
Trichloroethene	3	300	NA	NA	NA	NA	NA	NA	0.22 J	NA
Trichlorofluoromethane	2100	21000	NA	NA	NA	NA	NA	NA	0.8 U	NA
Vinyl chloride	1	100	NA	NA	NA	NA	NA	NA	0.36 U	NA
Xylene (total)	20	200	NA	NA	NA	NA	NA	NA	2	NA
WCHEM (UG/L)										
Ethane	--	--	NA	0.96 U	NA	0.96 U	0.96 U	NA	0.96 U	NA
Ethylene	--	--	NA	1 U	NA	1 U	1 U	NA	1 U	NA
Methane	--	--	NA	11	NA	0.53 J	0.7 U	NA	380	NA
Alkalinity (Total)	--	--	NA	7000	NA	12000	18000	NA	5000	NA

Notes:

GCTL - Groundwater Cleanup Target Level

NADC - Natural Attenuation Default Concentration

1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L

B Analyte detected in associated lab blank.

J Analyte positively identified: associated numerical value is approximate.

JB Analyte detected in associated field blank.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ Analyte below the reported sample quantitation limit. However, the reported value is approximate.

NA not analyzed; ug/l micrograms per liter

Values Bolded are analytes not detected by the Lab but are above the **GCTL**

Values Shaded Pale Yellow are analytes not detected by the Lab but are above the **NADC**

Values Bolded and Shaded Pale Yellow are analytes not detected by the Lab but above **GCTL** and **NADC**

Values Bold and Pale Blue exceed the **GCTL**

Values Shaded Grey are hits that exceed the **NADC**

Values Bold and Shaded Grey are hits that exceed both **GCTL** and **NADC**

-- = Not Available at time of rule adoption/ limit does not apply

TABLE 3-2
Groundwater Statistical Data Summary
October 2011 and April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Parameter	Number of Samples	Number of Detects		Minimum Concentration (µg/L)		Maximum Concentration (µg/L)		GCTL (µg/L)	Exceed GCTL		NADC (µg/L)	Exceed NADC		Location of Minimum Concentration		Location of Maximum Concentration	
		S1	S2	S1	S2	S1	S2		S1	S2		S1	S2	S1	S2	S1	S2
Arsenic	26	13	12	5.01 J	3.75 J	16400	27400	10	5	5	100	4	4	MW42S	MW34S	MW03S	MW03S
Pesticides																	
alpha BHC	27	10	15	0.013	0.0024 J	3.3	3.5	0.01	10	11	0.6	5	4	MW34S	MW10S	MW42S	MW43S
beta BHC	27	11	16	0.061 J	0.0042 J	3.1	3	0.02	11	11	2	1	1	MW38S	MW32S	MW43S	MW43S
Chlordane	27	1	0	3	NA	3	NA	2.00	1	NA	200	0	NA	MW13S	NA	MW13S	NA
delta BHC	27	9	11	0.011 J	0.002 J	3.6	2.9	2.1	2	4	21	0	0	MW12S	MW10S	MW42S	MW11S
Dieldrin	27	4	5	0.005	0.0046	0.22	0.19	0.002	4	5	0.2	1	0	MW32S	MW32S	MW33S	MW33S
gamma BHC	27	13	20	0.024 J	0.0017 J	4.2	4.3	0.2	7	6	20	0	0	MW33S	MW26S, MW37S	MW11S	MW43S
heptachlor epoxide	27	8	12	0.011 J	0.0016 J	0.43 J	0.51 J	0.2	2	1	20	0	0	MW41S	MW37S	MW14S	MW14S
p,p'-DDD	27	12	11	0.0011 J	0.0007 J	12	4.8	0.1	4	5	10	1	0	MW35S	MW35S	MW35S	MW 03S
p,p'-DDE	27	7	9	0.0079 J	0.0021 J	0.48 J	0.37 J	0.1	4	3	10	0	0	MW14S	MW30S	MW02S	MW01S
p,p'-DDT	27	6	10	0.0069 J	0.0027 J	0.57	0.2	0.1	1	1	10	0	0	MW41S	MW30S	MW36S	MW36S
Volatile Organic Compounds																	
Benzene	11	6	6	0.62	0.37 J	12.6	9.9	1	4	5	100	0	0	MW13S	MW13S	MW01S	MW01S
cis-1,2-Dichloroethene	11	4	4	0.65	0.26 J	544	462 J	70	2	2	700	0	0	MW25S	MW25S	MW01S	MW04S
Ethylbenzene	11	4	4	0.31 J	0.49 J	126	143	30	2	2	300	0	0	MW11S	MW42S	MW01S	MW01S
Isopropylbenzene (Cumene)	11	5	4	3.4	0.22 J	7.6	9.0	0.8	5	2	8	0	1	MW25S	MW13S	MW42S	MW01S
Tetrachloroethene (PCE)	11	2	2	11	5.3	12	29	3	2	2	300	0	0	MW04S	MW04S	MW01S	MW01S
Toluene	11	2	3	14	0.2 J	45	43.4	40	1	1	400	0	0	MW04S	MW11S	MW01S	MW01S
Trichloroethene (TCE)	11	4	4	0.22 J	0.46 J	3.6	5.5	3	1	1	300	0	0	MW42S	MW04S	MW01S	MW01S
Vinyl Chloride	11	1	0	6.4	NA	6.4	NA	1	1	NA	100	0	NA	MW01S	NA	MW01S	NA
Xylenes, total	11	4	4	2	1.2 J	1560	2210 J	20	2	2	200	2	1	MW42S	MW42S	MW01S	MW01S
Semi-volatile Organic Compounds																	
Biphenyl	11	0	5	NA	1.3 J	NA	10.1	0.5	NA	4	5	NA	3	NA	MW01S	NA	MW25S
1-Methylnaphthalene	11	6	6	1.4	1.5	46.5	59.8	28	2	1	280	0	0	MW13S	MW13S	MW42S	MW11S
2-Methylnaphthalene	11	6	6	0.52	0.76	87.9	107	28	4	2	280	0	0	MW13S	MW13S	MW11S	MW11S
Naphthalene	11	6	6	0.33	0.55	142	132	14	5	4	140	1	0	MW13S	MW13S	MW11S	MW11S
Natural Attenuation Parameters																	
Iron-Dissolved	11	11	7	12.5 B	160	22700 B	15100	300	7	5	3000	3	3	MW39S	MW13S	MW04S	MW04S
Manganese-Dissolved	11	11	9	1.5 J	12.7	146	118	50	1	1	500	0	0	MW40S	MW25S	MW04S	MW04S
Ferrous Iron	11	10	7	98 J	245 J	4980	4640	NA	NA	NA	NA	NA	NA	MW39S	MW13S	MW04S	MW01S
Arsenic-III	0/16	0	6	NA	2 J	NA	18900	NA	NA	NA	NA	NA	NA	NA	MW19S/MW37S	NA	MW03S
Arsenic-V	0/16	0	5	NA	4 J	NA	3720	NA	NA	NA	NA	NA	NA	NA	MW019S/MW43S	NA	MW03S
Alkalinity	11	10	5	2000	3000	18000	8000	NA	NA	NA	NA	NA	NA	MW10S, MW25S	MW32S	MW40S	MW40S
Methane	11	10	10	0.53 J	0.7 J	4700	3500	NA	NA	NA	NA	NA	NA	MW39S	MW39S	MW01S	MW01S
Ethane	11	0		NA	NA	NA	9790	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	11	0		NA	NA	NA	1180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	11	11	11	200 J	400 J	8000 J	12800	NA	NA	NA	NA	NA	NA	MW32S	MW011S/MW34S	MW01S	MW01S
Total Organic Carbon	11	11	11	1500	1090	18700	14500	NA	NA	NA	NA	NA	NA	MW39S	MW39S	MW01S	MW01S
Nitrogen, nitrate (as n)	11	8	8	89 J	67 J	2200	3200	10000	0	NA	NA	NA	NA	MW32S	MW32S	MW11S	MW40S
Sulfate	11	11	11	8300	9500	214000	225000	250000	1	NA	2500000	0	NA	MW40S	MW39S	MW04S	MW04S

Notes:

µg/L - micrograms per liter

J - estimated value; B - also detected in blank

NA - not available

GCTL - Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Level

NADC - FDEP Natural Attenuation Default Concentration

S1 - October 2011 Semiannual Sampling Event

S2 - March 2012 Semiannual Sampling Event

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			MW01S	MW02S	MW03S	MW04S	MW10S	MW11S	MW11S	MW12S	MW13S	MW13S	MW14S	MW15S	MW19S	MW25S	MW26S	MW26S
Sample ID			JM40-JAX47-937-MW01S-0412	JM40-JAX47-937-MW02S-0412	JM40-JAX47-937-MW03S-0412	JM40-JAX47-937-MW04S-0412	JM40-JAX47-MW10S-0412	JM40-JAX47-MW11S-0412	JM40-JAX47-FD01-0412	JM40-JAX47-MW12S-0412	JM40-JAX47-MW13S-0412	JM40-JAX47-FD02-0412	JM40-JAX47-MW14S-0412	JM40-JAX47-MW15S-0412	JM40-JAX47-MW19S-0412	JM40-JAX47-MW25S-0412	JM40-JAX47-MW26S-0412	JM40-JAX47-FD03-0412
Sample Date			04/23/2012	04/20/2012	04/20/2012	04/23/2012	04/17/2012	04/17/2012	04/17/2012	04/19/2012	04/23/2012	04/23/2012	04/19/2012	04/19/2012	04/20/2012	04/18/2012	04/17/2012	04/17/2012
Analyte	**GCTL[1]**	**NADC**																
METAL (UG/L)																		
Arsenic	10	100	**104**	**16000**	**27400**	4.15 J	6.62 U	6.62 U	10 U	6.62 U	3.94 J	6.62 U	4.68 J	6.62 U	6.17 J	6.62 U	6.62 U	6.62 U
Arsenic III			**68**	**13300**	**18900**	5 U		5 U			5 U		5 U		2 J			
Arsenic V			**3 J**	**364**	**3720**	5 U		5 U			5 U		5 U		5 U			
Iron	300	3000	**14400**	NA	NA	**15100**	NA	**504**	NA	NA	160	NA	NA	NA	NA	50 U	NA	NA
Manganese	50	500	22.7	NA	NA	**113**	NA	17.3	NA	NA	10 U	NA	NA	NA	NA	12.7	NA	NA
SM3500FE-D (UG/L)																		
Ferrous Iron	--	--	4640	NA	NA	1930	NA	451	NA	NA	245 J	NA	NA	NA	NA	184 U	NA	NA
SM4500SF (UG/L)																		
Sulfide	--	--	12800	NA	NA	1800 J	NA	400 J	NA	NA	600 J	NA	NA	NA	NA	800 J	NA	NA
SW300.1 (UG/L)																		
Nitrate-N	10000	100000	72 U	NA	NA	330	NA	850	NA	NA	2300	NA	NA	NA	NA	460	NA	NA
Sulfate	250000	2500000	22900	NA	NA	225000	NA	25500	NA	NA	24500	NA	NA	NA	NA	24000	NA	NA
SW8081B (UG/L)																		
4,4'-DDD	0.1	10	**0.14**	**0.26 J**	**4.8**	0.011 U	0.0011 U	0.021 U	0.0011 U	0.0011 U	**0.3 J**	**0.48 J**	0.0011 U	0.00062 J	0.011 U	0.021 U	0.0011 U	0.0011 U
4,4'-DDE	0.1	10	**0.37 J**	**0.24 J**	0.04 J	**0.14**	0.0016 U	0.031 U	0.0016 U	0.0016 U	0.016 U	0.016 U	0.0098 J	0.0016 U	0.016 U	0.031 U	0.0016 U	0.019 J
4,4'-DDT	0.1	10	0.0045 U	0.0045 U	0.009 U	0.0045 U	0.00045 U	0.009 U	0.0035 J	0.00045 U	0.042 J	0.098 J	0.00045 U	0.00045 U	0.0045 U	0.009 U	0.00045 U	0.00045 U
Aldrin	0.002	0.2	**0.0065 U**	**0.0065 U**	**0.013 U**	**0.0065 U**	0.00065 UJ	**0.013 U**	0.00065 U	0.00065 U	**0.0065 U**	**0.0065 U**	0.00065 U	0.00065 U	**0.0065 U**	**0.013 U**	0.00065 U	0.00065 U
alpha-BHC	0.006	0.6	**0.012 U**	**0.068 J**	**0.1**	**0.012 U**	0.0024 J	**2.7**	**2.6**	0.0035	**0.38 J**	**0.59 J**	0.0012 U	0.0012 U	**0.012 U**	**2.6**	0.0012 U	0.0012 U
alpha-Chlordane	--	--	0.012 U	0.012 U	0.024 U	0.012 U	0.0012 U	0.024 U	0.0012 U	0.065 J	0.15 J	0.26 J	0.067 J	0.0012 U	0.012 U	0.024 U	0.029 J	0.031
beta-BHC	0.02	2	0.0049 U	0.0049 U	**0.69 J**	0.0049 U	0.0058 J	**0.69**	**0.61**	**0.17**	**0.071 J**	**0.19 J**	0.00049 U	0.00049 U	0.0049 U	**0.97**	0.00049 U	0.00049 U
Chlordane	2	200	0.2 U	0.2 U	0.41 U	0.2 U	0.02 U	0.41 U	0.02 U	0.02 U	0.67 J	1.2 J	0.02 U	0.02 U	0.2 U	0.41 U	0.02 U	0.02 U
delta-BHC	2.1	21	0.012 U	0.012 U	0.25 J	0.012 U	0.002 J	**2.9**	**3.1**	0.0063 J	0.31 J	0.48 J	0.037 J	0.0012 U	0.012 U	**2.8**	0.0012 U	0.0012 U
Dieldrin	0.002	0.2	**0.011 U**	**0.011 U**	**0.16 J**	**0.011 U**	0.0011 UJ	**0.022 U**	0.0011 U	**0.024 J**	**0.011 U**	**0.011 U**	0.0011 U	0.0011 U	**0.011 U**	**0.022 U**	0.0011 U	0.0011 U
Endosulfan I	42	420	0.018 U	0.018 U	0.035 U	0.018 U	0.0018 UJ	0.035 U	0.0018 U	0.0018 U	0.018 U	0.018 U	0.0018 U	0.0018 U	0.018 U	0.035 U	0.0018 U	0.0018 U
Endosulfan II	42	420	0.0065 U	0.0065 U	0.024 J	0.0065 U	0.00065 U	0.013 U	0.00065 U	0.00065 U	0.025 J	0.068 J	0.00065 U	0.00065 U	0.0065 U	0.013 U	0.00065 U	0.00065 U
Endosulfan sulfate	42	420	0.0041 U	0.0041 U	0.0082 U	0.0041 U	0.00041 UJ	0.0082 U	0.00041 U	0.00041 U	0.0041 U	0.0041 U	0.00041 U	0.00041 U	0.0041 U	0.0082 U	0.00041 U	0.00041 U
Endrin aldehyde	--	--	0.0061 U	0.0061 U	0.012 U	0.0061 U	0.00061 UJ	0.012 U	0.00061 U	0.00061 U	0.0061 U	0.0061 U	0.00061 U	0.00061 U	0.0061 U	0.012 U	0.00061 U	0.00061 U
Endrin ketone	--	--	0.024 U	0.024 U	0.049 U	0.024 U	0.0024 UJ	0.049 U	0.0024 U	0.0024 U	0.024 U	0.024 U	0.0024 U	0.0024 U	0.024 U	0.049 U	0.0024 U	0.0024 U
Endrin	2	20	0.0073 U	0.0073 U	0.015 U	0.095 J	0.00073 UJ	0.015 U	0.00073 U	0.00073 U	0.0073 U	0.0073 U	0.00073 U	0.00073 U	0.0073 U	0.015 U	0.00073 U	0.00073 U
gamma-BHC (Lindane)	0.2	20	0.18	0.0098 U	**0.9 J**	0.042 J	0.003 J	**3.7**	**3.7**	0.0038 J	**0.24 J**	**0.4 J**	0.00098 U	0.00098 U	0.0098 U	**2.3**	0.0017 J	0.0062 J
gamma-Chlordane	--	--	0.0098 U	0.0098 U	0.02 U	0.0098 U	0.00098 U	0.02 U	0.00098 U	0.00098 U	0.12 J	0.21 J	0.00098 U	0.00098 U	0.0098 U	0.02 U	0.00098 U	0.00098 U
Heptachlor epoxide	0.2	20	0.14 J	0.0057 U	0.011 U	0.093 J	0.00035 J	0.011 U	0.00057 U	0.016	0.0057 U	0.0057 U	**0.51 J**	0.00057 U	0.0057 U	0.011 U	0.069	0.061
Heptachlor	0.4	40	0.016 U	0.016 U	0.032 U	0.016 U	0.0016 UJ	0.032 U	0.0016 U	0.0016 U	0.016 U	0.016 U	0.0016 U	0.0016 U	0.016 U	0.032 U	0.0016 U	0.0016 U
Methoxychlor	40	400	0.0073 U	0.0073 U	0.015 U	0.0073 U	0.00073 U	0.015 U	0.00073 U	0.00073 U	0.0073 U	0.0073 U	0.00073 U	0.00073 U	0.0073 U	0.015 U	0.00073 U	0.00073 U
Toxaphene	3	300	0.73 U	0.73 U	1.5 U	0.73 U	0.073 U	1.5 U	0.073 U	0.073 U	0.73 U	0.73 U	0.073 U	0.073 U	0.73 U	1.5 U	0.073 U	0.073 U
SW8270D (UG/L)																		
1,1'-Biphenyl	0.5	5	**1.3 J**	NA	NA	**1.6 U**	**1.6 UJ**	**6.8 J**	**7.6 J**	NA	**1.6 U**	**1.6 U**	NA	**1.6 U**	**1.6 U**	**10.1**	NA	NA
1,2,4,5-Tetrachlorobenzene	2.1	21	**4.5 U**	NA	NA	**4.5 U**	**4.5 U**	**4.5 U**	**4.5 U**	NA	**4.5 U**	**4.5 U**	NA	**4.5 U**	**4.5 U**	**4.5 U**	NA	NA
1,2,4-Trichlorobenzene	70	700	5.3 U	NA	NA	5.3 U	5.3 U	5.3 U	5.3 U	NA	3.7 J	5.2 J	NA	5.3 U	5.3 U	5.3 U	NA	NA
2,2'-Oxybis(1-chloropropane)	10	100	6.7 U	NA	NA	6.7 U	6.7 U	6.7 U	6.7 U	NA	6.7 U	6.7 U	NA	6.7 U	6.7 U	6.7 U	NA	NA
2,4,5-Trichlorophenol	1	10	**6.9 U**	NA	NA	**6.9 U**	**6.9 U**	**6.9 U**	**6.9 U**	NA	**6.9 U**	**6.9 U**	NA	**6.9 U**	**6.9 U**	**6.9 U**	NA	NA
2,4,6-Trichlorophenol	3.2	320	1.7 U	NA	NA	1.7 U	1.7 U	1.7 U	1.7 U	NA	1.7 U	1.7 U	NA	1.7 U	1.7 U	1.7 U	NA	NA
2,4-Dichlorophenol	0.3	3	**6.3 U**	NA	NA	**6.3 U**	**6.3 U**	**6.3 U**	**6.3 U**	NA	**6.3 U**	**6.3 U**	NA	**6.3 U**	**6.3 U**	**6.3 U**	NA	NA
2,4-Dimethylphenol	140	1400	8.3	NA	NA	4.7 U	4.7 U	4.7 U	4.7 U	NA	4.7 U	4.7 U	NA	4.7 U	4.7 U	4.7 U	NA	NA
2,4-Dinitrophenol	14	140	11.4 U	NA	NA	11.4 U	11.4 U	11.4 U	11.4 U	NA	11.4 U	11.4 U	NA	11.4 U	11.4 U	11.4 U	NA	NA
2,4-Dinitrotoluene	0.05	5	**5.7 U**	NA	NA	**5.7 U**	**5.7 U**	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	**5.7 U**	NA	NA
2,6-Dinitrotoluene	0.05	5	**5.7 U**	NA	NA	**5.7 U**	**5.7 U**	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	**5.7 U**	NA	NA
2-Chloronaphthalene	560	5600	5.7 U	NA	NA	5.7 U	5.7 U	5.7 U	5.7 U	NA	5.7 U	5.7 U	NA	5.7 U	5.7 U	5.7 U	NA	NA
2-Chlorophenol	35	350	5.9 U	NA	NA	5.9 U	5.9 U	5.9 U	5.9 U	NA	5.9 U	5.9 U	NA	5.9 U	5.9 U	5.9 U	NA	NA
2-Methylphenol	35	350	3.9 J	NA	NA	5.3 U	5.3 U	5.3 U	5.3 U	NA	5.3 U	5.3 U	NA	5.3 U	5.3 U	5.3 U	NA	NA
2-Nitroaniline	21	210	6.1 U	NA	NA	6.1 U	6.1 U	6.1 U	6.1 U	NA	6.1 U	6.1 U	NA	6.1 U	6.1 U	6.1 U	NA	NA
2-Nitrophenol	--	--	1.6 U	NA	NA	1.6 U	1.6 U	1.6 U	1.6 U	NA	1.6 U	1.6 U	NA	1.6 U	1.6 U	1.6 U	NA	NA
3,3'-Dichlorobenzidine	0.08	8	**5.5 U**	NA	NA	**5.5 U**	**5.5 U**	**5.5 U**	**5.5 U**	NA	**5.5 U**	**5.5 U**	NA	**5.5 U**	**5.5 U**	**5.5 U**	NA	NA
3-Nitroaniline	1.7	170	**5.7 U**	NA	NA	**5.7 U**	**5.7 U**	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	NA	**5.7 U**	**5.7 U**	**5.7 U**	NA	NA
4,6-Dinitro-2-methylphenol	--	--	8.2 U	NA	NA	8.2 U	8.2 U	8.2 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.2 U	NA	NA
4-Bromophenyl-phenylether	70	700	4.7 U	NA	NA	4.7 U	4.7 U	4.7 U	4.7 U	NA	4.7 U	4.7 U	NA	4.7 U	4.7 U	4.7 U	NA	NA
4-Chloro-3-methylphenol	63	630	5.5 U	NA	NA	5.5 U	5.5 U	5.5 U	5.5 U	NA	5.5 U	5.5 U	NA	5.5 U	5.5 U	5.5 U	NA	NA
4-Chloroaniline	28	280	6.1 U	NA	NA	6.1 U	6.1 U	6.1 U	6.1 U	NA	6.1 U	6.1 U	NA	6.1 U	6.1 U	6.1 U	NA	NA
4-Chlorophenyl-phenylether	--	--	5.1 U	NA	NA	5.1 U	5.1 U	5.1 U	5.1 U	NA	5.1 U	5.1 U	NA	5.1 U	5.1 U	5.1 U	NA	NA
4-Methylphenol	3.5	35	**12.4 U**	NA	NA	**12.4 U**	**12.4 U**	**12.4 U**	**12.4 U**	NA	**12.4 U**	**12.4 U**	NA	**12.4 U**	**12.4 U**	**12.4 U**	NA	NA
4-Nitroaniline	1.7	170	**3.1 U**	NA	NA	**3.1 U**	**3.1 U**	**3.1 U**	**3.1 U**	NA	**3.1 U**	**3.1 U**	NA	**3.1 U**	**3.1 U**	**3.1 U**	NA	NA
4-Nitrophenol	56	560	8.2 U	NA	NA	8.2 U	8.2 U	8.2 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.2 U	NA	NA
Acetophenone	700	7000	8.2 U	NA	NA	8.2 U	8.2 U	8.2 U	8.2 U	NA	8.2 U	8.2 U	NA	8.2 U	8.2 U	8.2 U	NA	NA
Atrazine	3	300	1.1 U	NA	NA	1.1 U	1.1 UJ	1.1 UJ	1.1 UJ	NA	1.1 U	1.1 U	NA	1.1 U	1.1 U	1.1 U	NA	NA
SW8270D (UG/L)																		

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			**MW01S**	**MW02S**	**MW03S**	**MW04S**	**MW10S**	**MW11S**	**MW11S**	**MW12S**	**MW13S**	**MW13S**	**MW14S**	**MW15S**	**MW19S**	**MW25S**	**MW26S**	**MW26S**
Sample ID			JM40-JAX47-937-MW01S-0412	JM40-JAX47-937-MW02S-0412	JM40-JAX47-937-MW03S-0412	JM40-JAX47-937-MW04S-0412	JM40-JAX47-MW10S-0412	JM40-JAX47-MW11S-0412	JM40-JAX47-FD01-0412	JM40-JAX47-MW12S-0412	JM40-JAX47-MW13S-0412	JM40-JAX47-FD02-0412	JM40-JAX47-MW14S-0412	JM40-JAX47-MW15S-0412	JM40-JAX47-MW19S-0412	JM40-JAX47-MW25S-0412	JM40-JAX47-MW26S-0412	JM40-JAX47-FD03-0412
Sample Date			04/23/2012	04/20/2012	04/20/2012	04/23/2012	04/17/2012	04/17/2012	04/17/2012	04/19/2012	04/23/2012	04/23/2012	04/19/2012	04/19/2012	04/20/2012	04/18/2012	04/17/2012	04/17/2012
Analyte	**GCTL[1]**	**NADC**																
Benzaldehyde	700	7000	1 U	NA	NA	1 U	1 UJ	1 UJ	1 UJ	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA
Bis(2-chloroethoxy)methane	--	--	7.1 U	NA	NA	7.1 U	7.1 U	7.1 U	7.1 U	NA	7.1 U	7.1 U	NA	7.1 U	7.1 U	7.1 U	NA	NA
Bis(2-chloroethyl)ether	0.03	3	**6.1 U**	NA	NA	**6.1 U**	**6.1 U**	**6.1 U**	**6.1 U**	NA	**6.1 U**	**6.1 U**	NA	**6.1 U**	**6.1 U**	**6.1 U**	NA	NA
Bis(2-ethylhexyl)phthalate	6	600	**9 U**	NA	NA	**9 U**	**9 U**	**9 U**	**9 U**	NA	**9 U**	**9 U**	NA	**9 U**	**9 U**	**9 U**	NA	NA
Butylbenzylphthalate	140	1400	6.1 U	NA	NA	6.1 U	6.1 U	6.1 U	6.1 U	NA	6.1 U	6.1 U	NA	6.1 U	6.1 U	6.1 U	NA	NA
Caprolactam	--	--	8.2 UJ	NA	NA	8.2 UJ	8.2 UJ	8.2 UJ	8.2 UJ	NA	8.2 UJ	8.2 UJ	NA	8.2 UJ	8.2 UJ	8.2 UJ	NA	NA
Carbazole	1.8	180	**6.3 U**	NA	NA	**6.3 U**	**6.3 U**	**6.3 U**	**6.3 U**	NA	**6.3 U**	**6.3 U**	NA	**6.3 U**	**6.3 U**	**6.3 U**	NA	NA
Dibenzofuran	28	280	5.5 U	NA	NA	5.5 U	5.5 U	5.5 U	5.5 U	NA	5.5 U	5.5 U	NA	5.5 U	5.5 U	4 J	NA	NA
Diethylphthalate	5600	56000	9.8	NA	NA	5.7 U	5.7 U	5.7 U	5.7 U	NA	5.7 U	5.7 U	NA	5.7 U	5.7 U	5.7 U	NA	NA
Dimethylphthalate	70000	700000	6.1 U	NA	NA	6.1 U	6.1 U	6.1 U	6.1 U	NA	6.1 U	6.1 U	NA	6.1 U	6.1 U	6.1 U	NA	NA
Di-n-butylphthalate	700	7000	1.8 U	NA	NA	1.8 U	1.8 U	1.8 U	1.8 U	NA	1.8 U	1.8 U	NA	1.8 U	1.8 U	1.8 U	NA	NA
Di-n-octylphthalate	140	1400	2.2 U	NA	NA	2.2 U	2.2 U	2.2 U	2.2 U	NA	2.2 U	2.2 U	NA	2.2 U	2.2 U	2.2 U	NA	NA
Hexachlorobenzene	1	100	0.84 U	NA	NA	0.84 U	0.84 U	0.84 U	0.84 U	NA	0.84 U	0.84 U	NA	0.84 U	0.84 U	0.84 U	NA	NA
Hexachlorobutadiene	0.4	40	**5.1 U**	NA	NA	**5.1 U**	**5.1 U**	**5.1 U**	**5.1 U**	NA	**5.1 U**	**5.1 U**	NA	**5.1 U**	**5.1 U**	**5.1 U**	NA	NA
Hexachlorocyclopentadiene	50	500	1.7 U	NA	NA	1.7 U	1.7 U	1.7 U	1.7 U	NA	1.7 U	1.7 U	NA	1.7 U	1.7 U	1.7 U	NA	NA
Hexachloroethane	2.5	250	**5.3 U**	NA	NA	**5.3 U**	**5.3 U**	**5.3 U**	**5.3 U**	NA	**5.3 U**	**5.3 U**	NA	**5.3 U**	**5.3 U**	**5.3 U**	NA	NA
Indeno(1,2,3-cd)pyrene	0.05	5	**3.3 U**	NA	NA	**3.3 U**	**3.3 U**	**3.3 U**	**3.3 U**	NA	**3.3 U**	**3.3 U**	NA	**3.3 U**	**3.3 U**	**3.3 U**	NA	NA
Isophorone	37	3700	7.8 U	NA	NA	7.8 U	7.8 U	7.8 U	7.8 U	NA	7.8 U	7.8 U	NA	7.8 U	7.8 U	7.8 U	NA	NA
Nitrobenzene	3.5	35	2 U	NA	NA	2 U	2 U	2 U	2 U	NA	2 U	2 U	NA	2 U	2 U	2 U	NA	NA
N-Nitroso-di-n-propylamine	0.005	0.5	**6.1 U**	NA	NA	**6.1 U**	**6.1 U**	**6.1 U**	**6.1 U**	NA	**6.1 U**	**6.1 U**	NA	**6.1 U**	**6.1 U**	**6.1 U**	NA	NA
N-Nitrosodiphenylamine	7.1	710	6.9 U	NA	NA	6.9 U	6.9 U	6.9 U	6.9 U	NA	6.9 U	6.9 U	NA	6.9 U	6.9 U	6.9 U	NA	NA
Pentachlorophenol	1	100	**2.8 U**	NA	NA	**2.8 U**	**2.8 U**	**2.8 U**	**2.8 U**	NA	**2.8 U**	**2.8 U**	NA	**2.8 U**	**2.8 U**	**2.8 U**	NA	NA
Phenol	10	100	3.5 U	NA	NA	3.5 U	3.5 U	3.5 U	3.5 U	NA	3.5 U	3.5 U	NA	3.5 U	3.5 U	3.5 U	NA	NA
SW8270D-SIM (UG/L)																		
1-Methylnaphthalene	28	280	13.6	NA	NA	2.4	0.041 U	**59.8**	**62**	NA	1.5	1.6	NA	0.041 U	0.041 U	2.4	NA	NA
2-Methylnaphthalene	28	280	**34.1**	NA	NA	5.8	0.041 U	**107**	**111**	NA	0.76	0.79	NA	0.041 U	0.041 U	1.2	NA	NA
Acenaphthene	20	200	0.068	NA	NA	0.041 U	0.041 U	1.7	1.8	NA	0.4	0.42	NA	0.041 U	0.041 U	0.041 U	NA	NA
Acenaphthylene	210	2100	0.04 J	NA	NA	0.041 U	0.041 U	0.56	0.6	NA	0.1	0.11	NA	0.041 U	0.041 U	0.46	NA	NA
Anthracene	2100	21000	0.43	NA	NA	0.041 U	0.041 U	0.13	0.11	NA	0.068	0.076	NA	0.041 U	0.041 U	1.1	NA	NA
Benzo(a)anthracene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Benzo(a)pyrene	0.2	20	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Benzo(b)fluoranthene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Benzo(g,h,i)perylene	210	2100	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Benzo(k)fluoranthene	0.5	50	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Chrysene	4.8	480	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Dibenzo(a,h)anthracene	0.005	0.5	**0.041 U**	NA	NA	**0.041 U**	**0.041 U**	**0.041 U**	**0.041 U**	NA	**0.041 U**	**0.041 U**	NA	**0.041 U**	**0.041 U**	**0.041 U**	NA	NA
Fluoranthene	280	2800	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Fluorene	280	2800	0.098	NA	NA	0.03 J	0.041 U	2.1	2.2	NA	0.74	0.78	NA	0.041 U	0.041 U	2.7	NA	NA
Indeno(1,2,3-cd)pyrene	0.05	5	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
Naphthalene	14	140	**58.7**	NA	NA	7.4	0.041 U	**132**	**137**	NA	0.55	0.58	NA	0.041 U	0.041 U	**122**	NA	NA
Phenanthrene	210	2100	0.038 J	NA	NA	0.041 U	0.041 U	1.9	2	NA	0.53	0.57	NA	0.041 U	0.041 U	0.89	NA	NA
Pyrene	210	2100	0.041 U	NA	NA	0.041 U	0.041 U	0.041 U	0.041 U	NA	0.041 U	0.041 U	NA	0.041 U	0.041 U	0.041 U	NA	NA
TOC (UG/L)																		
TOC	--	--	14500	NA	NA	9330	NA	8060	NA	NA	3790	NA	NA	NA	NA	3720	NA	NA
VOA (UG/L)																		
1,1,1-Trichloroethane	200	2000	1.4 U	NA	NA	0.28 U	0.28 U	0.28 U	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA
1,1,2,2-Tetrachloroethane	0.2	20	**1.3 U**	NA	NA	**0.26 U**	**0.26 U**	**0.26 U**	**0.26 U**	NA	**0.26 U**	**0.26 U**	NA	**0.26 U**	**0.26 U**	**0.26 U**	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane	210000	2100000	5 U	NA	NA	1 U	1 U	1 U	1 U	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA
1,1,2-Trichloroethane	5	500	2 U	NA	NA	0.4 U	0.4 U	0.4 U	0.4 U	NA	0.4 U	0.4 U	NA	0.4 U	0.4 U	0.4 U	NA	NA
1,1-Dichloroethane	70	700	5 U	NA	NA	1 U	1 U	1 U	1 U	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA
1,1-Dichloroethene	7	70	1.9 U	NA	NA	0.38 U	0.38 U	0.54	0.42 J	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.44 J	NA	NA
1,2,3-Trichlorobenzene	70	700	5 U	NA	NA	1 U	1 U	1 U	1 U	NA	2.8	2.6	NA	1 U	1 U	0.76 J	NA	NA
1,2,4-Trichlorobenzene	70	700	4 U	NA	NA	0.8 U	0.8 U	1.9	1.7	NA	7.7	6.6	NA	0.8 U	0.8 U	2.3 J	NA	NA
1,2-Dibromo-3-chloropropane	0.2	20	**10 U**	NA	NA	**2 U**	**2 U**	**2 U**	**2 U**	NA	**2 U**	**2 U**	NA	**2 U**	**2 U**	**2 U**	NA	NA
1,2-Dibromoethane	0.02	2	**1.1 U**	NA	NA	**0.22 U**	**0.22 U**	**0.22 U**	**0.22 U**	NA	**0.22 U**	**0.22 U**	NA	**0.22 U**	**0.22 U**	**0.22 U**	NA	NA
1,2-Dichlorobenzene	600	6000	2.5 U	NA	NA	0.5 U	0.5 U	2.3	2.1	NA	2.6	2.2	NA	0.5 U	0.5 U	2.4 J	NA	NA
1,2-Dichloroethane	3	300	1.5 U	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA
1,2-Dichloropropane	5	500	1.5 U	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA
1,3-Dichlorobenzene	210	2100	1.5 U	NA	NA	0.3 U	0.3 U	0.8 J	0.3 U	NA	1.7 J	1.7 J	NA	0.3 U	0.3 U	1.9 J	NA	NA
1,4-Dichlorobenzene	75	7500	1.5 U	NA	NA	0.3 U	0.3 U	6.9	6.3	NA	3.2	2.8 J	NA	0.3 U	0.3 U	12.8 J	NA	NA
2-Butanone	4200	42000	20 U	NA	NA	4 U	4 U	4 U	4 U	NA	4 U	4 U	NA	4 U	4 U	4 U	NA	NA
2-Hexanone	280	2800	4.8 U	NA	NA	0.96 U	0.96 U	0.96 U	0.96 U	NA	0.96 U	0.96 U	NA	0.96 U	0.96 U	0.96 U	NA	NA
4-Methyl-2-pentanone	560	5600	10 U	NA	NA	2 U	2 U	2 U	2 U	NA	2 U	2 U	NA	2 U	2 U	2 U	NA	NA
Acetone	6300	63000	13 U	NA	NA	10 U	2.6 U	10 U	2.6 U	NA	2.6 U	2.6 U	NA	10 U	2.6 U	10 U	NA	NA
VOA (UG/L)																		
Benzene	1	100	**9.9**	NA	NA	**1.3**	0.34 U	**2.6**	**2.4**	NA	0.37 J	0.35 J	NA	0.34 U	0.34 U	**1.3 J**	NA	NA

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			**MW01S**	**MW02S**	**MW03S**	**MW04S**	**MW10S**	**MW11S**	**MW11S**	**MW12S**	**MW13S**	**MW13S**	**MW14S**	**MW15S**	**MW19S**	**MW25S**	**MW26S**	**MW26S**
Sample ID			JM40-JAX47-937-MW01S-0412	JM40-JAX47-937-MW02S-0412	JM40-JAX47-937-MW03S-0412	JM40-JAX47-937-MW04S-0412	JM40-JAX47-MW10S-0412	JM40-JAX47-MW11S-0412	JM40-JAX47-FD01-0412	JM40-JAX47-MW12S-0412	JM40-JAX47-MW13S-0412	JM40-JAX47-FD02-0412	JM40-JAX47-MW14S-0412	JM40-JAX47-MW15S-0412	JM40-JAX47-MW19S-0412	JM40-JAX47-MW25S-0412	JM40-JAX47-MW26S-0412	JM40-JAX47-FD03-0412
Sample Date			04/23/2012	04/20/2012	04/20/2012	04/23/2012	04/17/2012	04/17/2012	04/17/2012	04/19/2012	04/23/2012	04/23/2012	04/19/2012	04/19/2012	04/20/2012	04/18/2012	04/17/2012	04/17/2012
Analyte	**GCTL[1]**	**NADC**																
Bromochloromethane	91	910	1.7 U	NA	NA	0.34 U	0.34 U	0.34 U	0.34 U	NA	0.34 U	0.34 U	NA	0.34 U	0.34 U	0.34 U	NA	NA
Bromodichloromethane	0.6	60	**1.5 U**	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U	NA	0.3 U	0.3 U	NA	0.3 U	0.3 U	0.3 U	NA	NA
Bromoform	4.4	440	1.9 U	NA	NA	0.38 U	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.38 U	NA	NA
Bromomethane	9.8	98	4.3 U	NA	NA	0.86 U	0.86 U	0.86 U	0.86 U	NA	0.86 U	0.86 U	NA	0.86 U	0.86 U	0.86 U	NA	NA
Carbon disulfide	700	7000	1.9 U	NA	NA	0.38 U	0.38 U	0.38 U	0.38 U	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.38 U	NA	NA
Carbon tetrachloride	3	300	1.4 U	NA	NA	0.28 U	0.28 U	0.28 U	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA
Chlorobenzene	100	1000	2.4 J	NA	NA	0.25 J	0.32 U	13.8	12.5	NA	2.2	2.3	NA	0.32 U	0.32 U	7.5 J	NA	NA
Chloroethane	12	1200	7.2 U	NA	NA	1.4 U	1.4 U	1.4 U	1.4 U	NA	1.4 U	1.4 U	NA	1.4 U	1.4 U	1.4 U	NA	NA
Chloroform	70	700	1.6 U	NA	NA	0.32 U	0.32 U	3	2.8	NA	0.32 U	0.32 U	NA	0.32 U	0.32 U	0.32 U	NA	NA
Chloromethane	2.7	270	**3.2 U**	NA	NA	0.64 U	0.64 U	0.64 U	0.64 U	NA	0.64 U	0.64 U	NA	0.64 U	0.64 U	0.64 U	NA	NA
cis-1,2-Dichloroethene	70	700	**462 J**	NA	NA	**100 J**	0.38 U	0.27 J	0.3 J	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.26 J	NA	NA
cis-1,3-Dichloropropene	--	--	4 U	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U	NA	0.8 U	0.8 U	NA	0.8 U	0.8 U	0.8 U	NA	NA
Cyclohexane	--	--	2 U	NA	NA	0.4 U	0.4 U	8.6	8	NA	0.4 U	0.4 U	NA	0.4 U	0.4 U	0.41 J	NA	NA
Dibromochloromethane	0.4	40	**1.3 U**	NA	NA	0.26 U	0.26 U	0.26 U	0.26 U	NA	0.26 U	0.26 U	NA	0.26 U	0.26 U	0.26 U	NA	NA
Dichlorodifluoromethane	1400	14000	6 U	NA	NA	1.2 U	1.2 U	1.2 U	1.2 U	NA	1.2 U	1.2 U	NA	1.2 U	1.2 U	1.2 U	NA	NA
Ethylbenzene	30	300	**143**	NA	NA	**30.4**	0.44 U	0.7	0.54	NA	0.44 U	0.44 U	NA	0.44 U	0.44 U	0.44 U	NA	NA
Isopropylbenzene	0.8	8	**9**	NA	NA	**1.5**	0.28 U	0.27 J	0.24 J	NA	0.22 J	0.2 J	NA	0.28 U	0.28 U	0.28 U	NA	NA
Methyl Acetate	3000	30000	3.8 U	NA	NA	0.76 U	0.76 U	0.76 U	0.76 U	NA	0.76 U	0.76 U	NA	0.76 U	0.76 U	0.76 U	NA	NA
Methyl tert-butyl ether	20	200	5 U	NA	NA	1 U	1 U	1 U	1 U	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA
Methylcyclohexane	--	--	2.7 U	NA	NA	0.54 U	0.54 U	8.2	7.4	NA	0.54 U	0.54 U	NA	0.54 U	0.54 U	4.5 J	NA	NA
Methylene chloride	5	500	**6.6 U**	NA	NA	1.3 U	1.3 U	1.3 U	1.3 U	NA	1.3 U	1.3 U	NA	1.3 U	1.3 U	1.3 U	NA	NA
Styrene	100	1000	1.2 U	NA	NA	0.24 U	0.24 U	0.24 U	0.24 U	NA	0.24 U	0.24 U	NA	0.24 U	0.24 U	0.24 U	NA	NA
Tetrachloroethene	3	300	**29**	NA	NA	**5.3**	0.42 U	0.42 U	0.42 U	NA	0.42 U	0.42 U	NA	0.42 U	0.42 U	0.42 U	NA	NA
Toluene	40	400	**43.4**	NA	NA	3.8	0.28 U	0.2 J	0.28 U	NA	0.28 U	0.28 U	NA	0.28 U	0.28 U	0.28 U	NA	NA
trans-1,2-Dichloroethene	100	1000	2.8 J	NA	NA	0.77	0.66 U	0.66 U	0.66 U	NA	0.66 U	0.66 U	NA	0.66 U	0.66 U	0.66 U	NA	NA
trans-1,3-Dichloropropene	--	--	3 U	NA	NA	0.6 U	0.6 U	0.6 U	0.6 U	NA	0.6 U	0.6 U	NA	0.6 U	0.6 U	0.6 U	NA	NA
Trichloroethene	3	300	**5.5**	NA	NA	0.46 J	0.38 U	1.3	1.3	NA	0.38 U	0.38 U	NA	0.38 U	0.38 U	0.6 J	NA	NA
Trichlorofluoromethane	2100	21000	4 U	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U	NA	0.8 U	0.8 U	NA	0.8 U	0.8 U	0.8 U	NA	NA
Vinyl chloride	1	100	**1.8 U**	NA	NA	0.36 U	0.36 U	0.36 U	0.36 U	NA	0.36 U	0.36 U	NA	0.36 U	0.36 U	0.36 U	NA	NA
Xylene (total)	20	200	**2110 J**	NA	NA	**108**	1 U	4	3.6	NA	1 U	1 U	NA	1 U	1 U	1 U	NA	NA
WCHEM (UG/L)																		
Alkalinity (Total)	--	--	5000	NA	NA	1000 U	NA	1000 U	NA	NA	1000 U	NA	NA	NA	NA	1000 U	NA	NA
Ethane	--	--	0.96 U	NA	NA	0.96 U	NA	0.96 U	NA	NA	0.96 U	NA	NA	NA	NA	0.96 U	NA	NA
Ethylene	--	--	1 U	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	NA
Methane	--	--	3500	NA	NA	250	NA	210	NA	NA	17	NA	NA	NA	NA	530	NA	NA

Notes:

GCTL - Groundwater Cleanup Target Level

NADC - Natural Attenuation Default Concentration

1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L

B Analyte detected in associated lab blank.

J Analyte positively identified: associated numerical value is approximate.

JB Analyte detected in associated field blank.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ Analyte below the reported sample quantitation limit. However, the reported value is approximate.

NA not analyzed; ug/l micrograms per liter

Values Bolded are analytes not detected by the Lab but are above the **GCTL**

Values Shaded Pale Yellow are analytes not detected by the Lab but are above the **NADC**

Values Bolded and Shaded Pale Yellow are analytes not detected by the Lab but above **GCTL** and **NADC**

Values Bold and Pale Blue exceed the **GCTL**

Values Shaded Grey are hits that exceed the **NADC**

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			**MW27S**	**MW30S**	**MW32S**	**MW33S**	**MW34S**	**MW35S**	**MW36S**	**MW37S**	**MW38S**	**MW39S**	**MW40S**	**MW41S**	**MW42S**	**MW43S**
Sample ID			JM40-JAX47-MW27S-0412	JM40-JAX47-MW30S-0412	JM40-JAX47-MW32S-0412	JM40-JAX47-MW33S-0412	JM40-JAX47-MW34S-0412	JM40-JAX47-MW35S-0412	JM40-JAX47-MW36S-0412	JM40-JAX47-MW37S-0412	JM40-JAX47-MW38S-0412	JM40-JAX47-MW39S-0412	JM40-JAX47-MW40S-0412	JM40-JAX47-MW41S-0412	JM40-JAX47-MW42S-0412	JM40-JAX47-MW43S-0412
Sample Date			04/18/2012	04/17/2012	04/17/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012
Analyte	**GCTL[1]**	**NADC**														
METAL (UG/L)																
Arsenic	10	100		10 U	6.62 U	6.62 U	3.75 J	6.62 U	**106**	8.18 J	6.62 U	6.62 U	5.31 J	10 U	6.62 U	8.65 J
Arsenic III				5 U			5 U		**58**	2 J	5 U		5 U	5 U		5 U
Arsenic V				5 U			5 U		**25**	5 U	5 U		5 U	5 U		3 J
Iron	300	3000	NA	NA	252	NA	50 U	NA	NA	**11400**	NA	50 U	50 U	NA	**499**	NA
Manganese	50	500	NA	NA	19.9	NA	14.6	NA	NA	26.7	NA	26.1	10 U	NA	16.7	NA
SM3500FE-D (UG/L)																
Ferrous Iron	--	--	NA	NA	432	NA	184 U	NA	NA	2490	NA	184 U	184 U	NA	437	NA
SM4500SF (UG/L)																
Sulfide	--	--	NA	NA	800 J	NA	400 J	NA	NA	600 J	NA	600 J	800 J	NA	800 J	NA
SW300.1 (UG/L)																
Nitrate-N	10000	100000	NA	NA	67 J	NA	100 U	NA	NA	72 U	NA	460	3200	NA	1000	NA
Sulfate	250000	2500000	NA	NA	13000	NA	19000	NA	NA	59300	NA	9500	16100	NA	21300	NA
SW8081B (UG/L)																
4,4'-DDD	0.1	10	0.011 U	0.0021 J	0.0011 U	0.0011 U	0.0011 U	0.0007 J	**2.4**	0.0024 J	0.012 J	0.011 U	0.013 J	0.011 U	0.021 U	0.021 U
4,4'-DDE	0.1	10	0.016 U	0.0021 J	0.0016 U	0.0016 U	0.018 J	0.0016 U	0.0016 U	0.0016 U	0.016 U	0.016 U	0.016 U	0.0081 J	0.031 U	0.027 J
4,4'-DDT	0.1	10	0.0045 U	0.0027 J	0.00045 U	0.059 J	0.017	0.0019 J	**0.21**	0.00045 U	0.0061 J	0.0045 U	0.0037 J	0.0062 J	0.0051 J	0.009 U
Aldrin	0.002	0.2	**0.0065 U**	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	**0.0065 U**	**0.0065 U**	**0.0065 U**	**0.0065 U**	**0.013 U**	**0.013 U**
alpha-BHC	0.006	0.6	**0.012 U**	0.0051 J	0.0042	0.0012 U	**0.0082 J**	0.0012 U	**0.12**	0.0012 U	**0.038**	**0.012 U**	**0.012 U**	**0.032 J**	**2.5**	**3.5**
alpha-Chlordane	--	--	0.012 U	0.0012 U	0.0034 J	0.28 J	0.038 J	0.0012 U	0.0012 U	0.0012 U	0.012 U	0.012 U	0.012 U	0.012 U	0.029 J	0.024 U
beta-BHC	0.02	2	0.0049 U	0.0049 J	0.0042 J	**0.11**	**0.64**	0.00049 U	**0.1**	0.011 J	0.014 J	0.0049 U	0.0049 U	**0.074 J**	**0.58 J**	**3.1**
Chlordane	2	200	0.2 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.2 U	0.2 U	0.2 U	0.2 U	0.41 U	0.41 U
delta-BHC	2.1	21	0.012 U	0.0025 J	0.00088 J	0.0099 J	0.018	0.0012 U	0.098	0.0033 J	0.017 J	0.012 U	0.012 U	0.014 J	**2.7**	**2.7**
Dieldrin	0.002	0.2	**0.011 U**	0.0011 U	**0.0046**	**0.19**	**0.056**	0.0011 U	0.0011 U	0.0011 U	**0.011 U**	**0.011 U**	**0.011 U**	**0.011 U**	**0.022 U**	**0.022 U**
Endosulfan I	42	420	0.018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.018 U	0.018 U	0.018 U	0.018 U	0.035 U	0.035 U
Endosulfan II	42	420	0.0065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0065 U	0.0065 U	0.0065 U	0.0065 U	0.013 U	0.013 U
Endosulfan sulfate	42	420	0.0041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.0041 U	0.0041 U	0.0041 U	0.0041 U	0.0082 U	0.0082 U
Endrin aldehyde	--	--	0.0061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.0061 U	0.0061 U	0.0061 U	0.0061 U	0.012 U	0.012 U
Endrin ketone	--	--	0.024 U	0.0024 U	0.0024 U	0.18	0.042	0.0024 U	0.0024 U	0.0024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.049 U	0.049 U
Endrin	2	20	0.0073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.015 U	0.015 U
gamma-BHC (Lindane)	0.2	20	0.0098 U	0.0028 J	0.0027 J	0.012	0.054	0.00098 U	0.16	0.0017 J	0.013 J	0.0098 U	0.034 J	0.0062 J	**1.5**	**4.3**
gamma-Chlordane	--	--	0.0098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.02 U	0.02 U
Heptachlor epoxide	0.2	20	0.0057 U	0.00057 U	0.0027 J	0.2	0.029 J	0.00057 U	0.00057 U	0.0016 J	0.008 J	0.0057 U	0.0057 U	0.012 J	0.011 U	0.011 U
Heptachlor	0.4	40	0.016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.016 U	0.016 U	0.016 U	0.016 U	0.032 U	0.032 U
Methoxychlor	40	400	0.0073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.015 U	0.015 U
Toxaphene	3	300	0.73 U	0.073 U	0.073 U	0.073 U	0.073 U	0.073 U	0.073 U	0.073 U	0.73 U	0.73 U	0.73 U	0.73 U	1.5 U	1.5 U
SW8270D (UG/L)																
1,1'-Biphenyl	0.5	5	**1.6 U**	**1.6 UJ**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**7.6**	NA
1,2,4,5-Tetrachlorobenzene	2.1	21	**4.5 U**	**4.5 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.5 U**	NA
1,2,4-Trichlorobenzene	70	700	5.3 U	5.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U	NA
2,2'-Oxybis(1-chloropropane)	10	100	6.7 U	6.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.7 U	NA
2,4,5-Trichlorophenol	1	10	**6.9 U**	**6.9 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.9 U**	NA
2,4,6-Trichlorophenol	3.2	320	1.7 U	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.7 U	NA
2,4-Dichlorophenol	0.3	3	**6.3 U**	**6.3 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.3 U**	NA
2,4-Dimethylphenol	140	1400	4.7 U	4.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.7 U	NA
2,4-Dinitrophenol	14	140	11.4 U	11.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.4 U	NA
2,4-Dinitrotoluene	0.05	5	**5.7 U**	**5.7 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.7 U**	NA
2,6-Dinitrotoluene	0.05	5	**5.7 U**	**5.7 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.7 U**	NA
2-Chloronaphthalene	560	5600	5.7 U	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.7 U	NA
2-Chlorophenol	35	350	5.9 U	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.9 U	NA
2-Methylphenol	35	350	5.3 U	5.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U	NA
2-Nitroaniline	21	210	6.1 U	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1 U	NA
2-Nitrophenol	--	--	1.6 U	1.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6 U	NA
3,3'-Dichlorobenzidine	0.08	8	**5.5 U**	**5.5 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.5 U**	NA
3-Nitroaniline	1.7	170	**5.7 U**	**5.7 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.7 U**	NA
4,6-Dinitro-2-methylphenol	--	--	8.2 U	8.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.2 U	NA
4-Bromophenyl-phenylether	70	700	4.7 U	4.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.7 U	NA
4-Chloro-3-methylphenol	63	630	5.5 U	5.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.5 U	NA
4-Chloroaniline	28	280	6.1 U	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1 U	NA
4-Chlorophenyl-phenylether	--	--	5.1 U	5.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.1 U	NA
4-Methylphenol	3.5	35	**12.4 U**	**12.4 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**12.4 U**	NA
4-Nitroaniline	1.7	170	**3.1 U**	**3.1 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.1 U**	NA
4-Nitrophenol	56	560	8.2 U	8.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.2 U	NA
Acetophenone	700	7000	8.2 U	8.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.2 U	NA
Atrazine	3	300	1.1 U	1.1 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1 U	NA
SW8270D (UG/L)																

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			**MW27S**	**MW30S**	**MW32S**	**MW33S**	**MW34S**	**MW35S**	**MW36S**	**MW37S**	**MW38S**	**MW39S**	**MW40S**	**MW41S**	**MW42S**	**MW43S**
Sample ID			JM40-JAX47-MW27S-0412	JM40-JAX47-MW30S-0412	JM40-JAX47-MW32S-0412	JM40-JAX47-MW33S-0412	JM40-JAX47-MW34S-0412	JM40-JAX47-MW35S-0412	JM40-JAX47-MW36S-0412	JM40-JAX47-MW37S-0412	JM40-JAX47-MW38S-0412	JM40-JAX47-MW39S-0412	JM40-JAX47-MW40S-0412	JM40-JAX47-MW41S-0412	JM40-JAX47-MW42S-0412	JM40-JAX47-MW43S-0412
Sample Date			04/18/2012	04/17/2012	04/17/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012
Analyte	**GCTL[1]**	**NADC**														
Benzaldehyde	700	7000	1 U	1 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA
Bis(2-chloroethoxy)methane	--	--	7.1 U	7.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.1 U	NA
Bis(2-chloroethyl)ether	0.03	3	**6.1 U**	**6.1 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.1 U**	NA
Bis(2-ethylhexyl)phthalate	6	600	**9 U**	**9 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**9 U**	NA
Butylbenzylphthalate	140	1400	6.1 U	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1 U	NA
Caprolactam	--	--	8.2 UJ	8.2 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.2 UJ	NA
Carbazole	1.8	180	**6.3 U**	**6.3 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.3 U**	NA
Dibenzofuran	28	280	5.5 U	5.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.5 U	NA
Diethylphthalate	5600	56000	5.7 U	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.7 U	NA
Dimethylphthalate	70000	700000	6.1 U	6.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.1 U	NA
Di-n-butylphthalate	700	7000	1.8 U	1.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA
Di-n-octylphthalate	140	1400	2.2 U	2.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2 U	NA
Hexachlorobenzene	1	100	0.84 U	0.84 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.84 U	NA
Hexachlorobutadiene	0.4	40	**5.1 U**	**5.1 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.1 U**	NA
Hexachlorocyclopentadiene	50	500	1.7 U	1.7 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.7 U	NA
Hexachloroethane	2.5	250	**5.3 U**	**5.3 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.3 U**	NA
Indeno(1,2,3-cd)pyrene	0.05	5	**3.3 U**	**3.3 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.3 U**	NA
Isophorone	37	3700	7.8 U	7.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.8 U	NA
Nitrobenzene	3.5	35	2 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA
N-Nitroso-di-n-propylamine	0.005	0.5	**6.1 U**	**6.1 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**6.1 U**	NA
N-Nitrosodiphenylamine	7.1	710	6.9 U	6.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.9 U	NA
Pentachlorophenol	1	100	**2.8 U**	**2.8 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.8 U**	NA
Phenol	10	100	3.5 U	3.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	NA
SW8270D-SIM (UG/L)																
1-Methylnaphthalene	28	280	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	27.3	NA
2-Methylnaphthalene	28	280	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.3	NA
Acenaphthene	20	200	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2	NA
Acenaphthylene	210	2100	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.51	NA
Anthracene	2100	21000	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.12	NA
Benzo(a)anthracene	0.05	5	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(a)pyrene	0.2	20	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(b)fluoranthene	0.05	5	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(g,h,i)perylene	210	2100	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Benzo(k)fluoranthene	0.5	50	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Chrysene	4.8	480	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Dibenzo(a,h)anthracene	0.005	0.5	**0.041 U**	**0.041 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.041 U**	NA
Fluoranthene	280	2800	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Fluorene	280	2800	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6	NA
Indeno(1,2,3-cd)pyrene	0.05	5	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
Naphthalene	14	140	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**36**	NA
Phenanthrene	210	2100	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3	NA
Pyrene	210	2100	0.041 U	0.041 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.041 U	NA
TOC (UG/L)																
TOC	--	--	NA	NA	3350	NA	2220	NA	NA	5550	NA	1090	1140	NA	4990	NA
VOA (UG/L)																
1,1,1-Trichloroethane	200	2000	0.28 U	0.28 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.28 U	NA
1,1,2,2-Tetrachloroethane	0.2	20	**0.26 U**	**0.26 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.26 U**	NA
1,1,2-Trichloro-1,2,2-trifluoroethane	210000	2100000	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA
1,1,2-Trichloroethane	5	500	0.4 U	0.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4 U	NA
1,1-Dichloroethane	70	700	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA
1,1-Dichloroethene	7	70	0.38 U	0.38 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38 U	NA
1,2,3-Trichlorobenzene	70	700	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 J	NA
1,2,4-Trichlorobenzene	70	700	0.8 U	0.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3	NA
1,2-Dibromo-3-chloropropane	0.2	20	**2 U**	**2 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2 U**	NA
1,2-Dibromoethane	0.02	2	**0.22 U**	**0.22 U**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.22 U**	NA
1,2-Dichlorobenzene	600	6000	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	NA
1,2-Dichloroethane	3	300	0.3 U	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U	NA
1,2-Dichloropropane	5	500	0.3 U	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U	NA
1,3-Dichlorobenzene	210	2100	0.3 U	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6 J	NA
1,4-Dichlorobenzene	75	7500	0.3 U	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14.8	NA
2-Butanone	4200	42000	4 U	4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4 U	NA
2-Hexanone	280	2800	0.96 U	0.96 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.96 U	NA
4-Methyl-2-pentanone	560	5600	2 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA
Acetone	6300	63000	10 U	2.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.6 U	NA
VOA (UG/L)																
Benzene	1	100	0.34 U	0.34 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**	NA

TABLE 3-3
Groundwater Analytical Data Summary - April 2012
PSC 47, NAS Jacksonville
Jacksonville, Florida

Location			**MW27S**	**MW30S**	**MW32S**	**MW33S**	**MW34S**	**MW35S**	**MW36S**	**MW37S**	**MW38S**	**MW39S**	**MW40S**	**MW41S**	**MW42S**	**MW43S**
Sample ID			JM40-JAX47-MW27S-0412	JM40-JAX47-MW30S-0412	JM40-JAX47-MW32S-0412	JM40-JAX47-MW33S-0412	JM40-JAX47-MW34S-0412	JM40-JAX47-MW35S-0412	JM40-JAX47-MW36S-0412	JM40-JAX47-MW37S-0412	JM40-JAX47-MW38S-0412	JM40-JAX47-MW39S-0412	JM40-JAX47-MW40S-0412	JM40-JAX47-MW41S-0412	JM40-JAX47-MW42S-0412	JM40-JAX47-MW43S-0412
Sample Date			04/18/2012	04/17/2012	04/17/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/19/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012	04/18/2012
Analyte	**GCTL[1]**	**NADC**														
Bromochloromethane	91	910	0.34 U	0.34 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.34 U	NA
Bromodichloromethane	0.6	60	0.3 U	0.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U	NA
Bromoform	4.4	440	0.38 U	0.38 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38 U	NA
Bromomethane	9.8	98	0.86 U	0.86 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.86 U	NA
Carbon disulfide	700	7000	0.38 U	0.38 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38 U	NA
Carbon tetrachloride	3	300	0.28 U	0.28 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.28 U	NA
Chlorobenzene	100	1000	0.32 U	0.32 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.7	NA
Chloroethane	12	1200	1.4 U	1.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.4 U	NA
Chloroform	70	700	0.32 U	0.32 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.32 U	NA
Chloromethane	2.7	270	0.64 U	0.64 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.64 U	NA
cis-1,2-Dichloroethene	70	700	0.38 U	0.38 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38 U	NA
cis-1,3-Dichloropropene	--	--	0.8 U	0.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8 U	NA
Cyclohexane	--	--	0.4 U	0.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3	NA
Dibromochloromethane	0.4	40	0.26 U	0.26 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.26 U	NA
Dichlorodifluoromethane	1400	14000	1.2 U	1.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2 U	NA
Ethylbenzene	30	300	0.44 U	0.44 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.49 J	NA
Isopropylbenzene	0.8	8	0.28 U	0.28 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.28 U	NA
Methyl Acetate	3000	30000	0.76 U	0.76 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.76 U	NA
Methyl tert-butyl ether	20	200	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA
Methylcyclohexane	--	--	0.54 U	0.54 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.6	NA
Methylene chloride	5	500	1.3 U	1.3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3 U	NA
Styrene	100	1000	0.24 U	0.24 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.24 U	NA
Tetrachloroethene	3	300	0.42 U	0.42 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.42 U	NA
Toluene	40	400	0.28 U	0.28 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.28 U	NA
trans-1,2-Dichloroethene	100	1000	0.66 U	0.66 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.66 U	NA
trans-1,3-Dichloropropene	--	--	0.6 U	0.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.6 U	NA
Trichloroethene	3	300	0.38 U	0.38 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38 U	NA
Trichlorofluoromethane	2100	21000	0.8 U	0.8 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8 U	NA
Vinyl chloride	1	100	0.36 U	0.36 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.36 U	NA
Xylene (total)	20	200	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2 J	NA
WCHEM (UG/L)																
Alkalinity (Total)	--	--	NA	NA	3000	NA	4000	NA	NA	1000 U	NA	7000	8000	NA	1000 U	NA
Ethane	--	--	NA	NA	0.96 U	NA	0.96 U	NA	NA	0.96 U	NA	0.96 U	0.96 U	NA	0.96 U	NA
Ethylene	--	--	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U	1 U	NA	1 U	NA
Methane	--	--	NA	NA	1.6 J	NA	2.6 J	NA	NA	4.6 J	NA	0.7 J	0.7 U	NA	630	NA

Notes:

GCTL - Groundwater Cleanup Target Level

NADC - Natural Attenuation Default Concentration

1 = Ch 62-777 FAC Groundwater Cleanup Target Levels (GCTLs) reported in µg/L

B Analyte detected in associated lab blank.

J Analyte positively identified: associated numerical value is approximate.

JB Analyte detected in associated field blank.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ Analyte below the reported sample quantitation limit. However, the reported value is approximate.

NA not analyzed; ug/l micrograms per liter

Values Bolded are analytes not detected by the Lab but are above the **GCTL**

Values Shaded Pale Yellow are analytes not detected by the Lab but are above the **NADC**

Values Bolded and Shaded Pale Yellow are analytes not detected by the Lab but above **GCTL** and **NADC**

Values Bold and Pale Blue exceed the **GCTL**

Values Shaded Grey are hits that exceed the **NADC**

Operable Unit 8
Groundwater Analytical Results Summary Table
NAS Jacksonville - Jacksonville, Florida

Well ID	Sample Date	CONTAMINANTS OF CONCERN (µg/L)																										
		Aldrin	Arsenic	Benzene	alpha-BHC	beta-BHC	delta-BHC	gamma-BHC	1,1-Biphenyl	4,4'-DDD	4,4'-DDE	4,4'-DDT	Dieldrin	1,2-Dibromo-3-Chloropropane	cis-1,2-DCE	2,4-Dichlorophenol	Endrin Ketone	Ethylbenzene	Heptachlor Epoxide	Isopropylbenzene	2-Methylnaphthalene	Naphthalene	Pentachlorophenol	Tetrachloroethene	Trichloroethene	2,4,5-Trichlorophenol	Vinyl Chloride	Xylenes (total)
GCTL (µg/L)		0.002	10	1	0.006	0.02	2.1	0.2	0.5	0.1	0.1	0.1	0.002	0.2	70	0.3	-	30	0.2	0.8	28	14	1	3	3	1	1	20
NADC (µg/L)		0.2	100	100	0.6	2	21	20	5	10	10	10	0.2	20	700	3	-	300	20	8	280	140	100	300	300	10	100	200
JAX47-937-MW01S	10/21/2010	0.00065 U	215	1.8	0.0012 U	0.00049 U	0.11 J	0.00098 U	1.6 U	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	93.9	6.3 U	0.0024 U	13.6	0.00057 U	0.62 J	5.1 JB	5.8 JB	2.8 U	1.5	1.6	6.9 U	1.5	200
	3/29/2011	0.0065 U	184	NA	0.012 U	0.0049 U	0.012 U	0.0098 U	NA	0.65 J	0.016 U	0.0045 U	0.011 U	NA	NA	NA	0.024 U	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.0065 U	183	3.5	0.012 U	0.0049 U	0.012 U	0.45 J	0.96 J	0.51 J	0.016 U	0.0045 U	0.011 U	2 U	117	6.3 U	0.14 J	42.4	0.0057 U	2.4	15.5	20.8	2.8 U	5.1	2.2	6.9 U	1.8	793
	10/31/2011	0.0066 U	106	12.6	0.012 U	0.0049 U	0.012 U	0.45 J	1.8 J	0.03 J	0.22 J	0.0045 U	0.011 U	10 U	544	6.3 U	0.025 U	126	0.0057 U	5.4	28.5	55 B	2.8 U	11.8	3.6	6.9 U	6.4	1560
	4/23/2012	0.0065 U	104	9.9	0.012 U	0.0049 U	0.012 U	0.18	1.3 J	0.14	0.37 J	0.0045 U	0.011 U	10 U	462 J	6.3 U	0.024 U	143	0.14 J	9	34.1	58.7	2.8 U	29	5.5	6.9 U	1.8 U	2110 J
JAX47-937-MW02S	10/22/2010	0.0065 U	6660	NA	0.012 U	0.0048 U	0.51 J	0.28 J	NA	0.1 U	0.015 U	0.29	0.011 U	NA	NA	NA	0.024 U	NA	0.0056 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/6/2011	0.0065 U	10200	NA	0.012 U	0.0049 U	0.012 U	0.055 J	NA	0.13 J	0.016 U	0.0045 U	0.011 U	NA	NA	NA	12 J	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/1/2011	0.033 U	15800	NA	0.062 U	0.025 U	0.062 U	0.049 U	NA	0.5 J	0.48 J	0.023 U	0.056 U	NA	NA	NA	0.12 U	NA	0.029 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/20/2012	0.0065 U	16000	NA	0.068 J	0.0049 U	0.012 U	0.0098 U	NA	0.26 J	0.24 J	0.0045 U	0.011 U	NA	NA	NA	0.024 U	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-937-MW03S	10/20/2010	0.13 U	11400	NA	0.81 J	1.2 J	0.73 JB	1.1 J	NA	11	0.31 U	0.089 U	0.58	NA	NA	NA	0.49 U	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.13 U	10800	NA	1.1 J	1.2 J	0.88 JB	1.1 J	NA	11	0.31 U	0.09 U	0.61	NA	NA	NA	0.25 J	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/6/2011	0.0065 U	4040	NA	0.28	0.0049 U	0.54	0.79	NA	7.6	0.12	0.036 J	0.13 J	NA	NA	NA	0.024 U	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/31/2011	0.0033 U	16400	NA	0.0061 U	0.0024 U	0.0061 U	0.63 J	NA	12	0.12 J	0.0022 U	0.0055 U	NA	NA	NA	0.012 U	NA	0.0028 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/20/2012	0.013 U	27400	NA	0.1	0.69 J	0.25 J	0.9 J	NA	4.8	0.04 J	0.009 U	0.16 J	NA	NA	NA	0.049 U	NA	0.011 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-937-MW04S	10/19/2010	0.13 U	11.6	5.6	0.24 U	0.097 U	0.24 U	0.19 U	2.2 J	0.21 U	0.31 U	0.089 U	0.22 U	20 U	376	6.3 U	0.48 U	121	0.11 U	6.3 J	41.4	64.8	2.8 U	60.1	3.5 J	6.9 U	6.4 J	1580
		0.13 U	9.69 J	5.2	0.24 U	0.098 U	0.24 U	0.2 U	2.3 J	0.21 U	0.31 U	0.09 U	0.22 U	20 U	373	6.3 U	0.49 U	117	0.11 U	6 J	41.7	65.5	2.8 U	60.3	3.5 J	6.9 U	6 J	1570
	3/30/2011	0.0065 U	6.62 U	3.1	0.012 U	2.6 J	0.012 U	0.0098 U	0.94 J	0.011 U	0.016 U	0.0045 U	0.011 U	10 U	212	6.3 U	0.024 U	62.7	0.0057 U	3.2 J	23.4 JB	47.7 JB	2.8 U	17.2	1.1 J	6.9 U	4.8 J	952
		0.0065 U	6.62 U	3	0.012 U	0.0049 U	0.012 U	0.0098 U	1.3 J	0.011 U	0.016 U	0.0045 U	0.011 U	10 U	200	6.3 U	0.024 U	61.2	0.0057 U	2.7 J	33.4 JB	35.1 JB	2.8 U	19	1.1 J	6.9 U	4.1 J	833
	10/31/2011	0.0065 U	5.31 J	3.2	0.012 U	0.0049 U	0.012 U	0.0097 U	2.1 J	0.01 U	0.34	0.0045 U	0.011 U	2 U	278	6.3 U	0.024 U	91.9	0.0057 U	4.4	38.8	61.1 B	2.8 U	10.5	1.4	6.9 U	0.36 U	582
	4/23/2012	0.0065 U	4.15 J	1.3	0.012 U	0.0049 U	0.012 U	0.042 J	1.6 U	0.011 U	0.14	0.0045 U	0.011 U	2 U	100 J	6.3 U	0.024 U	30.4	0.093 J	1.5	5.8	7.4	2.8 U	5.3	0.46 J	6.9 U	0.36 U	108
JAX47-MW10S	10/27/2010	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.00065 J	0.00097 U	NA	0.001 U	0.0015 U	0.0037 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/8/2011	0.00066 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00099 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00058 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/27/2011	0.00066 U	6.62 U	0.34 U	0.0012 U	0.00049 U	0.0012 U	0.00099 U	1.6 U	0.0011 U	0.0016 U	0.00045 U	0.0011 UJ	2 U	0.38 U	6.4 U	0.0025 U	0.44 U	0.00058 U	0.28 U	0.041 U	0.041 U	2.9 U	0.42 U	0.38 U	7 U	0.36 U	1 U
	4/17/2012	0.00065 UJ	6.62 U	0.34 U	0.0024 J	0.0058 J	0.002 J	0.003 J	1.6 UJ	0.0011 U	0.0016 U	0.00045 U	0.0011 UJ	2 U	0.38 U	6.3 U	0.0024 UJ	0.44 U	0.00035 J	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW11S	10/20/2010	0.065 U	5.57 J	1.2	3.4	1.3	3.3	6	6.3	0.11 U	0.16 U	0.045 U	0.11 U	2 U	2.5	6.3 U	0.24 U	5	0.057 U	4.7	66.8 B	147	2.8 U	0.42 U	6.8	6.9 U	0.36 U	7.6
	3/29/2011	0.00065 U	6.62 U	1	2.6	1.2	2.2	4.1	3.3 J	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	1.2	6.3 U	0.0024 U	0.48 J	0.00057 U	3.1	36	102	2.8 U	0.42 U	4.3	6.9 U	0.36 U	3.8
	10/27/2011	0.00066 U	4.25 J	1.7	2.5	0.44 J	2.4	3.4	9	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	0.82	6.3 U	0.0025 U	0.28 J	0.00058 U	5.8	91.5	145	2.8 U	0.42 U	1.7	6.9 U	0.36 U	4
		0.00066 U	5.23 J	1.7	3	0.63 J	2.8	4.2	9.4	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	0.91	6.4 U	0.0025 U	0.31 J	0.00057 U	5.7	87.9	142	2.9 U	0.42 U	1.7	7 U	0.36 U	3.9
	4/17/2012	0.013 U	6.62 U	2.6	2.7	0.69	2.9	3.7	6.8 J	0.021 U	0.031 U	0.009 U	0.022 U	2 U	0.27 J	6.3 U	0.049 U	0.7	0.011 U	0.27 J	107	132	2.8 U	0.42 U	1.3	6.9 U	0.36 U	4
		0.00065 U	10 U	2.4	2.6	0.61	3.1	3.7	7.6 J	0.0011 U	0.0016 U	0.0035 J	0.0011 U	2 U	0.3 J	6.3 U	0.0024 U	0.54	0.00057 U	0.24 J	111	137	2.8 U	0.42 U	1.3	6.9 U	0.36 U	3.6
JAX47-MW12S	10/27/2010	0.00065 U	6.62 U	NA	0.0012 U	0.84	0.0012 U	0.00097 U	NA	0.001 U	0.0015 U	0.035 J	0.098 J	NA	NA	NA	0.025	NA	0.091 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/7/2011	0.00065 U	6.62 U	NA	0.0012 U	0.8	0.0088 J	0.0062 J	NA	0.0011 U	0.0016 U	0.00045 U	0.2	NA	NA	NA	0.055	NA	0.16	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/2/2011	0.00066 U	6.62 U	NA	0.03	0.29	0.011 J	0.024	NA	0.0011 U	0.0016 U	0.00045 U	0.11	NA	NA	NA	0.0025 U	NA	0.07	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	6.62 U	NA	0.0035	0.17	0.0063 J	0.0038 J	NA	0.0011 U	0.0016 U	0.00045 U	0.024 J	NA	NA	NA	0.0024 U	NA	0.016	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW13S	10/19/2010	0.033 U	17.4	1.2	3	0.56	2.5	2.3	1.2 J	0.85	0.078 U	0.18 J	0.086 J	2 U	0.38 U	6.4 U	0.12 U	0.28 J	0.028 U	0.35 J	0.11	0.33	2.9 U	0.42 U	0.38 U	7 U	0.36 U	1 J
	3/30/2011	0.00065 U	8.28 J	0.98	1	0.3	0.81	0.71	1.5 U	0.41	0.0016 U	0.18	0.06 J	2 U	0.38 U	6.3 U	0.0024 U	0.25 J	0.078	0.21 J	0.092 JB	0.26 JB	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
	10/25/2011	0.00066 U	5.24 J	0.63	0.95	0.25	0.87	0.72	0.96 J	0.48	0.0016 U	0.1	0.0011 U	2 U	0.38 U	6.4 U	0.0025 U	0.44 U	0.00058 U	0.28 U	0.5	0.61 B	2.9 U	0.42 U	0.38 U	7 U	0.36 U	1 U
		0.00066 U	5.68 J	0.62	1.2	0.28	1	0.88	1.1 J	0.53	0.0016 U	0.098	0.0011 U	2 U	0.38 U	6.3 U	0.0025 U	0.44 U	0.00058 U	0.28 U	0.52	0.56 B	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
	4/23/2012	0.0065 U	3.94 J	0.37 J	0.38 J	0.071 J	0.31 J	0.24 J	1.6 U	0.3 J	0.016 U	0.042 J	0.011 U	2 U	0.38 U	6.3 U	0.024 U	0.44 U	0.0057 U	0.22 J	0.76	0.55	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
		0.0065 U	6.62 U	0.35 J	0.59 J	0.19 J	0.48 J	0.4 J	1.6 U	0.48 J	0.016 U	0.098 J	0.011 U	2 U	0.38 U	6.3 U	0.024 U	0.44 U	0.0057 U	0.2 J	0.79	0.58	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW14S	10/22/2010	0.00064 U	8.75 J	NA	0.0012 U	0.00048 U	0.0012 U	0.00096 U	NA	0.012	0.021	0.0057 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.002 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/4/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.01 J	NA	0.0038 J	0.019	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/28/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0048 J	0.0079 J	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.43 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	4.68 J	NA	0.0012 U	0.00049 U	0.037 J	0.00098 U	NA	0.0011 U	0.0098 J	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.51 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW15S	10/26/2010	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.0023 J	NA	0.0011 U	0.0016 U	0.00045 U	0.00069 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/5/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0018 J	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/1/2011	0.00066 U	5.22 J	0.34 U	0.0012 U	0.0005 U	0.0012 U	0.00099 U	1.6 U	0.0023 J	0.0016 U	0.00046 U	0.0011 U	2 U	0.38 U	6.4 U	0.0025 U	0.44 U	0.00058 U	0.28 U	0.041 U	0.041 U	2.9 U	0.42 U	0.38 U	7 U	0.36 U	1 U
	4/19/2012	0.00065 U	6.62 U	0.34 U	0.0012 U	0.00049 U	0.0012 U	0.00098 U	1.6 U	0.00062 J	0.0016 U	0.00045 U	0.0011 U	2 U	0.38 U	6.3 U	0.0024 U	0.44 U	0.00057 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW19S	10/27/2010	0.00065 U	6.62 U	NA	0.0012 U	0.00048 U	0.0012 U	0.00097 U	NA	0.001 U	0.0015 U	0.00044 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/1/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00097 U	NA	0.001 U	0.0015 U	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2011	0.00067 U	7.23 J	0.34 U	0.0012 U	0.0005 U	0.0012 U	0.001 U	1.6 U	0.0011 U	0.0016 U	0.00046 U	0.0011 U	2 U	0.38 U	6.3 U	0.0025 U	0.44 U	0.00058 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
	4/20/2012	0.0065 U	6.17 J	0.34 U	0.012 U	0.0049 U	0.012 U	0.0098 U	1.6 U	0.011 U	0.016 U	0.0045 U	0.011 U	2 U	0.38 U	6.3 U	0.024 U	0.44 U	0.0057 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW25S	10/21/2010	0.00066 U	6.62 U	0.43 J	0.74	1.8	1.2	0.97	1.8 J	0.0011 UJ	0.0016 UJ	0.00045 UJ	0.0011 UJ	2 U	0.38 U	6.3 U	0.0025 UJ	0.44 U	0.064 J	0.88	4 JB	21.5 JB	2.8 U	0.42 U	0.27 J	6.9 U	0.36 U	1 U
	3/30/2011	0.00065 U	6.62 U	0.75	1.5	1.3	1.9	1.9	1.9 J	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	0.38 U	6.3 U	0.0024 U	0.44 U	0.056 J	1.6	30.2 JB	31.9 JB	2.8 U	0.42 U	0.59	6.9 U	0.36 U	0.69 J
	11/1/2011	0.00066 U	5.07 J	0.74	1.5	0.76	1.9	1.5	6.1	0.0011 U	0.0016 U	0.011 J	0.0011 U	2 U	0.65	6.3 U	0.0025 U	0.44 U	0.00058 U	3.4	1.5	88.7	2.8 U	0.42 U	0.35 J	6.9 U	0.36 U	1 U
	4/18/2012	0.013 U	6.62 U	1.3 J	2.6	0.97	2.8	2.3	10.1	0.021 U	0.031 U	0.009 U	0.022 U	2 U	0.26 J	6.3 U	0.049 U	0.44 U	0.011 U	0.28 U	1.2	122	2.8 U	0.42 U	0.6 J	6.9 U	0.36 U	1 U
JAX47-MW26S	10/26/2010	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.008 J	NA	NA	NA	0.0024 U	NA	0.016	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/8/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0049	NA	NA	NA	0.0024 U	NA	0.014	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/27/2011	0.00066 U	6.62 U	NA	0.0012 U	0.0005 U	0.0012 U	0.00099 U	NA	0.00082 J	0.0016 U	0.00046 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.00066 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/17/2012	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.0017 J	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.069	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.0062 J	NA	0.0011 U	0.019 J	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.061	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW27S	11/1/2011	0.00065 U	NA	0.34 U	0.0012 U	0.00049 U	0.0012 U	0.00098 U	1.6 U	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	0.38 U	6.3 U	0.0024 U	0.44 U	0.00057 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
	4/18/2012	0.0065 U	NA	0.34 U	0.012 U	0.0049 U	0.012 U	0.0098 U	1.6 U	0.011 U	0.016 U	0.0045 U	0.011 U	2 U	0.38 U	6.3 U	0.024 U	0.44 U	0.0057 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW30S	10/26/2010	0.00065 U	NA	NA	0.0012 U	0.00049 UJ	0.0012 UJ	0.00098 UJ	NA	0.0011 UJ	0.0016 UJ	0.00045 UJ	0.0011 UJ	NA	NA	NA	0.0024 UJ	NA	0.00057 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/7/2011	0.0018 JB	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2011	0.00065 U	6.62 U	0.34 U	0.0012 U	0.00049 U	0.0012 U	0.00097 U	1.6 U	0.001 U	0.0015 U	0.00045 U	0.0011 U	2 U	0.38 U	6.4 U	0.0024 U	0.44 U	0.00057 U	0.28 U	0.041 U	0.041 U	2.9 U	0.42 U	0.38 U	7 U	0.36 U	1 U
	4/17/2012	0.00065 U	10 U	0.34 U	0.0051 J	0.0049 J	0.0025 J	0.0028 J	1.6 UJ	0.0021 J	0.0021 J	0.0027 J	0.0011 U	2 U	0.38 U	6.3 U	0.0024 U	0.44 U	0.00057 U	0.28 U	0.041 U	0.041 U	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	1 U
JAX47-MW32S	10/21/2010	0.00067 U	6.62 U	NA	0.0012 U	0.048	0.021	0.001 U	NA	0.0011 U	0.0016 U	0.00046 U	0.011	NA	NA	NA	0.0025 U	NA	0.00058 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/31/2011	0.0024	6.62 U	NA	0.0012 U	0.028	0.0025 J	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.013	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/2/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.005	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/17/2012	0.00065 U	6.62 U	NA	0.0042	0.0042 J	0.00088 J	0.0027 J	NA	0.0011 U	0.0016 U	0.00045 U	0.0046	NA	NA	NA	0.18	NA	0.0027 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW33S	10/27/2010	0.00065 U	6.62 U	NA	0.18	0.29	0.048	0.14	NA	0.001 U	0.0015 U	0.02 J	0.2 J	NA	NA	NA	0.034 J	NA	0.27	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/7/2011	0.00066 U	6.62 U	NA	0.083	0.18	0.027 J	0.071	NA	0.0011 U	0.0016 U	0.00045 U	0.18	NA	NA	NA	0.028	NA	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/2/2011	0.00067 U	6.62 U	NA	0.0012 U	0.15	0.0012 U	0.024 J	NA	0.0011 U	0.0016 U	0.00046 U	0.22	NA	NA	NA	0.072	NA	0.28	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	6.62 U	NA	0.0012 U	0.11	0.0099 J	0.012	NA	0.0011 U	0.0016 U	0.059 J	0.19	NA	NA	NA	0.042	NA	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW34S	10/25/2010	0.033 U	6.15 U	NA	0.061 U	5.2	0.061 U	0.049 U	NA	0.053 U	0.078 U	0.029 J	0.16	NA	NA	NA	0.12 U	NA	0.19 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/31/2011	0.00065 U	6.62 U	NA	0.0012 U	3.7	0.0012 U	0.022 J	NA	0.029	0.1	0.036	0.19	NA	NA	NA	0.13	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/2/2011	0.00066 U	6.62 U	NA	0.013	0.96	0.0012 U	0.091	NA	0.0011 U	0.032 J	0.024	0.071	NA	NA	NA	0.052	NA	0.058 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	3.75 U	NA	0.0082 J	0.64	0.018	0.054	NA	0.0011 U	0.018 J	0.017	0.056	NA	NA	NA	0.0024 U	NA	0.029 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW35S	10/20/2010	0.00065 U	5.66 J	NA	0.00094 J	0.00048 U	0.0024 JB	0.00057 J	NA	0.0021 J	0.0022 J	0.0004 U	0.013 J	NA	NA	NA	0.13	NA	0.00041 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/5/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.063	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/28/2011	0.00066 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00099 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00058 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 J	NA	0.0007 J	0.0016 U	0.0019 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW36S	10/26/2010	0.00065 UJ	908	NA	0.79	0.56	0.55	1.2	NA	12	0.0015 UJ	0.97 J	0.0011 UJ	NA	NA	NA	0.0024 UJ	NA	0.00056 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/5/2011	0.00065 U	206	NA	0.83	0.73	0.52	1.2	NA	8.9	0.0016 U	0.69	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/24/2011	0.00066 U	143	NA	0.14	0.11	0.11	0.18	NA	5.5	0.0016 U	0.57	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00058 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	106	NA	0.12	0.1	0.098	0.16	NA	2.4	0.0016 U	0.21	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW37S	10/25/2010	0.00065 U	9.83 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0074 J	0.0026 J	0.00045 U	0.00092 J	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/31/2011	0.002 J	11.8	NA	0.0012 U	0.00049 U	0.0075 J	0.00098 U	NA	0.01	0.0015 J	0.004 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/2011	0.00066 U	7.12 J	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0066 J	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2012	0.00065 U	8/18 J	NA	0.0012 U	0.011 J	0.0033 J	0.0017 J	NA	0.0024 J	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.024 U	NA	0.0016 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW38S	10/26/2010	0.00065 U	6.62 U	NA	0.15	0.033 J	0.11	0.048	NA	0.057	0.0034 J	0.0034 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.0026 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/6/2011	0.00065 UJ	6.62 U	NA	0.1 J	0.012 J	0.037 J	0.029 J	NA	0.015 J	0.0016 UJ	0.012 J	0.0011 UJ	NA	NA	NA	0.0024 UJ	NA	0.018 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/25/2011	0.00066 U	6.62 U	NA	0.17	0.061 J	0.053 J	0.041	NA	0.018 J	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 UJ	NA	0.069 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	0.0065 U	6.62 U	NA	0.038	0.014 J	0.017 J	0.013 J	NA	0.012 J	0.016 U	0.0061 J	0.011 U	NA	NA	NA	0.024 U	NA	0.008 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW39S	10/25/2010	0.00065 U	4.44 J	NA	0.0012 U	0.00049 U	0.0083 JB	0.00098 U	NA	0.0011 U	0.0028 J	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/4/2011	0.00083 J	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00097 U	NA	0.001 U	0.0015 U	0.00045 U	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/2011	0.00066 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	0.0065 U	6.62 U	NA	0.012 U	0.0049 U	0.012 U	0.0098 U	NA	0.011 U	0.016 U	0.0045 U	0.011 U	NA	NA	NA	0.024 U	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW40S	10/25/2010	0.0033 U	7.8 J	NA	0.0061 U	0.0024 U	0.0061 U	0.0049 U	NA	1.4	0.0078 U	0.066	0.0055 U	NA	NA	NA	0.012 U	NA	0.028 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/4/2011	0.00065 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00098 U	NA	0.13	0.0016 U	0.0044 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/2011	0.00066 U	6.62 U	NA	0.0012 U	0.00049 U	0.0012 U	0.00099 U	NA	0.024	0.0016 U	0.0011 J	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00058 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	0.0065 U	5.31 J	NA	0.012 U	0.0049 U	0.012 U	0.034 J	NA	0.013 J	0.016 U	0.0037 J	0.011 U	NA	NA	NA	0.024 U	NA	0.0057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW41S	10/22/2010	0.0033 U	6.62 U	NA	0.7	0.19	0.48	0.56	NA	0.0053 U	0.0063 J	0.0022 U	0.029	NA	NA	NA	0.012 U	NA	0.017 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/1/2011	0.00078 U	6.62 U	NA	0.29	0.084	0.13	0.21	NA	0.017	0.038 J	0.026	0.0013 U	NA	NA	NA	0.0029 U	NA	0.02 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/25/2011	0.00065 U	6.62 U	NA	0.064	0.075	0.023	0.028	NA	0.0034 J	0.013	0.0069 J	0.0011 U	NA	NA	NA	0.0024 U	NA	0.011 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	0.0065 U	10 U	NA	0.032 J	0.074 J	0.014 J	0.0062 J	NA	0.011 U	0.0081 J	0.0062 J	0.011 U	NA	NA	NA	0.024 U	NA	0.012 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
JAX47-MW42S	10/21/2010	0.00064 U	5.26 J	1.2	2.7	1.2	3.8	1.9	6.4	0.001 U	0.0015 U	0.00044 U	0.0011 U	2 U	0.38 U	6.2 U	0.0024 U	0.77	0.00056 U	4	44.7 JB	50.1 JB	2.8 U	0.42 U	0.35 J	6.8 U	0.36 J	1.5 J
	3/29/2011	0.00066 U	6.62 U	NA	3.3 J	0.9	3.9 J	2.1 J	NA	0.0011 U	0.0016 U	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.00057 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.00065 U	6.62 U	1.4	2.3 J	0.73	2.7 J	1.5 J	5.3	0.0011 U	0.0016 U	0.00045 U	0.0011 U	2 U	0.33 J	6.3 U	0.0024 U	0.68	0.00057 U	7	14.1	50.2	2.8 U	0.42 U	0.53	6.9 U	0.36 U	1.6 J
	10/25/2011	0.00066 U	5.01 J	1.4	3.3	0.75	3.6	2.8	9.8	0.0011 U	0.0016 U	0.00046 U	0.0011 U	2 U	0.38 U	6.4 U	0.0025 U	1	0.00058 U	7.6	35	90.4 B	2.9 U	0.42 U	0.22 J	7 U	0.36 U	2
	4/18/2012	0.013 U	6.62 U	1.8	2.5	0.58 J	2.7	1.5	7.6	0.021 U	0.031 U	0.0051 J	0.022 U	2 U	0.38 U	6.3 U	0.049 U	0.49 J	0.011 U	0.28 U	20.3	36	2.8 U	0.42 U	0.38 U	6.9 U	0.36 U	NA
JAX47-MW43S	10/20/2010	0.032 U	10.2 J	NA	12	13	13	9.4	NA	0.052 U	0.077 U	0.022 U	0.055 U	NA	NA	NA	0.12 U	NA	0.028 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.033 U	14.3 J	NA	12	12	12	9.3	NA	0.053 U	0.078 U	0.022 U	0.055 U	NA	NA	NA	0.12 U	NA	0.028 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/7/2011	0.00066 U	3.35 J	NA	9	10	8.6	6.9	NA	0.012	0.063	0.00045 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.091	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2011	0.00067 U	10.6	NA	2.3	3.1	2.1	2.4	NA	0.0011 U	0.0016 U	0.00046 U	0.0011 U	NA	NA	NA	0.0025 U	NA	0.035 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/18/2012	0.013 U	8.65 J	NA	3.5	3.1	2.7	4.3	NA	0.021 U	0.027 J	0.009 U	0.022 U	NA	NA	NA	0.049 U	NA	0.011 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

µg/L = Micrograms per liter
GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentration
B = Analyte detected in associated lab blank
J = Analyte positively identified : associated numerical value is approximate
JB = Analyte detected in associated field blank
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit
UJ = Analyte below the reported sample quantitation limit. However, the reported value is approximate.
NA =

Values bolded are analytes not detected by the Lab but are above the GCTL
Values shaded yellow are analytes not detected by the Lab but are above the NADC
Values bolded and shaded yellow are analytes not detected by the Lab but above the GCTL and NADC
Values bolded and shaded blue exceed the GCTL
Values bolded and shaded gray exceed the NADC

Arsenic Monitored Natural Attenuation Processes Evaluation

PSC 47 (Pesticide Shop)

Naval Air Station Jacksonville

Partnering Meeting – Jan.15, 2014

NAVFAC Naval Facilities Engineering Command

AGVIQ AGVIQ Environmental Services

CH2MHILL

Presentation Outline

- Recent Background
- Previous Work
- Investigation Objective
- Field Methods
- Results
- Preliminary Conclusions
- Path Forward
- Questions?

Background

- Record of Decision - 2010
  - PSC 47 Groundwater: Monitored Natural Attenuation
  - Arsenic
  - Organic Pesticides
  - VOCs and SVOCs
- Partners expressed concerns regarding arsenic MNA approach following review of 2011 AGMR
- Upcoming 5-year Performance Review Questions
  - Arsenic – Does MNA Remedial Alternative meet objective?
  - Organic pesticides – Likely to migrate beyond Compliance Point?

Groundwater Monitoring Data Trends

- Groundwater Data since 2008
  - Arsenic – Stable or decreasing plume mass and area
  - Organic pesticides – Concentrations of some continue to slightly exceed screening criteria (Organic pesticides will not be further addressed in this presentation)
  - VOCs and SVOCs – Not addressed as part of this investigation
- Arsenic MNA Performance Review Technical Memorandum (2011)

Investigation Objectives for Arsenic

- Arsenic investigation approach based upon EPA Guidance: MNA of Inorganic Contaminants in GW - Tier II
  - Identify Attenuation Mechanisms
  - Estimate Attenuation Rates

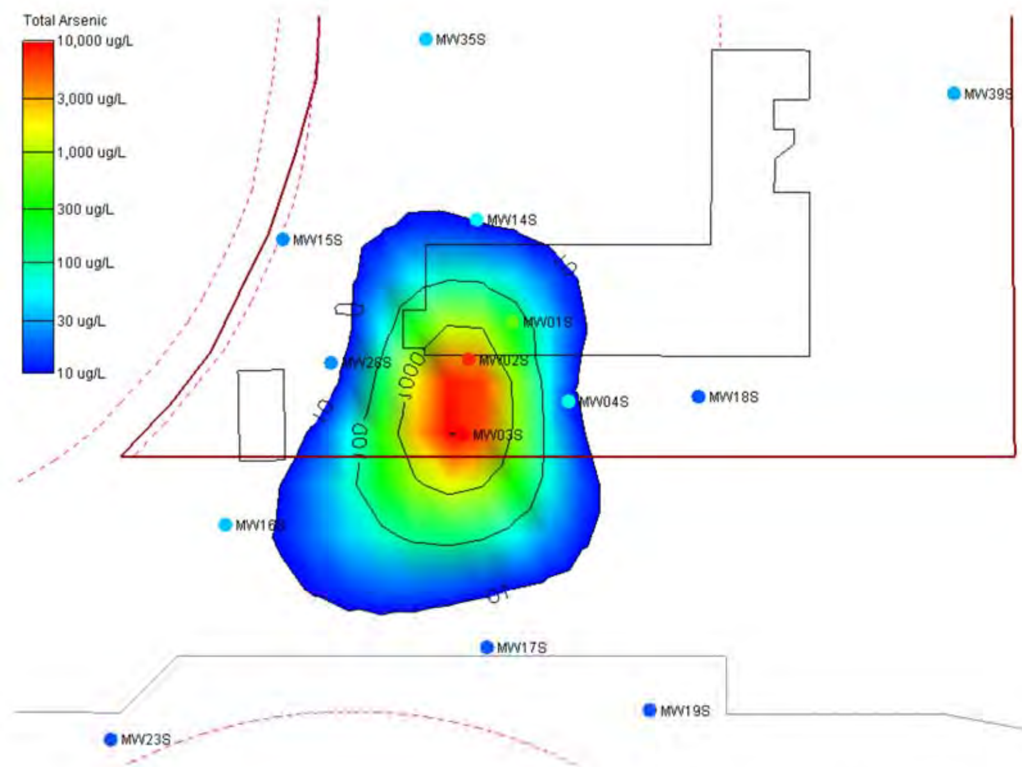


FIGURE 6
PSC 47 Total Arsenic in Groundwater October 2010
PSC 47, NAS Jacksonville, Jacksonville, FL

Analytical Methods

- Arsenic
  - Arsenic test kits – Triad Approach for DPT-4 Location (Field)
  - X-Ray Fluorescence –Sample Interval Selection (Field)
  - Sequential Extraction (Laboratory)
  - Overall Mineralogy by X-Ray Diffraction (Laboratory)

1. Select Location

2. Collect Soil Cores

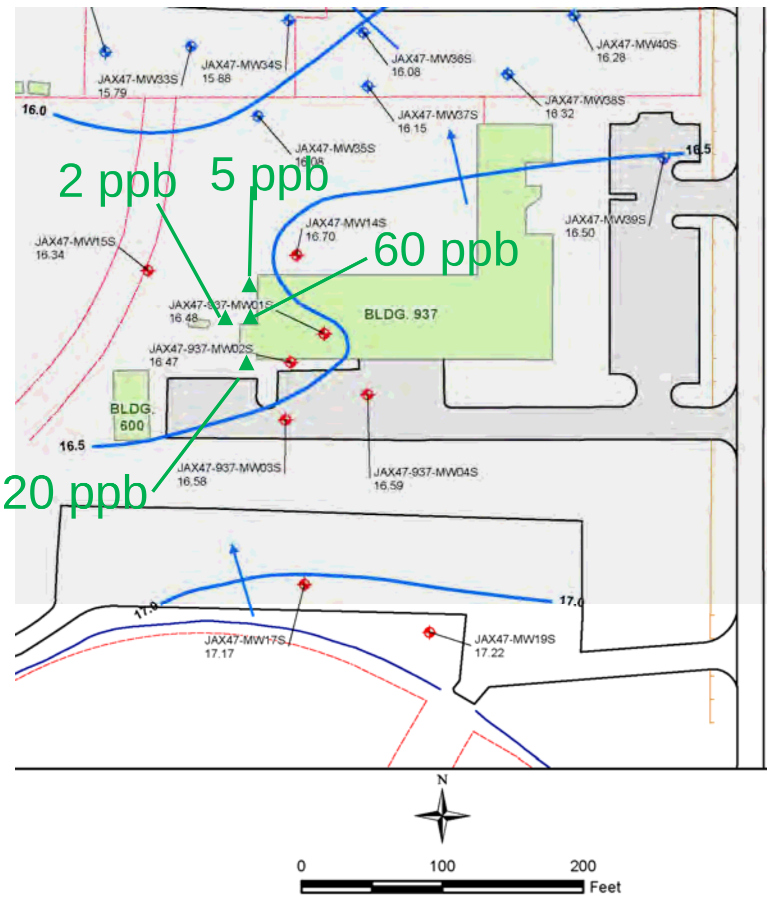
3. Dry the samples

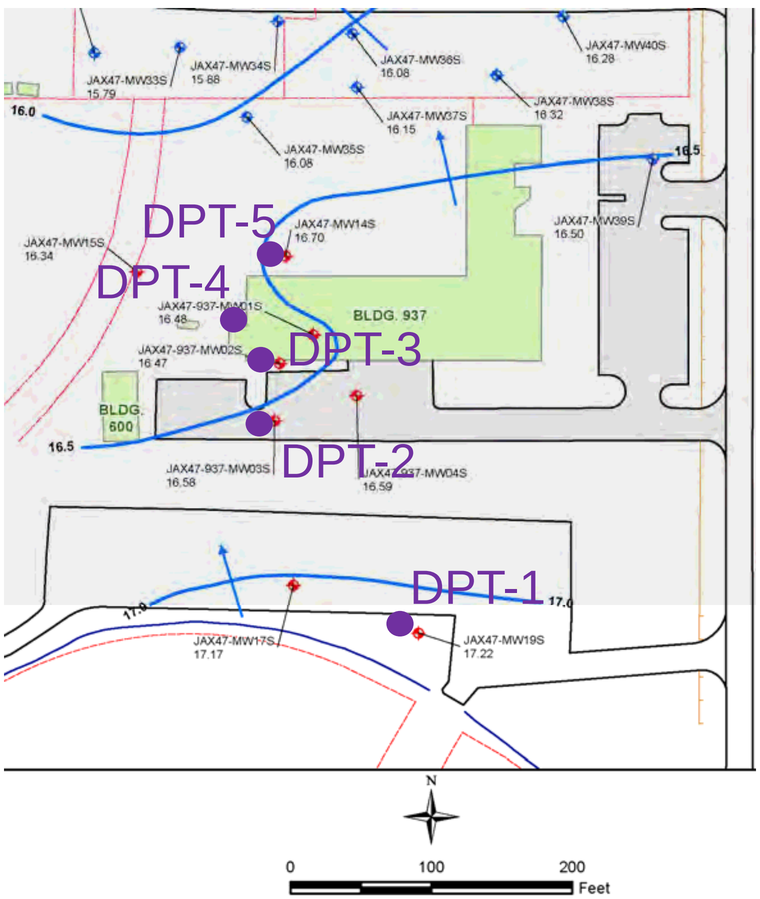
4. Measure arsenic by XRF

5. Select samples for laboratory analysis

Results: Arsenic Field Test Kits

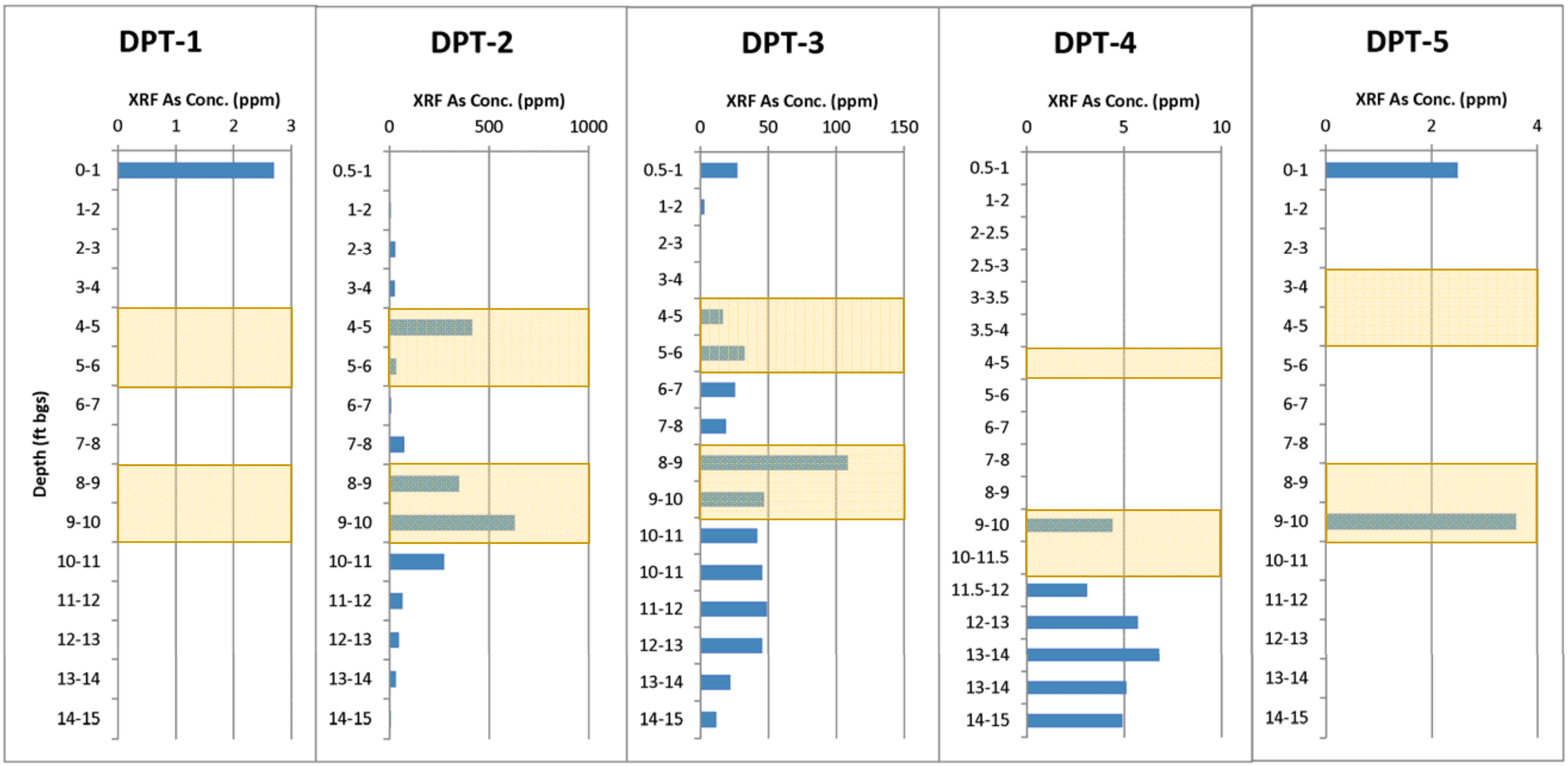
Arsenic Concentrations in GW → Location of DPT-4 → **DPT Locations**





Results: X-Ray Fluorescence

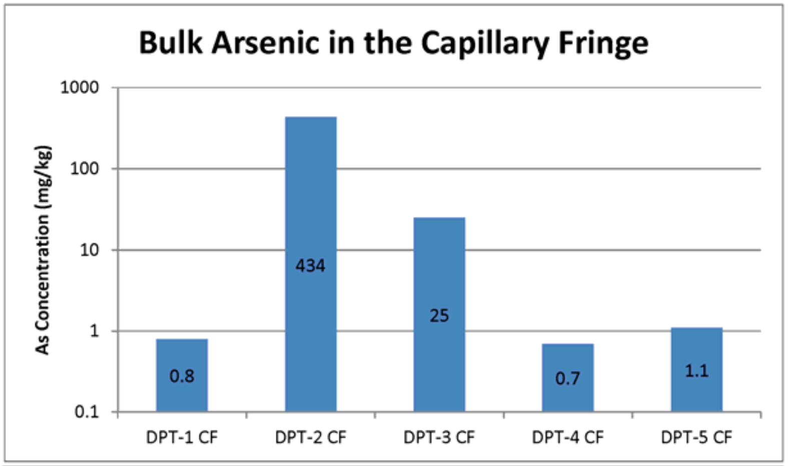
***Note the change in concentration scale between borings**

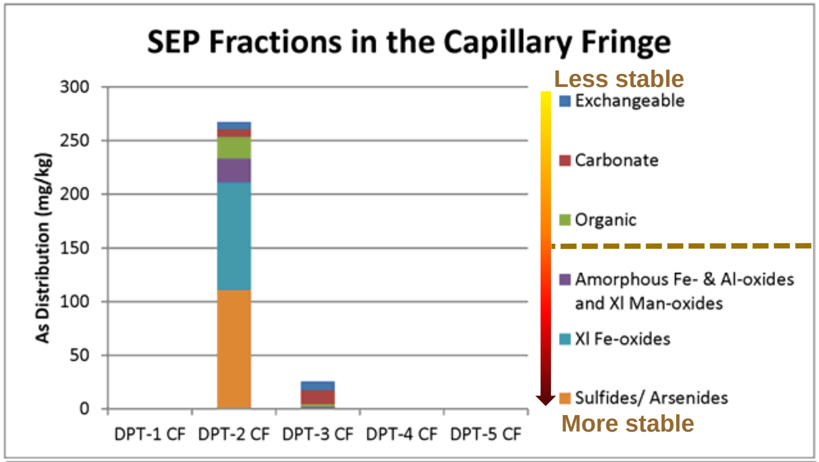


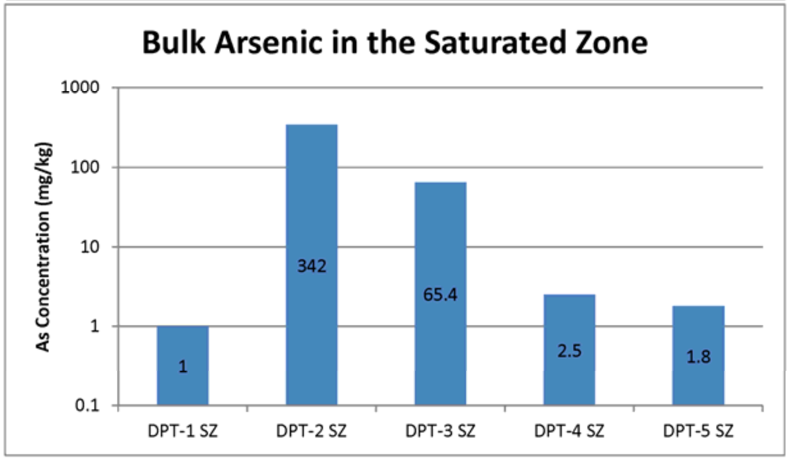
Interval selected for laboratory analyses

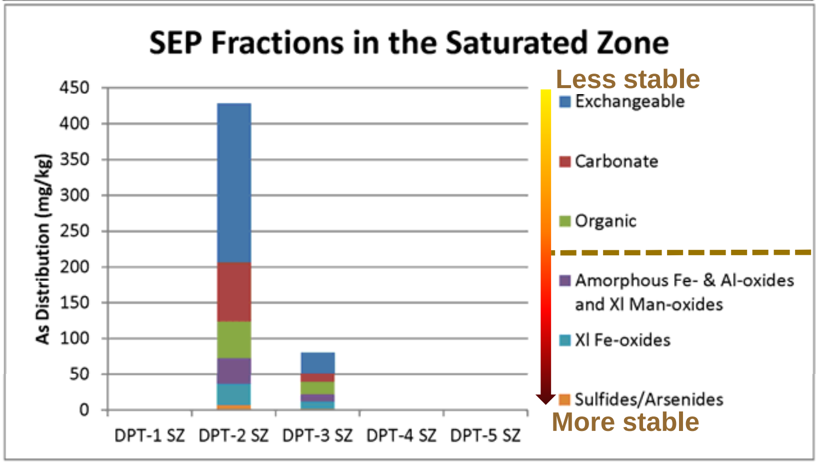
Results: Sequential Extraction

Arsenic Concentration Distribution



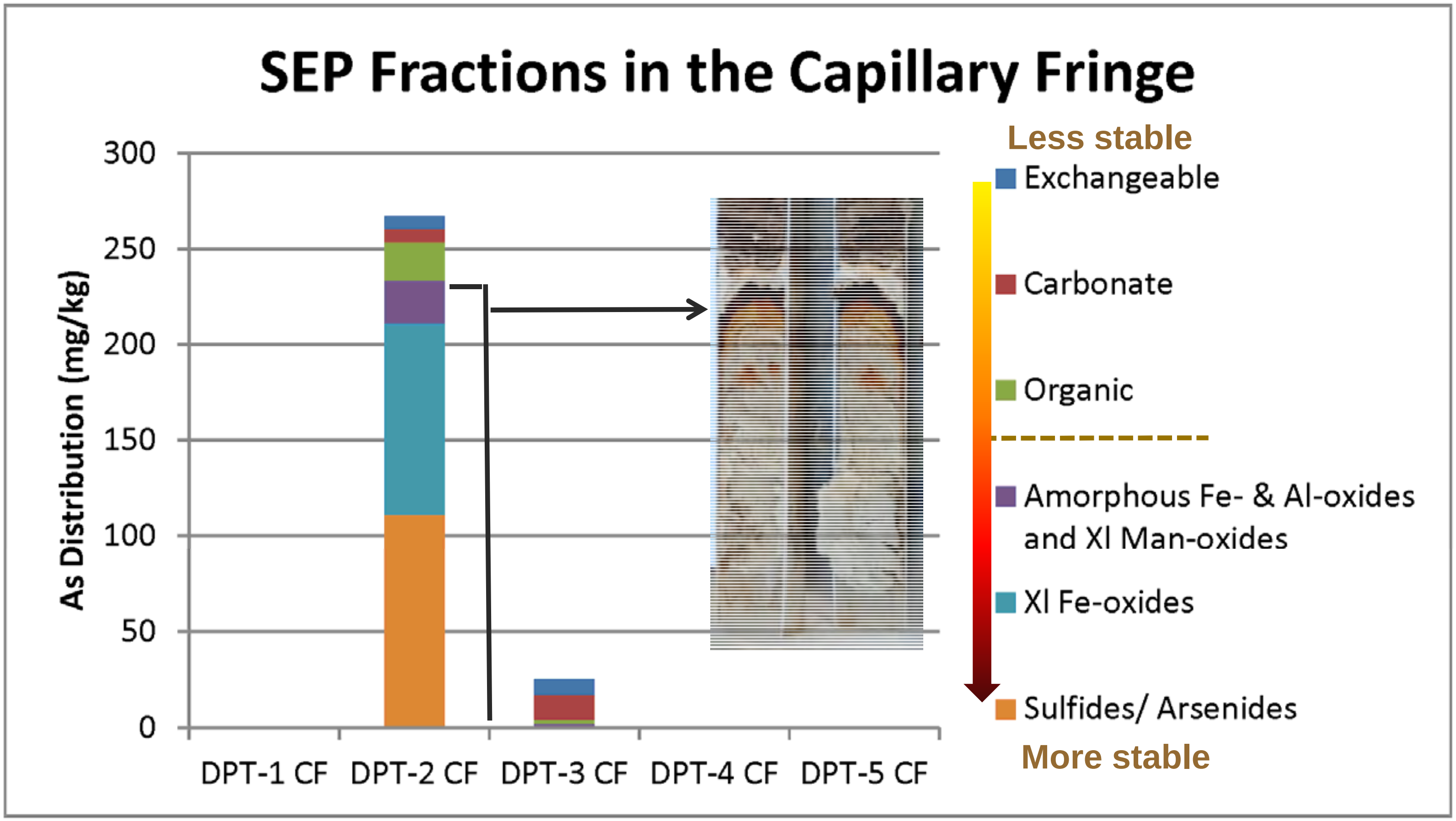






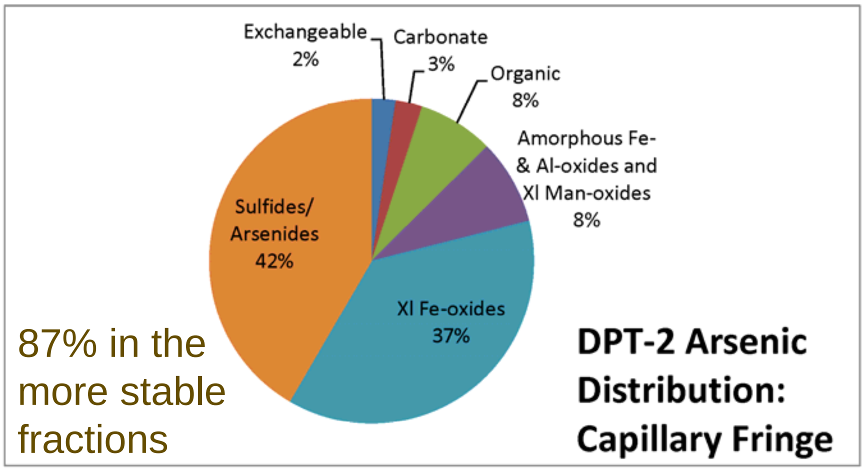
Results: Sequential Extraction

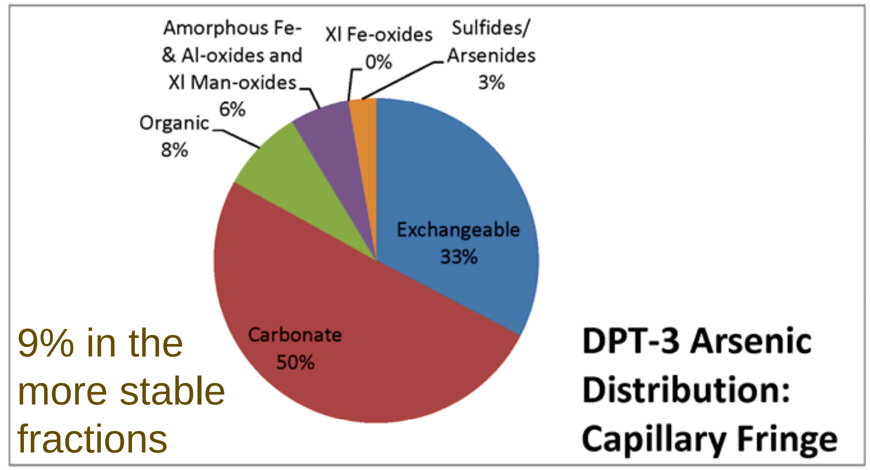
Arsenic Concentration Distribution (Continued)

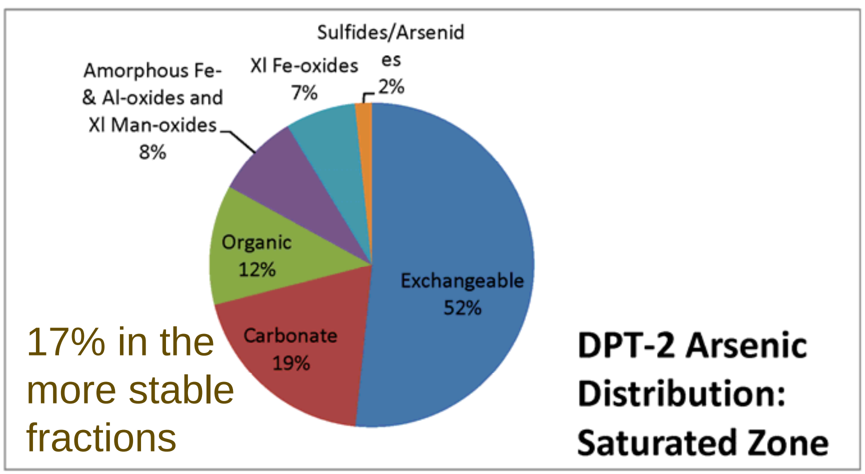


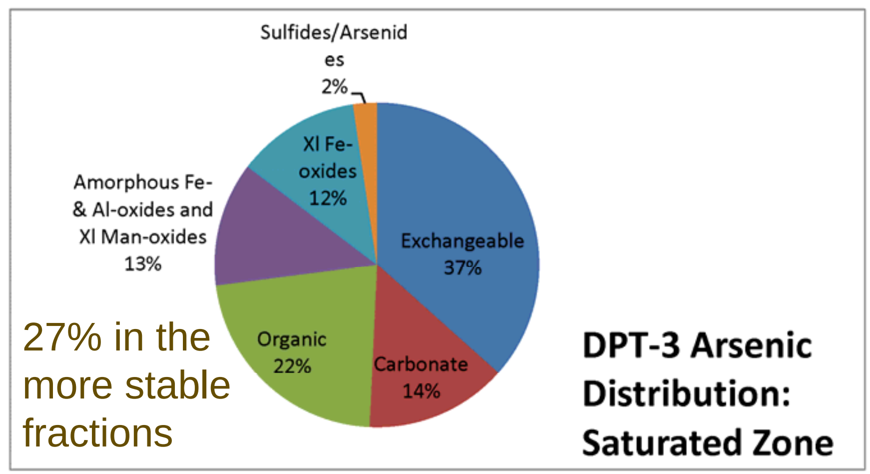
Results: Sequential Extraction

Proportional Distribution (DPT-2 and DPT-3)





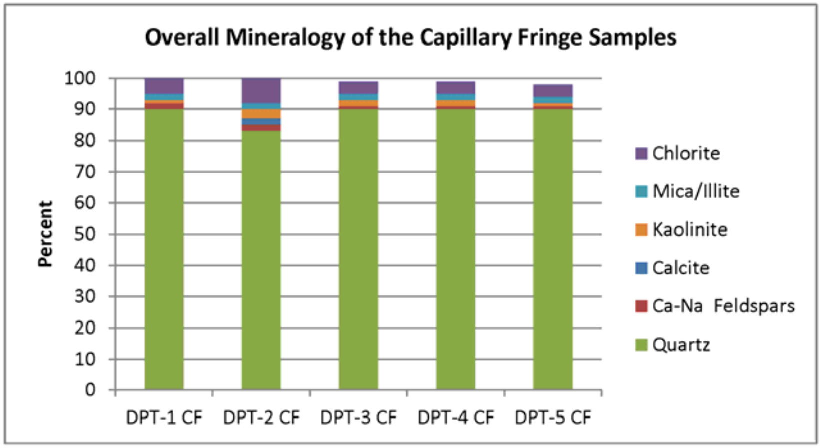




Results: Overall Mineralogy

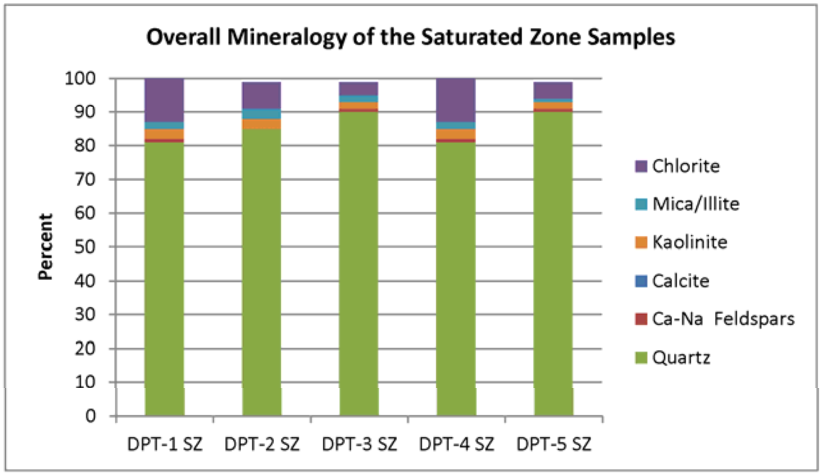
Samples Collected in the Capillary Fringe

Sample Location	Chlorite	Mica/Illite	Kaolinite	Quartz	Ca-Na Feldspars	Calcite
DPT-1 CF	~5	~2	~ 1	~90	~2	<1
DPT-2 CF	~8	~2	~ 3	~83	~2	~2
DPT-3 CF	~4	~2	~ 2	~90	~1	<1
DPT-4 CF	~4	~2	~ 2	~90	~1	<1
DPT-5 CF	~4	~2	~ 1	~90	~1	<1



Samples Collected in the Saturated Zone

Sample Location	Chlorite	Mica/Illite	Kaolinite	Quartz	Ca-Na Feldspars	Calcite
DPT-1 SZ	~14	~2	~ 3	~81	~1	<1
DPT-2 SZ	~8	~3	~ 3	~85	<1	<1
DPT-3 SZ	~4	~2	~ 2	~90	~1	<1
DPT-4 SZ	~13	~2	~ 3	~81	~1	<1
DPT-5 SZ	~5	~1	~ 2	~90	~1	<1



Preliminary Conclusions

- Arsenic is partitioning from groundwater to aquifer solids
  - Bulk concentrations decrease in the downgradient direction
  - Saturated Zone arsenic is associated with the less stable exchangeable, carbonate, and organic fractions at DPT-2
  - Saturated Zone arsenic is associated with the more stable iron and sulfide fractions at DPT-3
- Capillary zone arsenic:
  - Associated with the more stable iron and sulfide fractions at DPT-2
  - Associated with the less stable exchangeable, carbonate, and organic fractions at DPT-3

Preliminary Conclusions (cont.)

- Overall mineralogy
  - No detectable concentrations of arsenic- or iron-containing minerals
  - Predominantly quartz
  - Low and variable amounts of feldspar and clay minerals
  - Calcite is rare

Preliminary Conclusions (cont.)

- The data collected are sufficient to meet the Tier II characterization goal:

"...identify the aqueous and solid phase constituents within the aquifer that control contaminant attenuation."

- Partitioning mechanisms are effective in reducing arsenic groundwater concentrations to less than GCTL while migrating beneath the Pesticide Shop
- Calculated Rate of Attenuation will be provided in the forthcoming TM

Path Forward

- Technical Memorandum forthcoming
  - Calculated Rate of Attenuation
  - Recommendations about further data collection (Tier III and Tier IV?)
- Determine how this information will be used in 5-Year Performance Review
- Site Management Decisions

Questions?

Presentation Outline

- Inorganic Contaminant Plume Behavior
- Investigation Recap
- Arsenic and Iron in Saturated Zone Soil
- Conceptual Model of Arsenic Fate and Transport
- Conclusions
- Path Forward
- Questions?

Inorganic Plume Behavior

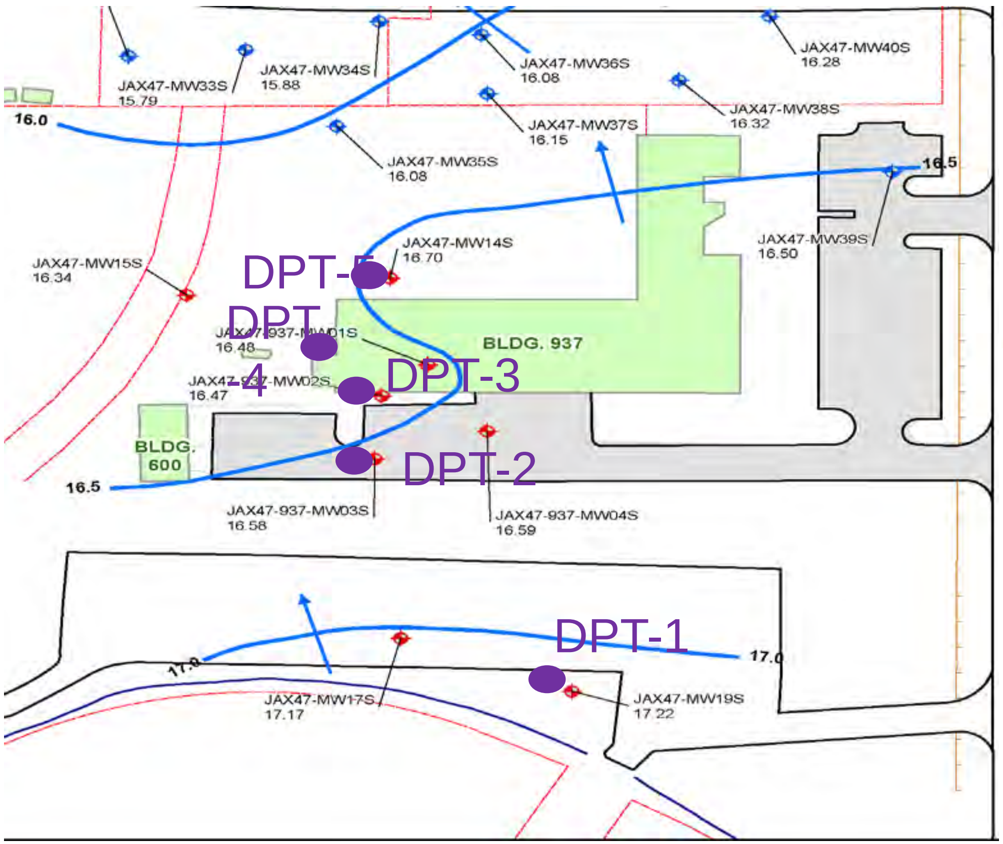
- "In general, an inorganic contaminant can be transferred between solid, liquid, or gaseous phases present within the aquifer, but the contaminant will always be present." Monitored Natural Attenuation of Inorganic Contaminants in Groundwater Volume 1, page 4.

Investigation Recap

- In October 2013, AGVIQ (CH2M HILL) collected field and lab data to evaluate the geochemical processes supporting the natural attenuation of arsenic in groundwater.
- The investigation was conducted in accordance with the EPA MNA for Inorganic Contaminants guidance document (EPA 2007).
- Scope of Field Effort
  - Five boreholes (Field arsenic test kits for DPT-4 Location)
  - Vertical delineation of arsenic using XRF
  - Five vadose zone and five saturated zone soil samples analyzed for overall mineralogy (XRD), arsenic partitioning fractions (SEP), and Total Metals (EPA Method 6010)

Investigation Recap

DPT Locations



1. Select Location

2. Collect Soil Cores

3. Dry the samples

4. Measure arsenic by XRF

5. Select samples for laboratory analysis

Investigation Recap

- Preliminary Findings
  - Arsenic is completely removed from groundwater before reaching the northern side of Building 937 (MW-14S is non-detect)
  - Saturated Zone arsenic becomes increasingly associated with the more stable iron and sulfide fractions in the downgradient direction

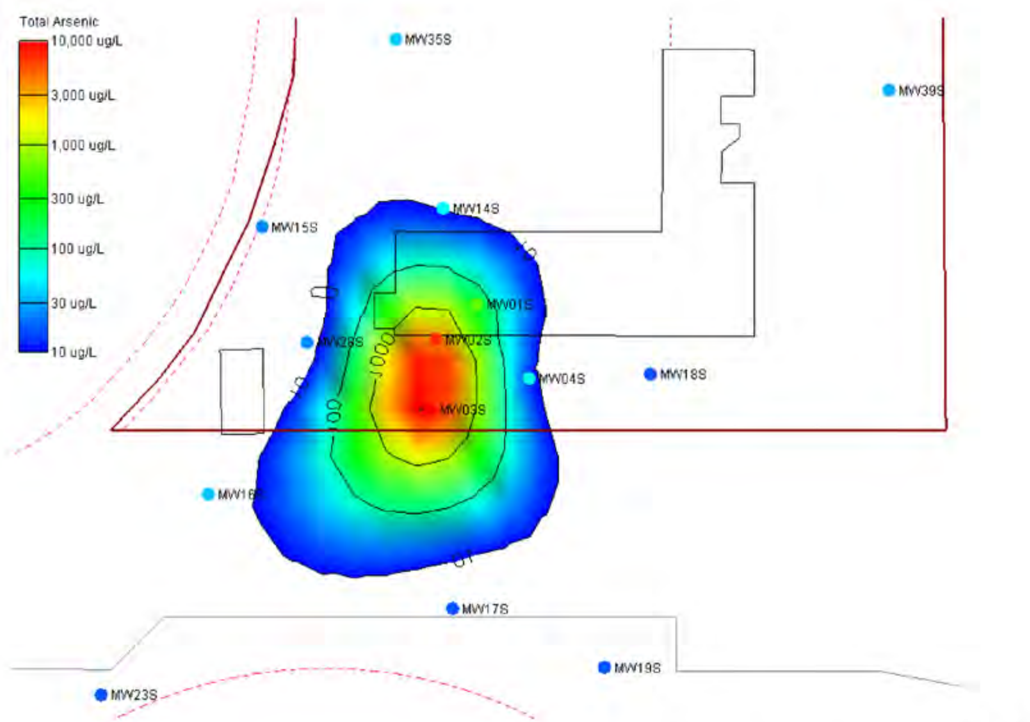
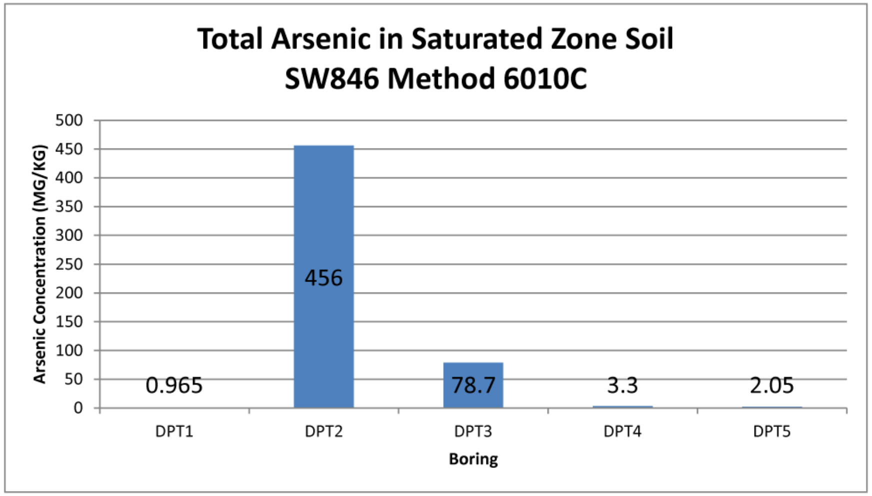
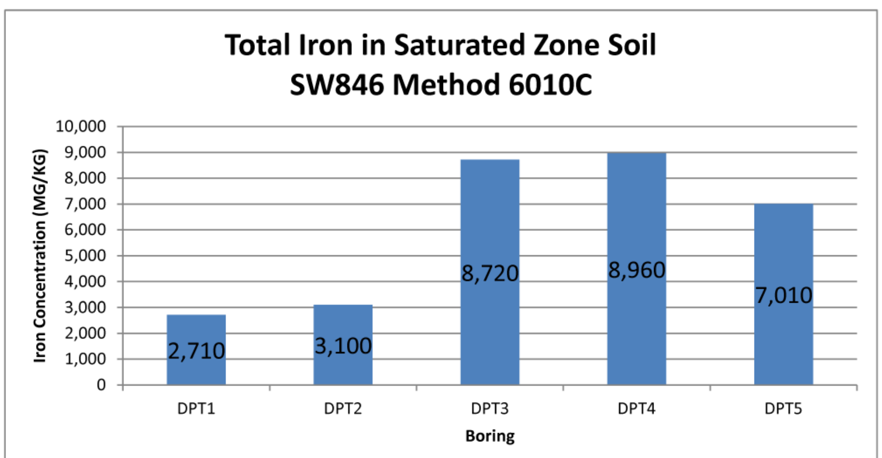


FIGURE 6
PSC 47 Total Arsenic in Groundwater October 2010
PSC 47, NAS Jacksonville, Jacksonville, FL

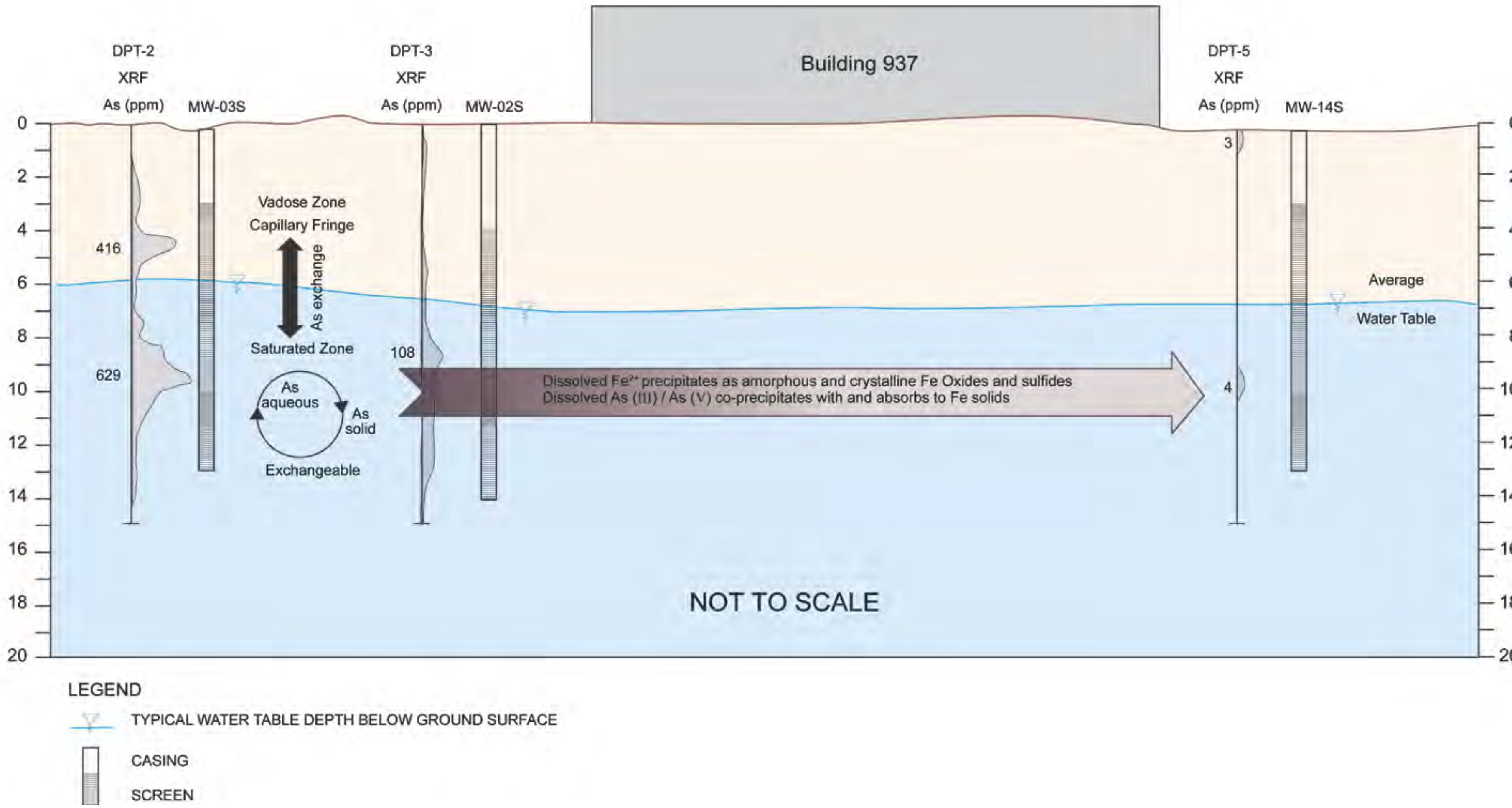
Arsenic and Iron in Saturated Zone Soil





- Arsenic concentrations **decrease** downgradient
- Iron concentrations **increase** downgradient
- Arsenic is incorporated into the crystalline structure of iron oxides in **oxidizing** conditions and sulfides in **reducing** conditions
- Iron solids immobilize arsenic within approximately 100 feet
- Unlikely to migrate even if conditions change

Conceptual Model of Arsenic Fate and Transport



Conclusions

- The data collected are sufficient to identify the aqueous and solid phase constituents within the aquifer that control contaminant attenuation
- Arsenic partitions from groundwater to aquifer solids
  - Bulk arsenic concentrations decrease in the downgradient direction
  - Exchangeable arsenic able to cycle between the vadose zone and the saturated zone
  - Saturated zone arsenic is increasingly associated with the stable iron and sulfide fractions in the downgradient direction

Conclusions (cont.)

- Arsenic concentration fluctuations preclude calculation of attenuation rate at this time
- Dissolved iron in the plume precipitates in the downgradient flow direction, resulting in the natural development of an in-situ reaction zone
- This reactive iron zone attenuates arsenic in groundwater to concentrations less than the GCTL during migration beneath Building 937
- The iron solids have a very large capacity to immobilize arsenic
- As will remain immobilized under current site conditions
- The attenuation mechanisms will continue preventing arsenic migration in groundwater into the future

Path Forward

- Continue MNA as a component of the selected remedy for arsenic
- Currently in a semi-annual groundwater monitoring program

Appendix F
Operable Unit 2 Land Use Control Implementation Plans

Naval Air Station Jacksonville
Land Use Control Implementation Plan
October 1998
Operable Unit Two

Description:
Operable Unit (OU) 2 consists of PSCs 2, 3, 4, 41, 42, and 43 and the northwest portion of Naval Air Station Jacksonville bordered by patrol road on north and west; Taxiway Charlie and Delta on the east and southeast; and Runway 09 on the south.

PSC 2 is the former Firefighting Training Area, which consisted of a shallow, unlined pit, approximately 100 feet in diameter. The pit was used for firefighting training from approximately 1966 to 1991. Vehicle chassis and parts were sprayed with JP-4, JP-5, aviation gasoline, or waste oil and then ignited to simulate aircraft crashes. This site is being investigated and remediated under the Florida Petroleum Cleanup Program.

PSC 3 is a 15-acre tract where approximately 20,000 tons of domestic and industrial sewage sludge, reportedly containing metals and organic compounds, were disposed of between 1962 and 1980. The area consists of two approximately equal-size parcels divided by an access road. The northern parcel is located to the northeast of the WTP and has been planted with pine trees. The southern parcel is located adjacent and to the east of the WTP and remains an unmaintained open field.

PSC 4 is approximately 70 acres, south and west of the Wastewater Treatment Plant (WTP). The area was reportedly used for the disposal of WTP sludge, asbestos, and petroleum products between 1968 to 1975. Approximately 5 to 6 acres in the northern most portion of PSC 4, immediately adjacent to the WTP, were planted with pine trees sometime after 1975 (i.e., the Pine Tree Planting Area). The remaining areas of PSC 4, located adjacent to runway 9-27 and the west-end apron, have been maintained as open grassy fields.

(PSCs 41, 42, and 43 are addressed separately)

Naval Air Station Jacksonville
Land Use Control Implementation Plan
October 1998
Operable Unit Two (Cont'd)

Location:
Reference: Naval Air Station Jacksonville Site Plan dated 4/01/98

Site Plan coordinate	Northing	Easting
E6	437,229	2,145,173
F6	437,229	2,144,173
E7	438,229	2,145,173
F7	438,229	2,144,173
E8	439,229	2,145,173
F8	439,229	2,144,173
D9	440,229	2,146,173
E9	440,229	2,145,173
F9	440,229	2,144,173
B10	441,229	2,148,173
C10	441,229	2,147,173
D10	441,229	2,146,173
E10	441,229	2,145,173
F10	441,229	2,144,173
B11	442,229	2,148,173
C11	442,229	2,147,173
D11	442,229	2,146,173

Land Use Control implemented:
NAS Jacksonville Installation Restoration Manager will coordinate inspections and forward discrepancies to NAS Facilities Officer for correction.
Maintain existing fence which restricts airfield trespassing.
Maintain industrial use.
Restrict construction on site which may impact groundwater. Obtain concurrence from USEPA and FDEP prior to design. No residential usage allowed.
Provide worker notification of potential hazard in sediment and groundwater.

Objective:
Prevent residential use.

Decision Document:
Record of Decision signed 20 October 1998

Potential Source of Contamination (PSC) 42
Wastewater Treatment Plant – Polishing Pond
Naval Air Station (NAS) Jacksonville, Jacksonville, Florida

1. Site Description: PSC 42 (Polishing Pond) was built in 1970 to provide final clarification for 2.36 million gallons per day of combined domestic and industrial wastewater treated effluent prior to chlorination and discharge to the St. Johns River. The Polishing Pond was unlined and had a surface area of 3.8 acres and an average depth of 3.5 feet. The Polishing Pond was identified as a PSC by the Navy prior to 1983. The United States Environmental Protection Agency (USEPA) classified the Polishing Pond as a surface impoundment to treat Resource Conservation and Recovery Act (RCRA) hazardous wastes F001 through F006, and F019, which are toxic hazardous wastes from nonspecific sources.

2. Site Location: PSC 42 is located in the north-western portion of the base east of the Patrol Road and west of a taxiway.

3. Institutional Control (IC) Objective: To restrict public access to the area and minimize exposure to contaminated soil under cover and groundwater.

4. ICs Implemented to Achieve Objective:
   - NAS Jacksonville Installation Restoration Manager coordinates inspections and forwards discrepancies to NAS Facilities Officer for correction.
   - Maintain fence and signs restricting airfield trespassing.
   - No residential construction on site (maintain industrial use).
   - No water supply wells on site (groundwater restriction, prevent direct contact with groundwater).
   - Restrict Construction. Workers must be notified that contamination exists and Occupational Safety and Health Administration (OSHA) regulations apply if construction activities are proposed on the site. Obtain concurrence from USEPA and Florida Department of Environmental Protection (FDEP) prior to final design. No residential usage allowed.

5. Decision Document: Record of Decision signed 20 October 1998. Land Use Control Implementation Plan October 1998.

Naval Air Station Jacksonville
Land Use Control Implementation Plan
October 1998
Potential Source of Contamination Forty-one

Description:
Potential Source of Contamination (PSC) 41 consisted of five 50 foot by 50 foot unlined sludge drying beds. The beds were used for the domestic wastewater treatment plant, which included the effluent of the industrial wastewater treatment plant. The base of these beds were underlain with 7 inches of sand, 3 inches of fine gravel and six to twelve inches of course gravel. Each bed was surrounded by a cinder block containment wall. The beds were excavated, solidified, and consolidated with the soils of PSC 41 in PSC 42.

Location:
Reference: Naval Air Station Jacksonville Site Plan dated 4/01/98

Site Plan coordinate	Northing	Easting
D10	441,229	2,146,173

Land Use Control implemented:
NAS Jacksonville Installation Restoration Manager will coordinate inspections and forward discrepancies to NAS Facilities Officer for correction.
Maintain existing fence which restricts airfield trespassing.
Maintain industrial use.
Groundwater restriction, no water supply wells allowed within the restricted area.
Restrict construction on site which may impact groundwater. Obtain concurrence from USEPA and FDEP prior to design. No residential usage allowed.
Provide worker notification of potential hazard in soil under cover and groundwater.

Objective:
Prevent residential use.

Decision Document:
Record of Decision signed 20 October 1998

Naval Air Station Jacksonville
Land Use Control Implementation Plan
October 1998
Potential Source of Contamination Forty-two

Description:
Potential Source of Contamination (PSC) 42 is a polishing pond used to complete treatment of industrial wastewater from the wastewater treatment plant. The pond, serpentine in shape, allowed metals to settle out of the effluent prior to discharge to the St. Johns River. PSC 42 had a surface area of 3.8 acres and an average total depth of 7.3 feet with about 3.5 feet of water and 1.5 feet of sludge. The pond was constructed of an unlined earthen dam. The underlying sediments consisted of 75 feet of sand and sandy clay. Surface water drains to the northeast towards the St. Johns River. The groundwater flow in the surficial aquifer is generally towards the St. Johns River. The pond was solidified in place in 1995, along with the solidified material from PSC 41, PSC 43, and building 101.

Location:
Reference: Naval Air Station Jacksonville Site Plan dated 4/01/98

Site Plan coordinate	Northing	Easting
B10	441,229	2,148,173
C10	441,229	2,147,173
B11	442,229	2,148,173
C11	442,229	2,147,173

Land Use Control implemented:
NAS Jacksonville Installation Restoration Manager will coordinate inspections and forward discrepancies to NAS Facilities Officer for correction.
Maintain soil cover over solidified material
Maintain existing fence which restricts airfield trespassing.
Maintain industrial use.
Groundwater restriction, prevent direct contact with groundwater.
Restrict construction on site. Workers must be notified that contamination exists and OSHA regulations apply if excavation activities are proposed on the site. Obtain concurrence from USEPA and FDEP prior to design. No residential usage allowed.

Objective:
Prevent residential use.

Decision Document:
Record of Decision signed 20 October 1998

Naval Air Station Jacksonville
Land Use Control Implementation Plan
October 1998
Potential Source of Contamination Forty-three

Description:
Potential Source of Contamination (PSC) 43 contained four sludge drying beds for the industrial wastewater treatment plant. Each bed was approximately 15 feet by 18 feet with a concrete retaining wall. The beds were unlined and had a 12 inch sand layer with a ten inch gravel layer on the bottom. Leachate was returned to the industrial wastewater treatment plant. The material was excavated and solidified. Solidified material from PSC 43 was initially staged with the solidified material from PSC 41, and later consolidated with the solidified material at PSC 42.

Location:
Reference: Naval Air Station Jacksonville Site Plan dated 4/01/98

Site Plan coordinate	Northing	Easting
D10	441,229	2,146,173

Land Use Control implemented:
NAS Jacksonville Installation Restoration Manager will coordinate inspections and forward discrepancies to NAS Facilities Officer for correction.
Maintain existing fence which restricts airfield trespassing.
Maintain industrial use.
Groundwater restriction, no water supply wells allowed within the restricted area.
Restrict construction on site which may impact groundwater. Obtain concurrence from USEPA and FDEP prior to design. No residential usage allowed.
Provide worker notification of potential hazard in groundwater.

Objective:
Prevent residential use.

Decision Document:
Record of Decision signed 20 October 1998