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RECORD OF DECISION FOR OPERABLE UNIT 9 (OU 9) SITE 59 NAS CECIL FIELD FL
3/12/2008
TETRA TECH NUS INC

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-94-D-0888

Record of Decision
Operable Unit 9, Site 59

Naval Air Station
Cecil Field
Jacksonville, Florida

Contract Task Order 0359

March 2008

NAVFAC
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

RECORD OF DECISION
OPERABLE UNIT 9, SITE 59

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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CONTRACT TASK ORDER 0359

MARCH 2008

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This document that describes the Record of Decision for Operable Unit 9, Site 59, at Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc
ARAR	Applicable or relevant and appropriate requirement
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of concern
CSF	Cancer slope factor
CTO	Contract Task Order
CWA	Clean Water Act
DDI	Due Diligence Investigation
DHC	*Dehalococcoides*
DPT	Direct-push technology
EBS	Environmental Baseline Survey
EE	Envirodyne Engineers
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facility Agreement
FS	Feasibility Study
ft^2	Square feet
GCTL	Groundwater Cleanup Target Level
G&M	Geraghty & Miller
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IR	Installation Restoration
JAA	Jacksonville Aviation Authority
JEDC	Jacksonville Economic Development Commission
JETC	Jet Engine Test Cell
kg	Kilograms

LUC	Land use control
MCL	Maximum Contaminant Level
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
µg/L	Micrograms per liter
NAAQS	National ambient air quality standards
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Contingency Plan
ND	Not detected
NFA	No further action
NPL	National Priorities List
NPW	Net present worth
O&M	Operation and maintenance
ORC	Oxygen-releasing compound
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization detector
POL	Petroleum, oil, and lubricant
PRE	Preliminary Risk Evaluation
PRG	Preliminary Remediation Goal
RAB	Restoration Advisory Board
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TBC	To be considered

TCE	Trichloroethene
TCL	Target compound list
TCLP	Toxicity characteristic leaching procedure
TOC	Total organic carbon
TRPH	Total recoverable petroleum hydrocarbons
TSDF	Treatment, storage, and disposal facility
TtNUS	Tetra Tech NUS, Inc.
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile organic compound
yd^3	Cubic yards

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Operable Unit (OU) 9, Site 59, consists of the contaminated groundwater identified at in the Building 324/Hangar 1845 area of Naval Air Station (NAS) Cecil Field, Jacksonville, Florida [United States Environmental Protection Agency (U.S. EPA) ID FL5 170 022 474]. NAS Cecil Field is subject to the Base Realignment and Closure law of 1993. Site 59 is located in the Main Base area of NAS Cecil Field, near the end of the north-south runways.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for contaminated groundwater at OU 9, Site 59 at NAS Cecil Field. The Site 59 remedial action was chosen by the Navy and U.S. EPA in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 Code of Federal Regulations (CFR) §300]. This decision document was prepared in accordance with U.S. EPA decision document guidance (1999). This decision is based on the Administrative Record file for the site, which is located at the Former Memorial Chapel, 6112 New World Avenue, Cecil Commerce Center, Jacksonville, Florida, 32221. The United States Department of the Navy (hereinafter the Navy) and U.S. EPA Region 4 issue this Record of Decision (ROD) (jointly). The Florida Department of Environmental Protection (FDEP) concurs with the selected remedy.

1.3 ASSESSMENT OF THE SITE

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

1.4 DESCRIPTION OF THE SELECTED REMEDY

OU 9, Site 59 is part of a comprehensive environmental investigation and cleanup currently being performed at NAS Cecil Field under CERCLA authority pursuant to the Federal Facility Agreement (FFA) for the former NAS Cecil Field dated October 23, 1990. This ROD addresses the groundwater at OU 9, Site 59. The selected remedy eliminates unacceptable exposure to groundwater at Site 59 containing

trichloroethene (TCE) at concentrations greater than the FDEP Groundwater Cleanup Target Level (GCTL) and U.S. EPA Maximum Contaminant Level (MCL).

The remediation of OU 9, Site 59 will not adversely impact the reasonably anticipated future land use of the site, which involves aviation-related industrial activities. The selected remedy for OU 9, Site 59 groundwater includes in-situ biological treatment of TCE Hot Spots, natural attenuation of the remaining portions of the TCE Plumes, land use controls (LUCs) that will prevent use of the surficial aquifer groundwater, and groundwater monitoring.

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

The major components of the selected remedy are as follows:

- In-situ biological treatment of TCE Hot Spots using focused groundwater recirculation systems to inject an electron donor compound (sodium lactate), a pH buffer (sodium bicarbonate), and a bacterial culture [*Dehalococcoides* (DHC)] within the TCE Hot Spots to promote their anaerobic biodegradation.

- Natural attenuation of the less concentrated areas of the TCE Plumes, which would rely on naturally occurring processes in the aquifer to reduce concentrations of TCE.

- Monitoring of several wells within and downgradient of the TCE Plumes and the TCE hot spots to evaluate decreases in COC concentrations that may result from in-situ treatment and/or natural attenuation.

- LUCs, including deed restrictions, will be implemented to prevent use of the surficial aquifer groundwater. Periodic inspections will be conducted to verify the continued implementation of the LUCs, which will remain applicable during Navy and subsequent ownership of the site.

The Navy shall prepare in accordance with U.S. EPA guidance and submit to the U.S. EPA and FDEP for review and approval (pursuant to those Primary Document review procedures stipulated in the FFA) a LUC Remedial Design (RD) as well as all other post-ROD documents as specified in that agreement and in the January 16, 2004, Department of Defense/U.S. EPA Principles and Procedures for LUCs and Other Post-ROD Actions (LUC Principles).

1.5 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, is cost-effective, and complies with federal and State requirements that are legally applicable or relevant and appropriate to remedial action. The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at this site and satisfies the preference for treatment as a principal element. Of those alternatives that are protective of human health and the environment and comply with ARARs, the selected remedy meets the threshold criteria and provides the best balance of trade-offs in terms of the balancing and modifying criteria. Because this remedy will result in contaminated groundwater remaining on site, LUCs will be instituted to prevent groundwater use and to ensure that RAOs are being achieved. The remedy will result in hazardous substances, pollutants, or contaminants remaining on site at levels that do not allow for unlimited use and unrestricted exposure; therefore, in accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of remedial action, and every 5 years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

1.6 ROD DATA CERTIFICATION CHECKLIST

The information required to be included in the ROD is summarized on Table 1-1. These data are presented in Section 2.0: Decision Summary of this ROD. Additional information, if required, can be found in the Administrative Record file for the former NAS Cecil Field.

1.7 AUTHORIZING SIGNATURES

Jim R. Ferro

Jim R. Ferro, P.E.
Director
BRAC Program Management Office Southeast

March 17 2008
Date

Franklin E. Hill
Director
Superfund Division
U.S. EPA Region 4

Date 4/29/05

TABLE 1-1

DATA CERTIFICATION CHECKLIST
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Information	ROD Reference
Chemicals of concern (COCs) and their concentrations	Section 2.5.2, page 2-7; Figures 2-4 to 2-8; Appendix B
Baseline risk represented by the COCs	Section 2.6, pages 2-8 and 2-9
Cleanup goals established for the COCs	Section 2.7, page 2-9
Disposition of source materials constituting principal threat	Not applicable
Current and reasonably anticipated future land use scenario used for risk assessment	Section 2.5.3, page 2-8
Potential land uses available at the sites as a result of the selected remedy	Section 2.11.4, pages 2-19 and 2-20
Estimated capital, operating and maintenance (O&M), and net present worth (NPW) costs of selected remedy. Discount rate used and timeframe over which these costs are projected	Section 2.11.3, page 2-19; Appendix C
Key factors that led to the selection of the remedy	Section 2.11.1, page 2-15

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

OU 9, Site 59 is located within the boundaries of the former NAS Cecil Field (U.S. EPA ID No. FL5 170 022 474), which is located 14 miles southwest of Jacksonville, Florida, as shown on Figure 2-1. The majority of Cecil Field is located within Duval County and the southernmost part of the Facility is located in Clay County. NAS Cecil Field was established in 1941 and provided facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operation forces as designated by the Chief of Naval Operations. Since the closure of NAS Cecil Field in September 1999, most of the Facility has been transferred to the Jacksonville Port Authority (now Jacksonville Aviation Authority) and the City of Jacksonville. According to the reuse plan, the Facility will have multiple uses but will be used primarily for aviation-related activities.

OU 9, Site 59 consists of the contaminated groundwater identified in the Building 324/Hangar 1845 and Building 815 Wash Rack Area. As shown on Figure 2-1, Site 59 is located in the Main Base area of NAS Cecil Field, near the northern end of the north-south runways. The majority of the Site 59 area is paved, with a concrete flightline apron that covers the eastern portion of the site, and buildings and parking lots that cover most of the remainder of the site (see Figure 2-2). Facilities associated with Site 59 include Buildings 324, 334, 339, 811, 814, 815, 837LN, 885, and 1845, two sanitary sewer lift stations (LS-1 and LS-2), an oil-water separator associated with Building 334 (334-OW), and Potential Source of Contamination (PSC) 56, Stormwater Retention Pond.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The first environmental studies for the investigation of waste handling and/or disposal sites at NAS Cecil Field were conducted between 1983 and 1985 [Geraghty and Miller (G&M), 1985]. These studies were followed in 1985 by an Initial Assessment Study (IAS) [Envirodyne Engineers (EE), 1985]. A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed in 1988 [Harding Lawson Associates (HLA), 1988].

NAS Cecil Field was placed on the National Priorities List (NPL) by the U.S. EPA in December 1989. An FFA was signed for NAS Cecil Field by the Navy, U.S. EPA, and the FDEP in 1990. Pursuant to the FFA, the Navy has conducted remedial investigations and response actions under CERCLA authority. OU 9 is one of 12 OUs that are included in the FFA to be addressed under the CERCLA program. A Hazardous and Solid Waste Amendments (HSWA) permit was issued to the Navy by FDEP on October 13, 1996. The HSWA permit was renewed by FDEP on August 25, 2000 and is still in effect. CERCLA response

obligations and RCRA corrective action obligations at NAS Cecil Field are being integrated through implementation of the FFA such that activities covered by the FFA will achieve compliance with CERCLA, applicable sections of RCRA, and all applicable or relevant and appropriate federal and state laws and regulations, to the extent required by Section 121 of CERCLA, 42 U.S.C. Section 9621. Therefore, CERCLA remedial actions selected, implemented, and completed under the FFA will be protective of human health, welfare, and the environment such that further corrective action under RCRA, as amended, will not be required. There have been no cited violations under federal or State environmental law or any past or pending enforcement actions pertaining to the cleanup of Site 59.

2.2.1 Site History

Building 324 was constructed in 1989 as a one-story sheet metal building on a concrete slab. According to the 1994 Environmental Baseline Survey (EBS), the building was periodically used by a private contractor for engine maintenance activities [ABB Environmental Sciences (ABB-ES), 1994]. Hazardous material storage lockers were located on the northwestern side of the building. The contents of the lockers were unknown, but no indications of releases were noted in the EBS. Hazardous materials that were reportedly used at the facility included paint, paint remover, and corrosion preventative chemicals.

Buildings 334, 339, and 811 and 334-OW were part of the Jet Engine Test Cell (JETC) facility at which jet engines were mounted onto test racks inside the buildings and powered for testing. Buildings 334 and 339 were built in 1959, and Building 811 was built in 1975. Engine testing results were monitored in an adjacent control room, and exhaust was discharged to a conical structure and vented outside in accordance with an FDEP air emissions permit.

Building 815, a concrete aircraft hangar built in 1970, includes a two-story administrative office area on the western side and an aircraft maintenance area on the eastern side. Hazardous materials used in the hangar were stored in a small, adjacent building. Building 837LN was a line shack providing office space, equipment storage, and a break area for flight maintenance crews. A hazardous materials locker was at one time located adjacent to the line shack but was subsequently moved to the northern side of Hangar 815. Materials stored in the locker included petroleum products, cleaning compounds, paints, lacquers, and thinner. A waste petroleum, oil, and lubricant (POL) accumulation point was located at the southwestern corner of Building 837LN, and Building 815 was a hazardous waste satellite accumulation area.

Building 1845 is a concrete maintenance hangar built in 1985, with a two-story administrative office area on the western side and an aircraft maintenance area on the eastern side. A hazardous waste satellite accumulation area was located at the southern side of the hangar. Building 885, built in 1980, is a one-

story cinderblock building located west of Building 1845 that was used as a hazardous materials storage locker. No information about the types of materials stored in the locker was included in the 1994 EBS.

2.2.2 Site Investigations

A 1998 Due Diligence Investigation (DDI) conducted in the areas of Buildings 815 and 1845 included identification of areas of environmental impacts and sampling within the current boundaries of Site 59 (Golder Associates, 1998). Elevated concentrations of volatile organic compounds (VOCs) in soil were detected in a sample from soil boring SB-15, located south of Building 1845, near the area of an aircraft wash rack and a former hazardous waste storage area.

At the JETC facility (Buildings 334, 339, 811, and 334-0W), petroleum-related contamination associated with two underground storage tanks (USTs) and one above-ground storage tank used to supply fuel for engine testing is being addressed under the Petroleum Program. Contaminated soil was excavated, and contaminated groundwater in the shallow portion of the surficial aquifer is currently being addressed via an air sparging (AS) system.

Environmental investigations associated with Building 815 involved an electrical transformer on the western side of the building (outside of the Site 59 area) and an aircraft wash rack located north of the building, just south of Building 1845 (within the Site 59 area). A small area of polychlorinated biphenyl (PCB)-contaminated soil was delineated and excavated from the transformer area in 2000, and the excavated soil was properly disposed off site. Following this removal action, soil in this area no longer represents a threat to human health or the environment. In the Building 815 wash rack area, concentrations of naphthalene and total recoverable petroleum hydrocarbons (TRPH) in shallow surficial groundwater exceeded regulatory criteria. The extent of contamination was delineated, and semi-annual monitoring was proposed and approved under the Petroleum Program. However, after 3 years of monitoring, naphthalene concentrations continued to exceed the applicable criterion, and an additional soil investigation was undertaken to evaluate possible soil sources in the area. No soil contamination was detected, and preparation of a Remedial Action Plan (RAP) was recommended.

PSC 56, the stormwater retention pond located southwest of Building 1845, was identified in the areas of Buildings 815 and 1845, based on the DDI (Golder Associates, 1998), which included surface water and sediment sampling within the pond and soil sampling on the southern side of Building 1845. VOCs and inorganic chemicals were detected in sediment from the pond, and VOCs were detected in soil samples. A subsequent investigation was conducted in the area that also included surface water, sediment, and soil sampling. Risks to human health and ecological receptors due to detected concentrations in sediment were determined to be negligible, and no analytes were detected in soil or surface water

samples collected as part of the PSC investigation. Based on these results, no further action was approved for PSC 56 (TtNUS, 2001).

The following investigations and studies have been conducted at OU 9, Site 59 under the Installation Restoration (IR) Program:

- November 2003 – Fifteen temporary wells including five shallow wells screened from 5 to 15 feet below ground surface (bgs) and 10 deep wells screened from 25 to 30 feet bgs were installed, sampled, and analyzed for volatiles, semivolatiles, and metals. TCE was detected at concentrations greater than the FDEP GCTL in several deep (25- to 30-foot) wells. Also in November 2003, a soil investigation was conducted in the Building 324 area (CDM, 2004) to assess potential soil sources based on groundwater data from a DDI conducted by Golder Associates in 2003. Twenty-eight direct push technology (DPT) borings were advanced with continuous soil sampling to the water table (6.5 to 7 feet bgs). Twenty-five soil samples were collected, based on photoionization detector (PID) readings, from depths between 2 and 7 feet bgs. All results were less than the detection limits for VOCs.

- December 2003 – Resampling of two temporary wells installed during the DDI to confirm previous TCE results. Permanent monitoring wells were then installed at the locations of the resampled wells. In January 2004, a groundwater investigation was begun by TtNUS using DPT to evaluate the extent of groundwater TCE contamination in the Building 324 area. During Phase I of this investigation, 37 groundwater samples were collected from 26 locations at depths intervals of 10, 30, 50, and 70 feet bgs and analyzed for VOCs. TCE was detected at concentrations of up to 3,160 micrograms per liter (µg/L) in an area northwest of Building 324. TCE was also detected at concentrations of 1,350 and 2,650 µg/L at the furthest downgradient (southeast) location. TtNUS collected four soil samples in the area northwest of the building (where TCE was detected at 3,160 µg/L) and analyzed them for VOCs. All analytical results were less than detection limits.

- February and March 2004 – The Phase II DPT investigation included the collection of 151 groundwater samples from 42 locations at depths of 15, 30, 50, 60, 70, and 90 feet bgs and refusal (typically about 100 feet bgs). Six existing permanent wells were also sampled and analyzed for VOCs. TCE concentrations greater than the FDEP GCTLs were detected in an area extending from the area northwest of Building 324 to the western side of Hangar 1845. Vertically, TCE exceedances were detected from 30 to approximately 100 feet bgs.

- September 2004 to January 2006 – Remedial Investigation (RI) field activities included installation of 57 permanent monitoring wells and sampling of 60 monitoring wells at 21 locations. Geotechnical soil

samples were collected and aquifer tests were conducted. The monitoring wells installed during the RI were located upgradient, sidegradient, downgradient, and within the areas where TCE contamination was previously detected. Typically each location included wells screened at four depths (30 feet bgs, 50 feet bgs, 70 or 80 feet bgs, and 100 to 120 feet bgs) to obtain data to aid in vertical delineation of the TCE plume. One monitoring well was also installed within the bedrock zone.

- March and August 2006 – Pilot-scale tests evaluating in-situ bioremediation of TCE groundwater contamination were conducted in the areas of monitoring well clusters CEF-59-003 and CEF-59-006, respectively. In-situ bioaugmentation [injection of an inoculum of *Dehalococcoides (DHC) ethenogenes* bacteria] and reductive dehalogenation (enhanced by using injections of sodium lactate as an electron donor compound) using a groundwater recirculation system was tested. The March 2006 test provided information regarding the impact of chemical addition on aquifer geochemistry but was inconclusive as to the effectiveness of contaminant reduction because baseline sampling showed that TCE concentrations in this area decreased significantly from the RI and were less than 300 µg/L prior to pilot test startup. The pilot test was relocated in August 2006 to CEF-59-006 where TCE concentrations remained greater than 300 µg/L. Results indicated a significant reduction in TCE concentrations from a maximum of 3,980 µg /L to not detected (ND).

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Navy has performed public participation activities in accordance with CERCLA and to the extent practicable the NCP throughout the CERCLA site cleanup process. Public notices of the availability of the Proposed Plan for Site 59(TtNUS, 2007) were placed in the *Florida Times-Union* on June 4, 2007. A 30-day comment period was held from June 4 through July 3, 2007. The results of the RI (ABB-ES, 1997), the preliminary risk evaluation (PRE), the remedial alternatives of the FS (TtNUS, 2006a), and the preferred alternatives of the Proposed Plan (TtNUS, 2006b) were also presented and discussed at a Restoration Advisory Board (RAB) meeting held on June 6, 2006, during which comments were solicited from the community. Public comments and the responses to these comments are presented in the Responsiveness Summary that is provided in Appendix A.

Documents pertaining to OU 9, Site 59 are available to the public at the Information Repository located at the Former Memorial Chapel, 6112 New World Avenue, Cecil Commerce Center, Jacksonville, Florida 32221 [Telephone (904) 777-1900]. This ROD will become part of the Administrative Record File [NCP §300.825(a)(2)].

2.4 SCOPE AND ROLE OF OPERABLE UNIT

The environmental concerns at NAS Cecil Field are complex. As a result, work at the 25 sites in the Installation Restoration (IR) Program has been organized into 12 OUs. The IR Program at NAS Cecil Field is governed by the FFA and Site Management Plan, and cleanup activities are being performed under CERCLA, except at those sites subject to the State of Florida Underground Storage Tank Corrective Action Program.

This ROD the documents the selected remedy for OU 9, Site 59. Final RODs have been approved for OU 1 through OU 4; OU 5, Sites 14 and 49; OU 6 through OU 8; OU 9, Sites 36 and 37 and 57, and 58; OU 10, Sites 21 and 25; OU 11, Site 45; and OU 12, Sites 32, 42, 44, and Old Golf Course. A draft ROD has been submitted for OU 5, Site 15.

Investigations at OU 9, Site 59 indicated the presence of groundwater contamination from past operating practices. This contamination would pose an unacceptable human health risk if groundwater was to be used for drinking purposes. No previous actions have been taken in response to the contamination at Site 59. The remedy documented in this ROD will achieve the RAOs for OU 9, Site 59, as listed in Section 2.7. Implementation of this remedy will allow industrial/commercial reuse of the site, as indicated for the area in the NAS Cecil Field Master Plan, which in accordance with the overall cleanup strategy for Cecil Field of restoring the facility for beneficial reuse.

2.5 SUMMARY OF SITE CHARACTERISTICS

Physical characteristics of OU 9, Site 59 and nature and extent of contamination are discussed in further detail Sections 4.0 and 5.0 of the RI Report (TtNUS, 2006). These site characteristics are summarized in the following paragraphs.

2.5.1 Surface Hydrology, Soil, and Hydrogeology

Surface water runoff in the Site 59 area is collected by the storm sewer system. Grass-lined drainage ditches receive runoff along Loop Road near Building 324. Runoff from other areas of the site is generally collected by below-ground storm sewer pipes that discharge to a flightline outfall on the eastern side of the north-south runways. A stormwater retention pond located in the southwestern portion of the site, southwest of Hangar 1846, was investigated as PSC 56. The pond received discharges from floor drains in Hangar 1845 and from a nearby oil/water separator. No further action was recommended based on the results of the PSC investigation of the stormwater pond (TtNUS, 2001).

Soils at Site 59 and the surrounding areas are classified as Boulogne, Arents, Sapelo, and urban land. Within the Site 59 area, Arents soils generally occur around Hangar 1845, Boulogne soils occur generally south of Loop Road and east of Flightline Road, Sapelo soils generally occur around Building 324, and urban land soils occur slightly south of Hangar 1845. Arents soils are described as nearly level, poorly drained, generally sandy soils that have been reworked by man-made, earth-moving activities (ABB-ES, 1996). Boulogne fine sands are nearly level, poorly drained soils that are located in flatwoods and formed in thick sandy marine sediments (USDA, 1998). Sapelo fine sand is a nearly level, poorly drained soil in broad flatwood areas. Urban land soils occur in areas that are 85 percent or more covered by streets, buildings, parking lots, and other man-made structures (ABB-ES, 1996).

Three water bearings systems are present beneath NAS Cecil Field, including, in descending order, the surficial aquifer system, the intermediate aquifer and confining units, and the Floridan Aquifer system. The surficial aquifer has been the main focus of investigations at Site 59. The majority of surficial sediments encountered during drilling at Site 59 included fine to very fine sands with varying minor amounts of silt. Isolated, discontinuous, relatively thin clay layers (less than 5 feet, usually less than 1 or 2 feet) were encountered within the top 40 feet. Starting at approximately 90 feet bgs, but deeper at some locations, the clay content increased significantly. In approximately 20 to 30 feet above bedrock, sandy clay and clayey sand interspersed with sand layers were encountered, all of varying thicknesses and generally localized in extent. The water table is unconfined beneath the site and may range between 3 and 8 feet bgs during the year depending on rainfall events.

2.5.2 Nature and Extent of Contamination

The horizontal and vertical extent of groundwater contamination at Site 59 was defined during the RI in 2004 (see Figures 2-4 through 2-7). TCE, the only chemical of concern (COC) detected at concentrations greater than GCTLs during the RI, was detected in excess of its FDEP GCTL (3 µg/L) in 17 wells at 12 locations, including seven wells in the 30-foot zone, six wells in the 50-foot zone, four wells in the 70- to 80-foot zone, and in the TOR well at location 004. TCE was not detected in the bedrock well installed at location 004. The maximum detected concentration of TCE was 1,810 µg/L in well NG-12D (50-foot well at location 006).

Post-RI verification sampling in 2006 showed that TCE concentrations had changed significantly at several wells, as follows:

CEF-59-003-28 - from 399 to 29.3 µg/L
CEF-59-003-53 - from 93.9 to 10.7 µg/L
CEF-NG-02D - from 477 to 911 µg/L
CEF-NG-12D - from 1,810 to 3,980 µg/L (then to 2,160 µg/L during the pilot study)

CEF-59-003-78 - from 1,100 to 167 µg/L

CEF-59-004-78 - from 1,670 to 657 µg/L

CEF-59-004-112 - from 373 µg/L to non-detect (at a detection limit of 0.5 µg/L)

Based on RI and post-RI data, TCE exceedances occur at two locations at the 30-foot depth; one from just north of Building 324, centered west of Building 818, and extending southeast to Building 1845, and one oriented approximately east-west between Buildings 1845 and 815. The northern plume covers approximately 82,000 square feet (ft^2), and the southern plume covers approximately 42,000 ft^2. At the 50-foot depth, the northern plume has a more east-west orientation, but it is still centered just west of Building 818 and covers an area of approximately 84,000 ft^2. The position of the southern plume shifts from between Buildings 1845 and 815 to encompassing most of Building 1845 and extending to Building 815, and the orientation changes from east-west to northwest-southeast. The area covered by this plume is approximately 115,000 ft^2. At the 70- to 80-foot depth, the plumes coalesce into a single area extending from southeast of Building 324 to within the Building 1845 foot print, with a northwest-southeast orientation, and the center shifts toward the northwestern corner of Building 1845. This plume covers approximately 150,000 ft^2. There is no plume in the TOR zone.

A summary of analytical results is provided in Appendix B.

2.5.3 Current and Potential Future Land and Resource Uses

Site 59 is currently used by the Jacksonville Aviation Authority (JAA) for aviation-related industrial/commercial activities, and continuation of such use is the reasonably anticipated future use of the site. There are no land use restrictions; however, based on the LUC portion of the selected remedy, all uses of groundwater from the surficial aquifer are prohibited without prior written approval of the Navy, U.S. EPA, and FDEP.

2.6 SUMMARY OF SITE RISKS

A human health Preliminary Risk Evaluation (PRE) was conducted using the RI data to evaluate the potential risks to human receptors from exposure to groundwater at Site 59 in a residential setting. VOCs were detected at concentrations exceeding United States Environmental Protection Agency's (U.S. EPA's) current drinking water standards (U.S. EPA, 2002), FDEP GCTLs (FDEP, 2005), or U.S. EPA Region 9 PRGs (U.S. EPA, 2004). TCE was detected at concentrations greater than its U.S. EPA Maximum Contaminant Level (MCL) and FDEP GCTL. To assess potential risks associated with hypothetical future residential groundwater consumption, the maximum detected concentration of TCE detected during the RI (1,810 µg/L) was compared to its Region 9 PRG. Although TCE concentrations have decreased in some wells, the overall level of contamination has not changed significantly.

Therefore, the risk values established during the RI are still appropriate. The maximum detected concentration of TCE during the RI was 64,643 times greater than its Region 9 PRG. This corresponds to an incremental cancer risk (ICR) of 6.46×10^{-2}, which exceeds U.S. EPA's target risk range of 1.0×10^{-4} to 1.0×10^{-6} and FDEP's target risk of 1.0×10^{-6}. The maximum detected concentration of vinyl chloride (0.68 µg/L) was 34 times greater than its Region 9 PRG. This corresponds to an ICR of 3.4×10^{-5}, which is within U.S. EPA's target range and greater than FDEP's target level. These unacceptable risks due to potential exposure to TCE and vinyl chloride necessitate the implementation of LUCs to prevent groundwater use at the site.

For ecological risk evaluation, a complete exposure pathway to potential receptors is absent at Site 59. A complete exposure pathway typically has three components: a source of contaminants that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for an ecological receptor. At Site 59, because ecological receptors will not come directly in contact with the groundwater and groundwater does not discharge to a nearby surface water body, the groundwater exposure pathway for ecological receptors is not complete. No soil or surface water contamination of concern has been detected. Thus, a route of contaminant exposure to terrestrial species is largely absent. For these reasons, a significant exposure pathway to terrestrial receptors does not exist at Site 59, so further evaluation of ecological risks was not required.

The response action selected in this ROD is necessary to protect the public health or welfare of the environment from actual or threatened releases or hazardous substances into the environment.

2.7 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup goals) for a site and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives described in Section 2.8.

The following RAOs were established for OU 9, Site 59:

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

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

2.7.1 Cleanup Goals

A cleanup goal is the target concentration to which a COC must be reduced within a particular medium of concern to achieve RAOs. The cleanup goal for groundwater at Site 59 was based on chemical-specific ARARs, namely the State of Florida GCTL for TCE, and is as follows:

- TCE: 3 µg/L

For TCE, the FDEP GCTL (3 µg/L) was used because it is more stringent than the U.S. EPA MCL (5 µg/L). which qualifies it as a specific ARAR.

2.8 DESCRIPTION OF REMEDIAL ALTERNATIVES

This section provides a narrative of each alternative evaluated for the remediation of groundwater at OU 9, Site 59. For further information on the remedial alternatives, refer to the Site 59 FS Report (TtNUS, 2007a) and the Proposed Plan (TtNUS, 2007b). As part of the FS, each of the following alternatives was evaluated with respect to the nine criteria outlined in the NCP at 40 CFR 300.430(e)(9)(iii). Section 2.9 summarizes the comparative analysis of alternatives that is documented in the FS.

This ROD has selected Alternative 4A: In-Situ Biological Treatment of TCE Hot Spots, Natural Attenuation, Institutional Controls, and Monitoring. A detailed description of the alternatives evaluated is provided in the Site 59 FS Report (TtNUS, 2007a) and these alternatives are summarized below.

2.8.1 Alternative 1: No Action

Under this alternative, no remedial activities would occur to remove groundwater contamination, and no controls would be implemented to preclude future exposure of human receptors. Although contaminant concentrations would eventually attenuate through natural processes, the expected time frame for groundwater to reach acceptable levels is estimated to be 71 years. No periodic monitoring would be performed to evaluate the effectiveness of these processes toward achieving the cleanup goals or to confirm that no downgradient migration of contaminants had occurred. Under this alternative, the property would be released for unrestricted use.

This alternative would not protect human health and the environment because concentrations of VOCs would remain in groundwater at levels that exceed GCTLs and potential future unacceptable exposure to these concentrations would not be precluded. This alternative would not achieve the RAOs or comply with ARARs. No treatment would be employed in this alternative, and therefore there would be no

reduction in toxicity, mobility, or volume of contaminants. Because no remedial action would take place, including no restrictions on groundwater use, this alternative would not result in any short-term risks and would be very easy to implement. There would be no cost associated with this alternative.

2.8.2 Alternative 2: Natural Attenuation, LUCs, and Monitoring

This alternative would include natural attenuation, LUCs, and groundwater monitoring. Naturally occurring processes such as biodegradation, dilution, dispersion, advection, and adsorption would eventually reduce the concentrations of TCE to its cleanup goal. Dispersion and dilution through aquifer movement and adsorption on soil particles would be the main natural attenuation processes. A long-term groundwater monitoring program would be implemented to evaluate the decrease of TCE concentrations in groundwater and to detect the potential downgradient migration of TCE. Compliance monitoring wells located downgradient of the contaminant plumes (CEF-59-19-33, -51, and -78 and CEF-59-18-105) would be sampled to verify that the plumes are not expanding past these sentinel wells. Samples would be collected quarterly for 1 year, semi-annually for 2 years, and annually thereafter. In addition, LUCs (including enforceable deed restrictions and existing lease provisions) would be required to prohibit the use of surficial aquifer groundwater at the site. Maintenance of this LUC would be addressed in a LUC RD to be submitted to U.S. EPA and FDEP for review and approval (pursuant to those Primary Document review procedures stipulated in the FFA).

This alternative would protect human health because LUCs would preclude direct human exposure to groundwater contamination by restricting use of the aquifer until natural attenuation reduces TCE concentrations to cleanup goals. Monitoring would verify the effects of natural attenuation and ensure that TCE is not migrating. There would be no reduction of contaminant toxicity, mobility, or volume through active treatment, but contaminant toxicity and volume would be reduced through natural attenuation. This alternative would achieve the RAOs and comply with location- and action-specific ARARs over time. Eventual compliance with chemical-specific ARARs (FDEP GCTLs) would also be achieved over time through long-term natural attenuation. There would be minimal short-term risks associated with the performance of groundwater monitoring activities, which would be addressed through appropriate health and safety procedures. Based on modeling results, it is anticipated that cleanup goals would be attained within 71 years of implementing this alternative. The activities for this alternative would be easy to implement. The capital cost, 30-year NPW of O&M costs, and 30-year NPW cost for this alternative are estimated at $79,000, $1,025,000, and $1,104,000, respectively.

2.8.3 Alternative 3: In-Situ Chemical Oxidation of TCE Hot Spots e, Natural Attenuation, LUCs, and Monitoring

This alternative would include installation and operation of focused groundwater recirculation systems for the in-situ chemical oxidation of TCE Hot Spots Nos. 2 and 3. The natural attenuation, LUCs, and monitoring components would be similar to those of Alternative 2.

The groundwater recirculation systems treating the TCE Hot Spots would each include several pairs of recovery and injection wells and a pumping system to establish subsurface recirculation of groundwater for the purpose of conveying and dispersing a mild chemical oxidant such as catalytically complexed sodium percarbonate ($2Na_2CO_3.3H_2O_2$, marketed as RegenOx™). For TCE Hot Spot No. 2, one focused groundwater recirculation system consisting of 10 pairs of recovery and injection wells to a depth of approximately 50 feet bgs with a 30-gallons per minute (gpm) groundwater pumping system would be installed. Approximately 1,500 pounds of complexed sodium percarbonate would be used over the 6-month estimated operation time of the system. For TCE Hot Spot No. 3, one focused groundwater recirculation system consisting of 14 pairs of recovery and injection wells to a depth of approximately 75 feet bgs with a 42-gpm groundwater pumping system would be installed. A total of approximately 2,700 pounds of complexed sodium percarbonate would be used over the 6-month estimated operation time of the system.

This alternative would protect human health because it would actively reduce groundwater contamination in the surficial aquifer and thus reduce the risk from any future direct exposure. This alternative would achieve the RAOs and comply with chemical- and action-specific ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 9 pounds of TCE would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the groundwater recirculation systems and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on operating experience with similar systems, it is estimated that Alternative 3 would remove the TCE Hot Spots within approximately 6 months. Based on modeling conducted as part of the FS, it is estimated that Alternative 3 would attain the cleanup goals through natural attenuation within an additional 56 years, for a total remediation time of approximately 57 years. The activities for this alternative would be relatively easy to implement. The capital cost, 5-year NPW of O&M costs, and 5-year NPW cost for this alternative are estimated at $1,497,000, $1,068,000, and $2,565,000, respectively.

2.8.4 Alternative 4A: In-Situ Biological Treatment of TCE Hot Spotse, Natural Attenuation, LUCs, and Monitoring

This alternative would include focused groundwater recirculation systems to inject an electron donor compound (sodium lactate), a pH buffer (sodium bicarbonate), and a bacterial culture [*Dehalococcoides* (DHC)] within the TCE Hot Spots to promote their anaerobic biodegradation. The natural attenuation, LUCs, and monitoring components would be similar to those of Alternative 2.

The focused groundwater recirculation systems would be identical to those of Alternative 3, except for the type and quantities of chemical injected. TCE Hot Spot No. 2, located in the 50-foot zone, would be treated with a 30-gpm recirculation system including 10 pairs of recovery and injection wells and using 7,650 pounds of sodium lactate, 10,300 pounds of sodium bicarbonate, and 61 liters of DHC culture. TCE Hot Spot No. 3, in the 70-to-80-foot zone, would be treated with a 42-gpm recirculation system. The system would include 14 pairs of recovery and injection wells and use of 13,420 pounds of sodium lactate, 18,100 pounds of sodium bicarbonate, and 107 liters of DHC culture.

This alternative would protect human health because it would actively reduce groundwater contamination in the surficial aquifer and thus reduce the risk from any future direct exposure. This alternative would achieve the RAOs and comply with chemical- and action-specific ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 10 pounds of TCE would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the groundwater recirculation systems and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on operating experience with similar systems, it is estimated that Alternative 4A would remove the TCE Hot Spots within approximately 1 year. Based on modeling conducted as part of the FS, it is estimated that Alternative 4A would attain the cleanup goals through natural attenuation within an additional 56 years, for a total remediation time of approximately 57 years. The activities for this alternative would be relatively easy to implement, and additives introduced into the Hot Spots would further promote biological natural attenuation in the plume areas over time. The capital cost, 5-year NPW of O&M costs, and 5-year NPW cost for this alternative are estimated at $1,242,000, $1,003,000, and $2,245,000, respectively.

2.8.5 Alternative 4B: In-Situ Biological Treatment of TCE Hot Spots and Fringes, Natural Attenuation, LUCs, and Monitoring

This alternative would include focused groundwater recirculation systems to inject an electron donor compound (sodium lactate), a pH buffer (sodium bicarbonate), and a bacterial culture (DHC) within the

TCE Hot Spots and Fringesto promote their anaerobic biodegradation. The natural attenuation, LUCs, and monitoring components would be similar to those of Alternative 2.

The focused groundwater recirculation systems would be similar to those of Alternative 4A but would be larger. TCE Hot Spot No. 2 would be treated with a 6-gpm recirculation system in the 30-foot zone and a 159-gpm system in the 50-foot zone. The 30-foot system would include two pairs of recovery and injection wells and use 1,850 pounds of sodium lactate, 2,500 pounds of sodium bicarbonate, and 15 liters of DHC culture. The 50-foot system would include 53 pairs of recovery and injection wells and use 49,100 pounds of sodium lactate, 56,650 pounds of sodium bicarbonate, and 333 liters of DHC culture. TCE Hot Spot No. 3, in the 70-to-80-foot zone, would be treated with a 165-gpm recirculation system. The system would include 55 pairs of recovery and injection wells and use of 73,400 pounds of sodium bicarbonate and 432 liters of DHC culture.

This alternative would protect human health because it would actively reduce groundwater contamination in the surficial aquifer and thus reduce the risk from any future direct exposure. This alternative would achieve the RAOs and comply with chemical-and action-specific ARARs through treatment. There would be a significant reduction of contaminant toxicity, mobility, or volume through treatment, and an estimated 15.3 pounds of TCE would be irreversibly and permanently removed from the groundwater. There would be some short-term risks associated with the installation and O&M of the groundwater recirculation systems and with the performance of groundwater monitoring activities. However, these risks would be addressed through appropriate health and safety procedures. Based on operating experience with similar systems, it is estimated that Alternative 4A would remove the TCE Hot Spots within approximately 1 year. Based on modeling conducted as part of the FS, it is estimated that Alternative 4A would attain the cleanup goals through natural attenuation within an additional 56 years, for a total remediation time of approximately 57 years. The activities for this alternative would be relatively easy to implement. The capital cost, 5-year NPW of O&M costs, and 5-year NPW cost for this alternative are estimated at $4,412,000, $2,454,000, and $6,866,000, respectively.

2.9 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section summarizes the comparison of each of the remedial alternatives with respect to the nine remedy selection criteria outlined in the NCP at 40 CFR 300.430(e)(9)(iii). These criteria are categorized as threshold, primary balancing, and modifying and are further explained in Table 2-1. Further information on the detailed comparison of remedial alternatives is presented in the Site 59 FS Report (TtNUS, 2007a). Table 2-2 presents a summary comparison of the remedial alternatives with respect to the nine criteria.

2.10 PRINCIPAL THREAT WASTES

The NCP at 40 CFR 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as reservoir for migration of contamination to groundwater, surface water, or air, or that acts as a source for direct exposure. Although there are no source materials constituting principal threats wastes at Site 59, the selected remedy will partially satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element through the in-situ treatment of contaminated groundwater, which is expected to irreversibly and permanently remove 10 pounds of COCs.

2.11 SELECTED REMEDY

2.11.1 Summary of Rationale For Remedy Selection

The goals of the selected remedy are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by Site 59 groundwater and to meet the ARARs. Based on consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and U.S. EPA, FDEP, and public comments, Alternative 4A was selected to address groundwater contamination at OU 9, Site 59.

This remedy was selected for the following reasons:

- It will meet the RAOs and cleanup goals and comply with chemical- and action-specific ARARs.

- It will achieve risk reduction through active treatment and mobility reduction and will effectively preclude by legally enforceable deed provisions future access to contaminated groundwater until the cleanup goal is met.

- Alternative 4A is expected to be slightly more effective than Alternative 3 because biological treatment is likely to remove the TCE Hot Spots more completely and provide a post-treatment environment much more favorable to continued natural attenuation.

2.11.2 Remedy Description

The remedy, as illustrated on Figure 2-9, consists of four major components: (1) in-situ biological treatment of TCE Hot Spots, (2) natural attenuation, (3) LUCs, and (4) groundwater monitoring. For TCE Hot Spots, the Navy will implement active treatment in areas of contaminated groundwater with TCE concentrations greater than 300 µg/L. Areas with TCE concentrations less than 300 µg/L will be restored through monitored natural attenuation processes.

2.11.2.1 Component 1: In-Situ Biological Treatment of TCE Hot Spots

This component includes installing and operating focused groundwater recirculation systems for the in-situ biostimulation and bioaugmentation of TCE Hot Spot Nos. 2 and 3.

The design of the TCE Hot Spot focused groundwater recirculation systems will be based on the results of the pilot-scale study and will be used to convey and disperse an electron donor (sodium lactate) ($NaC_3H_5O_3$) to promote anaerobic biological activity and to inject a culture of DHC or similar bacteria as needed to augment naturally occurring bacteria with a strain suitable for complete degradation of TCE to non-hazardous breakdown products. Sodium bicarbonate ($NaHCO_3$) or a similar buffering agent will be required for pH adjustment. Sodium lactate and sodium bicarbonate will be injected into the recirculating groundwater stream with individual chemical feed systems, each consisting of a mixer-equipped storage tank and manually adjustable chemical feed pumps. The DHC culture will be injected separately in each individual injection well. It is anticipated that the sodium lactate will be fed at a relatively constant but adjustable rate over the anticipated 1-year operation of the biological treatment systems. Approximately half of the sodium bicarbonate will be fed over a 14-day period for initial pH adjustment, and the remainder will be fed at a relatively constant but adjustable rate over the remaining 351 days of operation if determined appropriate. The DHC culture will be batch fed following initial pH adjustment and establishment of favorable anoxic/anaerobic subsurface conditions.

The conceptual design parameters of the in-situ biological treatment systems for the two TCE Hot Spots are summarized as follows:

- TCE Hot Spot No. 2: One focused groundwater recirculation system consisting of 10 pairs of recovery and injection wells will be installed to a depth of approximately 50 feet bgs with a 30-gpm groundwater pumping system. Approximately 7,650 pounds of sodium lactate, 10,300 pounds of sodium bicarbonate, and 61 liters (16.1 gallons) of DHC culture will be used over the 1-year estimated operation time of the system.

- TCE Hot Spot No. 3: One focused groundwater recirculation system will be installed. The system will consist of 14 pairs of recovery and injection wells installed to a depth of approximately 75 feet bgs with a 42-gpm groundwater pumping system. Approximately 13,420 pounds of sodium lactate, 18,100 pounds of sodium bicarbonate, and 107 liters (28.3 gallons) of DHC culture will be used over the 1-year estimated operation time of the system.

2.11.2.2 Component 2: Natural Attenuation

Natural attenuation will rely on naturally occurring processes within the aquifer, mainly dispersion and dilution through aquifer movement and adsorption on soil particles, to reduce the concentrations of TCE. Aquifer conditions would be regularly monitored , as discussed in Section 2.10.2.4, to ensure that concentrations are being adequately reduced through natural processes.

2.11.2.3 Component 3: LUCs

The area to be covered by LUCs is shown on Figure 2-9. The cross-hatched portion of that figure depicts that portion of Site 59 which has already been deed conveyed to the JAA. Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at Site 59 are as follows:

- To prohibit all uses of groundwater from the surficial aquifer underlying Site 59 (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes) unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP;
- To maintain the integrity of any existing or future monitoring or remediation system(s) at the site.

The following generally describes those LUCs that will be implemented across Site 59 (both conveyed and non-conveyed areas) to achieve the aforementioned LUC performance objectives:

- The LUC provisions in the current lease with JAA to prohibit use of groundwater will continue to be enforced until all the property encompassing Site 59 is transferred.

- For the un-conveyed portion of Site 59, a deed of conveyance will be executed at the time of property transfer that prohibits all uses of groundwater from the surficial aquifer underlying Site 59 (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes) unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. The deed will also prohibit interference with the integrity of any existing or future groundwater monitoring or remediation system(s) without prior Navy, U.S. EPA, and FDEP approval.

- For the already conveyed portion of Site 59, the Navy will ensure that a legally enforceable instrument under Florida law is recorded by the JAA (as current owner of those parcels previously transferred by the Navy) that similarly prohibits all uses of groundwater from the surficial aquifer underlying such parcel(s) (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes) unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. That instrument will also prohibit interference with the integrity of any existing or future groundwater monitoring or remediation system(s) without prior Navy, U.S. EPA, and FDEP approval.

- Notice of the Navy's application of LUCs to the site, such as the deed of conveyance or other legally enforceable instruments, will be provided to those local regulatory agencies that could assist the Navy with their future enforcement.

LUCs will be implemented and maintained by the Navy until concentrations of hazardous substances in groundwater are at such levels to allow for unrestricted use and unlimited exposure. The Navy or any subsequent owners shall not modify, delete, or terminate any LUC without U.S. EPA and FDEP concurrence. The LUCs will be maintained until the concentrations of hazardous substances in groundwater beneath the site have been reduced to levels that allow for unrestricted use and unlimited exposure.

The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs described in this ROD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedy integrity. Should any LUC remedy fail, the Navy will ensure that appropriate actions are taken to reestablish the remedy's protectiveness and may initiate legal action to either compel action by a third party(ies) and/or to recover the Navy's costs for remedying any discovered LUC violation(s).

The LUC implementation actions including monitoring and enforcement requirements will be provided in a LUC RD that will be prepared by the Navy as the LUC component of the overall RD. Within 90 days of ROD signature, the Navy shall prepare and submit to U.S. EPA and FDEP for review and approval (pursuant to those Primary Document review procedures stipulated in the FFA) the LUC RD for Site 59 that shall contain implementation and maintenance actions, including periodic inspections. The Navy will maintain, monitor, report on, and enforce the LUCs according to the LUC RD. LUCs have been developed in accordance with the Principles and Procedures for Specifying, Monitoring, and Enforcement of Land Use Controls and Other Post-ROD Actions, per a letter dated October 2, 2003 from Raymond F.

DuBois, Deputy Under Secretary of Defense (Installations and Environment), to Hon. Marianne Lamont Horinko, Acting Administrator, U.S. EPA.

2.11.2.4 Component 4: Groundwater Monitoring

Monitoring will consist of regularly collecting and analyzing groundwater samples from within and downgradient of the TCE Plumes and TCE Hot Spots to assess the performance of in-situ biological treatment and natural attenuation and to evaluate potential TCE migration. The sampling program will be established in the Site 59, OU9 Groundwater Remedial Design. The number of wells to be sampled, sampling frequency, and parameters to be analyzed may change over time dependent on monitoring well results with the concurrence of U.S. EPA, and FDEP.

Based on the results of preliminary groundwater modeling, three downgradient wells (CEF-59-19-33, CEF-59-19-51, and CEF-59-19-78) were designated as “sentinel” wells. If analysis of the groundwater collected from these sentinel wells indicates that the cleanup goals have been exceeded, the following step-by-step actions will be taken as agreed by the BCT:

1. The sentinel well(s) where the exceedance(s) was(were) detected will be resampled to verify the exceedance(s).

2. If the exceedance(s) is(are) verified, additional hydrogeological modeling will be performed to determine a revised predicted expansion of the contaminant plume(s) based on the new monitoring data.

3. If the revised expansion of the contaminant plume(s) predicted by the additional modeling is such that it would be of concern, contingency remedies will be developed.

As agreed to by the BCT, if the results of two consecutive sampling events indicate that the cleanup goals have been met, the site will be considered to be fully remediated and site closeout procedures will be initiated.

2.11.2.5 Contingency Remedy

If monitoring results for Site 59 show that contaminated groundwater has migrated to an unacceptable degree as determined by sentinel well sampling results or that in-situ biological treatment does not progress as expected and/or groundwater contamination is not attenuating as expected, then additional active remedial measures will be evaluated and may be implemented. Potential contingency remedial

measures could include in-situ biological treatment of larger portions of the contaminated groundwater plumes, in-situ oxidation, or other active remedial efforts.

2.11.3 Summary of Estimated Remedy Costs

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

- Capital cost: $1,242,000
- 30-Year NPW of O&M costs: $1,003,000
- 30-Year NPW cost: $2,245,000

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

2.11.4 Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy are summarized as follows:

- A significant reduction in TCE Hot Spot concentrations within 1 year.

- Within 57 years, the groundwater cleanup goals will be attained, and the surficial aquifer will become available for unrestricted use.

- LUCs will be required to prevent use of the surficial aquifer at Site 59. These LUCs will be maintained until the concentrations of hazardous substances in groundwater are at levels that allow for unrestricted use and unlimited exposure.

- Site 59 is currently used for aviation-related activities and will probably continue to be used for this purpose in the foreseeable future. It is anticipated that the reuse of NAS Cecil Field, including Site 59, will be beneficial to the Jacksonville area and expand the tax base of Duval County.

2.12 STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the selected remedy must be protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the

maximum extent practicable. The following sections discuss how the selected remedy meets these statutory requirements.

2.12.1 Protection of Human Health and the Environment

The selected remedy, Alternatives 4A, will protect human health and the environment. By actively removing the areas of maximum contamination (TCE Hot Spots), in-situ biological treatment will significantly reduce the expansion of the Chlorinated VOC Plumes. In addition, natural attenuation will eventually reduce concentrations of COCs in less contaminated areas of the plumes to cleanup goals through natural processes. This will significantly reduce risks from exposure to contaminated groundwater and will provide protection to future human receptors who may use this aquifer as a potable water source.

LUCs to restrict use of surficial aquifer groundwater will protect human health and the environment during the remedial period until cleanup goals are met. Monitoring will be protective by evaluating the effectiveness of the in-situ treatment and by detecting potential migration of groundwater COCs.

2.12.2 Compliance with ARARs

CERCLA Section 121(d) specifies in part that remedial actions for cleanup of hazardous substances must comply with requirements and standards under federal or more stringent state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs) to the hazardous substances or particular circumstances at a site or obtain a waiver (see also 40 CFR 300.430(f)(1)(ii)(B)). ARARs include only federal and state environmental or facility siting laws/regulations and do not include occupational safety or worker protection requirements. In addition, per 40 CFR 300.405(g)(3), other advisories, criteria, or guidance may be considered in determining remedies [so-called To-Be-Considered (TBC) criteria].

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, although not applicable to a hazardous substance, pollutant,

contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

In accordance with 40 CFR 300.400(g), the Navy, FDEP, and U.S. EPA have identified the specific ARARs for the selected remedy. The selected remedy is expected to comply with all ARARs related to implementing the selected action. Tables 2-3 and 2-4 list the chemical-specific and action-specific ARARs that will be considered in the implementation of the selected remedy.

2.12.3 Cost Effectiveness

The selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if it costs are proportional to its overall effectiveness." [NCP §300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., both were protective of human health and the environment and ARAR compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence Alternative 4A represents a reasonable value for the money spent. The estimated 30-year NPW cost of the selected remedy is $2,245,000.

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The Navy, in consultation with U.S. EPA and FDEP, has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at Site 59. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Navy, in consultation with U.S. EPA and FDEP, has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principle element and bias against off-site treatment and disposal and considering State and Community acceptance.

2.12.5 Preference for Treatment as a Principal Element

Alternative 4A will permanently and irreversibly remove an estimated 10 pounds of TCE from contaminated groundwater plumes at Site 59 through in-situ biological treatment. Contaminant concentrations in less contaminated areas of the TCE Plumes are also expected to be reduced over time

due to naturally occurring processes such as biological degradation, dispersion, advection, and adsorption.

2.12.6 Five-Year Review Requirement

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site in excess of levels that allow for unlimited use and unrestricted exposure, in accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of remedial action and every 5 years thereafter to ensure that the remedy continues to be protective of human health and the environment.

2.13 DOCUMENTATION OF SIGNIFICANT CHANGES

The public was provided an opportunity to review and comment on the Site 59 Proposed Plan. A Public Notice was published in the Florida Times-Union Newspaper on June 4, 2007, informing the public that the Proposed Plan was available for review at the Cecil Field Information Repository and requesting that all comments be submitted to the Navy by July 3, 2007. CERCLA Section 117(b) requires an explanation of significant changes from the selected remedy presented in the Proposed Plan that was published for public comment. No comments were received from the public during the comment period; however, one written comment, that was followed by an e-mail, was received on July 27, 2007. No significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate based on the comment obtained. The Navy immediately responded to the comment via e-mail. The comments and response to comments are provided in the Responsiveness Summary provided in Appendix A.

Subsequent to the comment period, additional discussions regarding Site 59 were held by the Cecil Field BCT. During the September 5, 2007 BCT meeting it was agreed that the total recoverable petroleum hydrocarbon (TRPH) plume associated with Building 815 Wash Rack, previously included as part of Site 59, would be addressed under the Petroleum Program. Based on this decision, references to the TRPH plume have been removed from this ROD, and a Sampling and Analysis Report Addendum (SARA) and Natural Attenuation Monitoring Plan (NAMP) have been prepared and will be implemented for the site identified as the Building 815 Wash Rack under the Petroleum Program. No other changes to the remedy as stated in the Proposed Plan were necessary or appropriate.

TABLE 2-1

EXPLANATION OF REMEDY SELECTION CRITERIA
OU 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Criterion	Description
Threshold	**Overall Protection of Human Health and the Environment.** Addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering methods, and/or institutional controls. **Compliance with ARARs.** CERCLA Section 121(d) and NCP §300.430(f)(1)(II)(B) require that remedial actions at CECRLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations, which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). This criterion addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.
Primary Balancing	**Long-Term Effectiveness and Permanence.** Refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time after cleanup levels have been met. Also includes consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls. **Reduction of Contaminant Toxicity, Mobility, and Volume Through Treatment**. Refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. **Short-Term Effectiveness.** Addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved. **Implementability**. Addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other government entities are also considered. **Cost.** The benefits of implementing a particular alternative are weighted against the cost of implementation.
Modifying	**State/Support Agency Acceptance.** The final Feasibility Study and the Proposed Plan, which are placed in the Administrative Record, represent a consensus by the Navy, U.S. EPA, and FDEP. **Community Acceptance.** The Navy assesses community acceptance of the preferred alternative by giving the public an opportunity to comment on the remedy selection process and the preferred alternative and then responds to those comments.

TABLE 2-2

SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION

Evaluation Criteria	**Alternative 1: No Action**	**Alternative 2: Natural Attenuation, Institutional Controls and Monitoring**	**Alternative 3: In-Situ Chemical Oxidation of TCE Hot Spots, Natural Attenuation, Institutional Controls, and Monitoring**	**Alternative 4A: In-Situ Biological Treatment of TCE Hot Spots, Natural Attenuation, Institutional Controls, and Monitoring**	**Alternative 4B: In-Situ Biological Treatment of TCE Hot Spots and Fringes, Natural Attenuation, Institutional Controls, and Monitoring**
Overall Protection of Human Health and Environment	Not protective	Protective	More protective than Alternative 2	As protective as Alternative 3	More protective than Alternatives 3 and 4A
Compliance with ARARs and TBCs: Chemical-Specific Location-Specific Action-Specific	 Would not comply None Not applicable	 Would eventually comply None Would comply	 Would eventually comply None Would comply	 Would eventually comply None Would comply	 Would eventually comply None Would comply
Long-Term Effectiveness and Permanence	Very limited	Effective	More effective than Alternative 2	As permanent but slightly more effective than Alternative 3	More effective and permanent than Alternatives 3 and 4A
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	None	None	Approximately 9 pounds of COCs removed through in-situ chemical oxidation	Approximately 10 pounds of COCs removed through in-situ biological treatment	Approximately 15.3 pounds of COCs removed through in-situ biological treatment.
Short-Term Effectiveness	No relevant issues to address	Would be effective. Minimum potential for short-term risks. Approximately 71 years to attain RAOs.	Would be effective. Greater potential for short-term risks than Alternative 2. Approximately 57 years to attain RAOs.	Would be effective. Greater potential for short-term risks than Alternative 2. Approximately 57 years to attain RAOs.	Would be effective. Greater potential for short-term risks than alternative 2. Approximately 29.5 years to attain RAOs.

TABLE 2-2

SUMMARY OF COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Natural Attenuation, Institutional Controls and Monitoring	Alternative 3: In-Situ Chemical Oxidation of TCE Hot Spots, Natural Attenuation, Institutional Controls, and Monitoring	Alternative 4A: In-Situ Biological Treatment of TCE Hot Spots, Natural Attenuation, Institutional Controls, and Monitoring	Alternative 4B: In-Situ Biological Treatment of TCE Hot Spots and Fringes, Natural Attenuation, Institutional Controls, and Monitoring
Implementability	No action to implement	Simple to implement.	Simple to implement.	Simple to implement.	Slightly more complex than Alternative 4A due to increased size of systems. Pilot-scale treatability testing would be required.
Costs: Capital NPW of O&M NPW	 $0 $0 $0	 $79,000 $1,025,000 (30-Year) $1,104,000 (30-Year)	 $1,497,000 $1,068,000 (30-Year) $2,565,000 (30-Year)	 $1,242,000 $1,003,000 (30-Year) $2,245,000 (30-Year)	 $4,412,000 $2,454,000 (30-Year) $6,866,000 (30-Year)
State Acceptance	FDEP concurs with selection of Alternative 4A as the preferred alternative.				
Community Acceptance	Will be determined following public comment period.				

ARARs Applicable or Relevant and Appropriate Requirements.
COCs Chemicals of concern.
NPW Net present worth.
O&M Operation and maintenance.
RAO Remedial Action Objective.
TBCs To-be-considered (criteria).
TCE Trichloroethene.

TABLE 2-3

CHEMICAL-SPECIFIC ARARs
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Florida Groundwater Classes, Standards and Exemptions	Chapter 62-520, Florida Administrative Code (F.A.C.)	Applicable	This rule designates the groundwater of the State into five classes and establishes minimum "free from" criteria. This rule also specifies that Classes I and II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	This rule was used to classify groundwater and establish cleanup goals for groundwater. Groundwater at this site is considered a potential source of drinking water (Class II).
Florida Drinking Water Standards. Monitoring, and Reporting	Chapter 62-550.310, F.A.C.	Relevant and appropriate	This rule provides primary drinking water quality standards and maximum contaminant levels (MCLs) for public water supply systems.	Cleanup goals for volatile organic compounds in groundwater are based on Florida MCLs listed in Table 4 of this rule.
Florida Contaminant Cleanup Target Levels Rule	Chapter 62-777.170(1)(a), F.A.C.	Relevant and appropriate	This rule provides default criteria in tables and the process for deriving site-specific Cleanup Target Levels (CTLs) for soil, groundwater, and surface water cleanup.	CTLs for groundwater provided in Table 1 of this rule were used to establish cleanup goals.

TABLE 2-4

ACTION-SPECIFIC ARARs
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

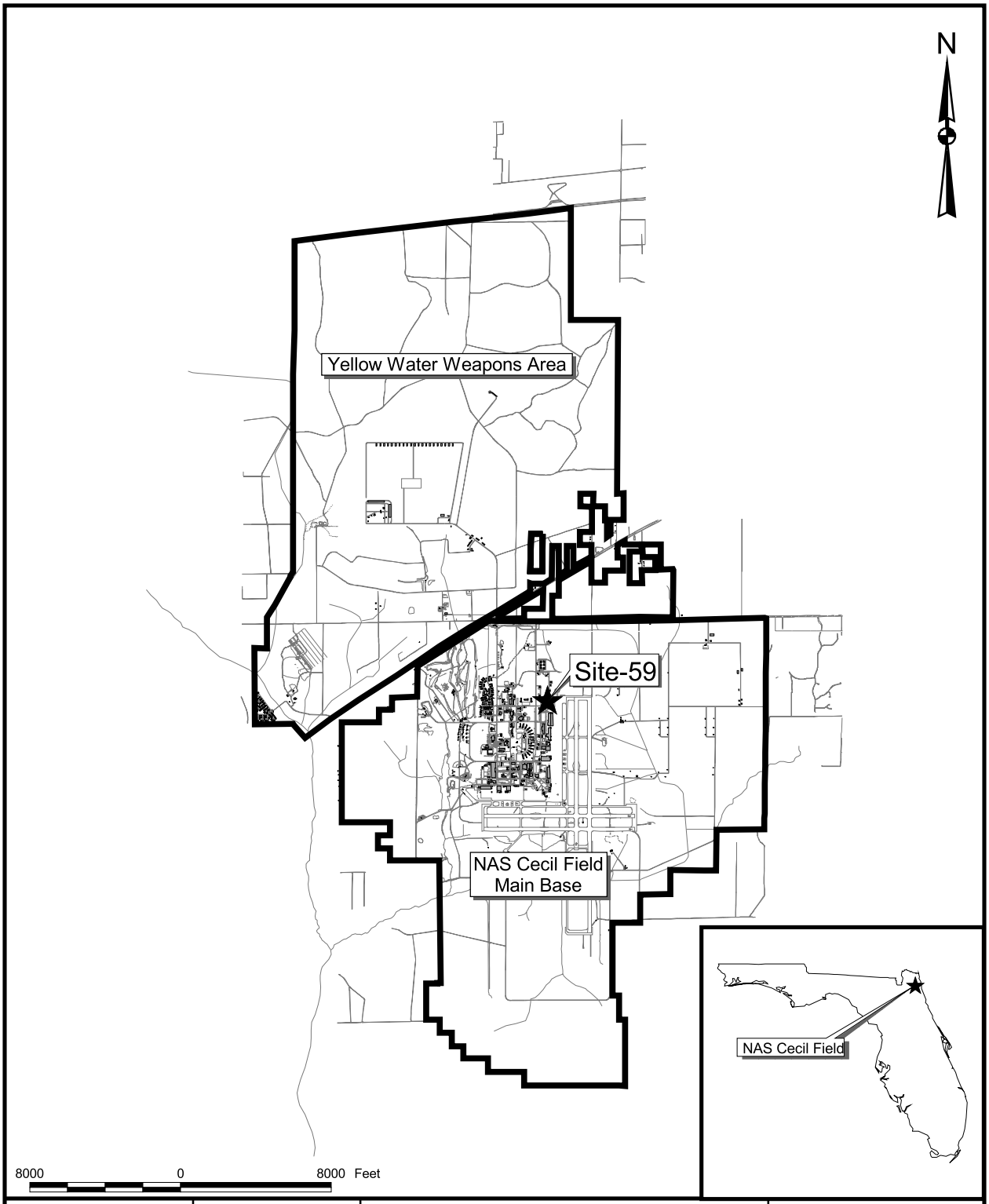
Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Florida Underground Injection Control Regulations	Chapter 62-528.600 through 528.645, Florida Administrative Code (F.A.C.)	Applicable	Establishes standards and criteria for construction, operation, monitoring, plugging, and abandonment for Class V wells.	Regulations pertaining to Class V Group 4 injection wells associated with aquifer remediation projects will be followed.
Florida Groundwater Permitting and Monitoring Requirements	Chapter 62-522.300 and 522.300(2)(e), F.A.C.	Applicable	Establishes permitting and monitoring requirements for installations discharging to groundwater to prevent contaminants from causing a violation of water quality standards and criteria of the receiving groundwater.	A zone of discharge is allowed for primary standards for groundwater for closed-loop reinjection systems and for the prime constituents of the reagents used to remediate the contaminants.
Florida Water Well Permitting and Construction Requirements	Chapter 62-532.500, F.A.C.	Applicable	Establishes minimum standards for the location, construction, repair, and abandonment of water wells.	The requirements for permitting for the construction, repair, and abandonment of monitoring, extraction, and injection wells will be met.
Florida Hazardous Waste - Requirements for Remedial Action	Chapter 62-730.225(3)	Applicable	Requires warning signs at sites suspected or confirmed to be contaminated with hazardous waste.	This requirement will be met.
Florida Natural Attenuation with Monitoring Regulation	Chapter 62-780.690 (8)(a) thru (c), F.A.C	Relevant and Appropriate	Specifies minimum number of wells and sampling frequency for conducting groundwater monitoring as part of a natural attenuation remedy.	The requirements associated with implementation of groundwater monitoring will be met.(1)

TABLE 2-4

ACTION-SPECIFIC ARARs
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Florida Active Remediation Regulation for Groundwater In-situ System(s)	Chapter 62-780.700(12)(g), F.A.C	Relevant and Appropriate	Specifies that operational parameters for in-situ system(s) should include measurements of biological, chemical, or physical indicators that will verify the radius of influence at representative monitoring locations, weekly for the first month, monthly for the next 2 months, quarterly for the first 2 years, and semi-annually thereafter.	In-situ groundwater remediation will consider the relevant requirements of this rule.(1)
Florida Active Remediation Regulation for Groundwater Bioremediation System(s)	Chapter 62-780.700(12)(h), F.A.C	Relevant and Appropriate	Specifies that operational parameters for bioremediation system(s) should include measurements of dissolved oxygen at representative monitoring locations; rates of biological, chemical, or nutrient enhancement additions; weekly for the first month, monthly for the next 2 months, quarterly for the first 2 years, and semi-annually thereafter.	Bioremediation groundwater remediation will consider relevant requirements of this rule.(1)
Florida Post Active Remediation Monitoring Regulation	Chapter 62-780.750(4)(a) thru (c), F.A.C	Relevant and Appropriate	Specifies minimum number of wells and sampling frequency for conducting groundwater monitoring as part of post active remediation monitoring.	Post active remediation monitoring will consider the relevant requirements of this rule.(1)

1 The designated number of wells, sampling time frames/frequency, and specific parameters for analyses will be provided in a Monitoring Plan that is included in a post-ROD document (e.g. Remedial Design or Remedial Action Work Plan) that is approved by the EPA and FDEP.



DRAWN BY MJJ	DATE 10Jan06	GENERAL LOCATION MAP OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

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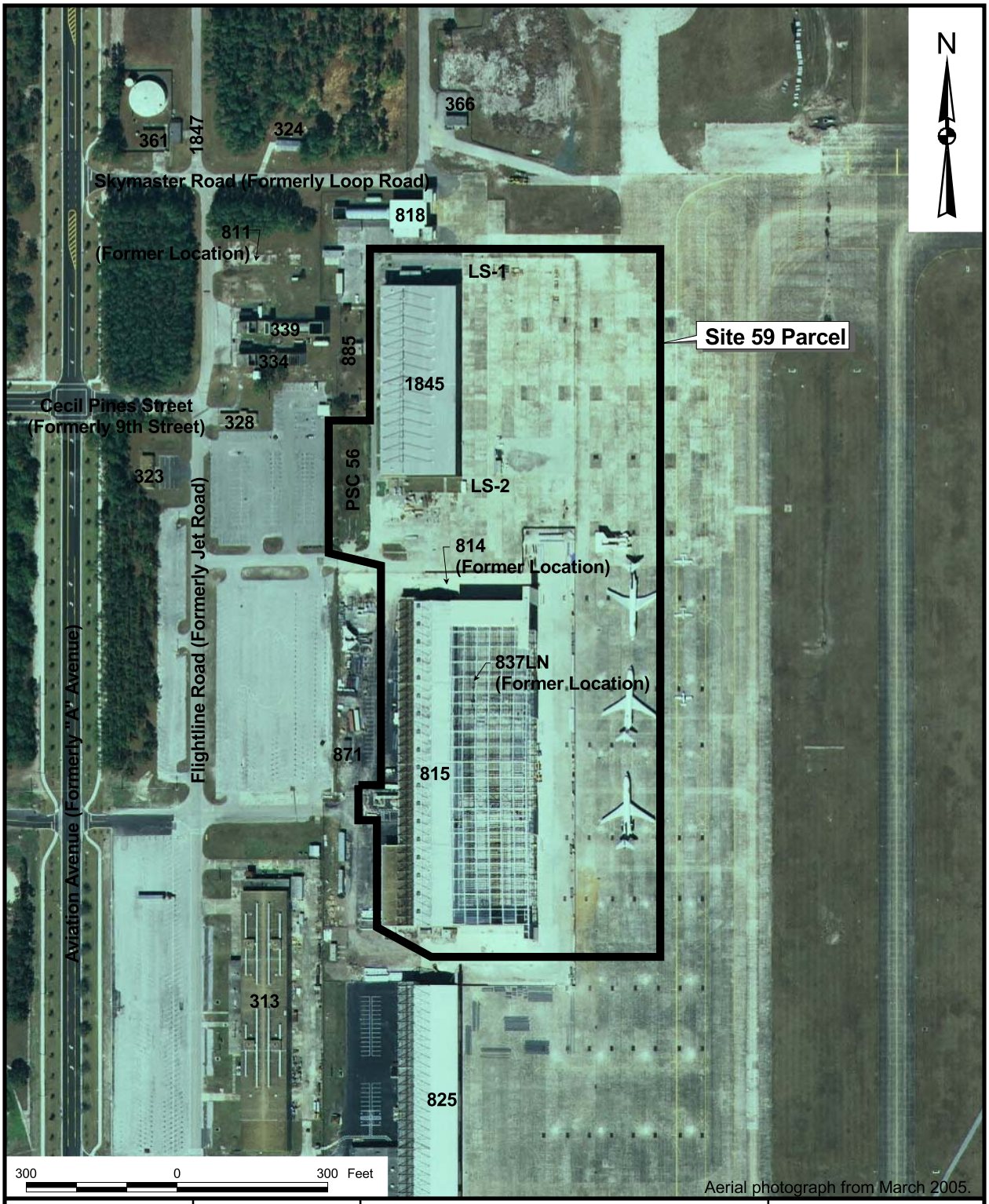

DRAWN BY MJJ	DATE 10Jan06	SITE LOCATION MAP OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 / REV 0

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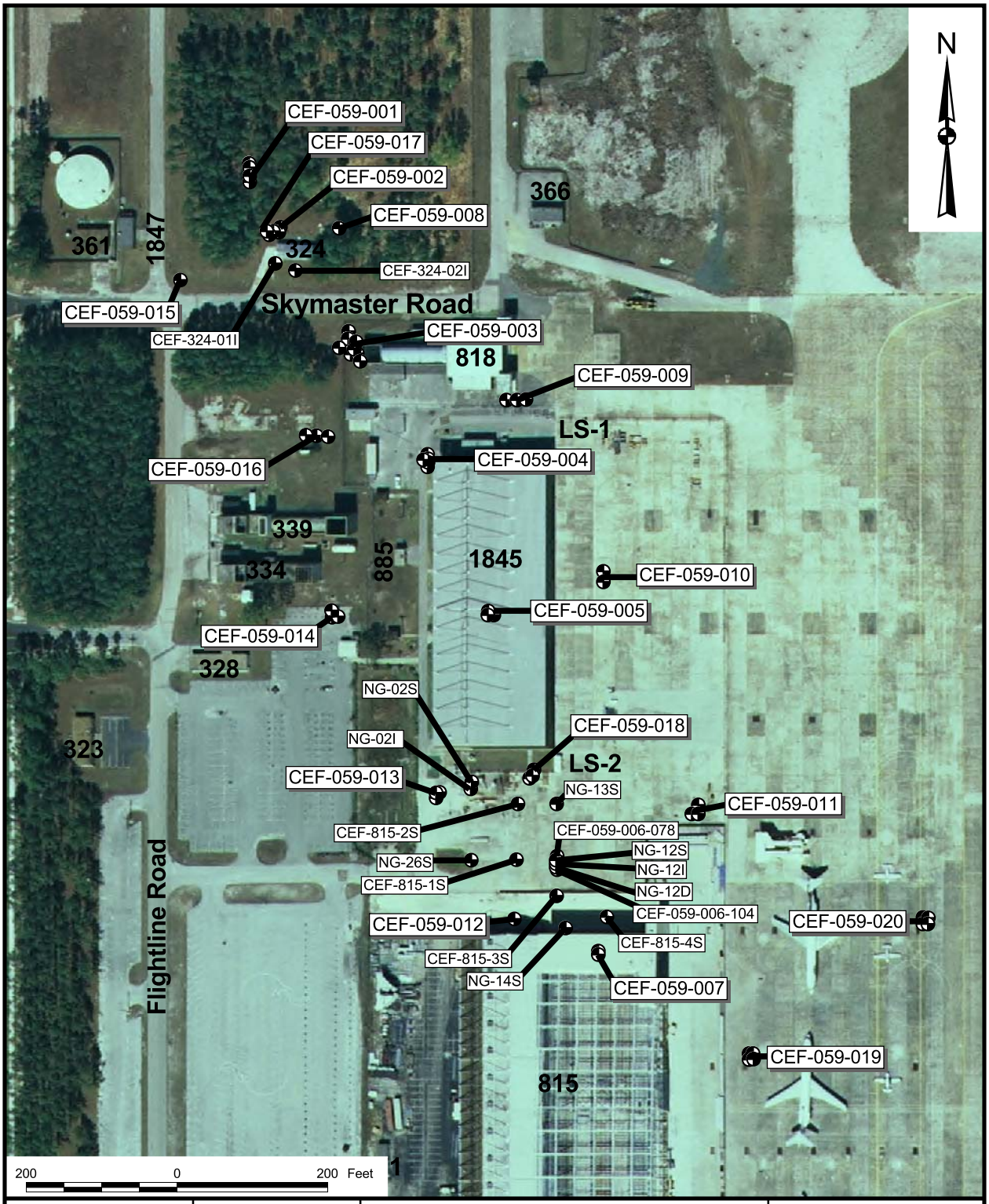

DRAWN BY MJJ — DATE 10Jan06	NAVFAC	SITE LAYOUT AND MONITORING WELL LOCATIONS OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY — DATE			APPROVED BY — DATE
COST/SCHEDULE-AREA			APPROVED BY — DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-3 — REV 0

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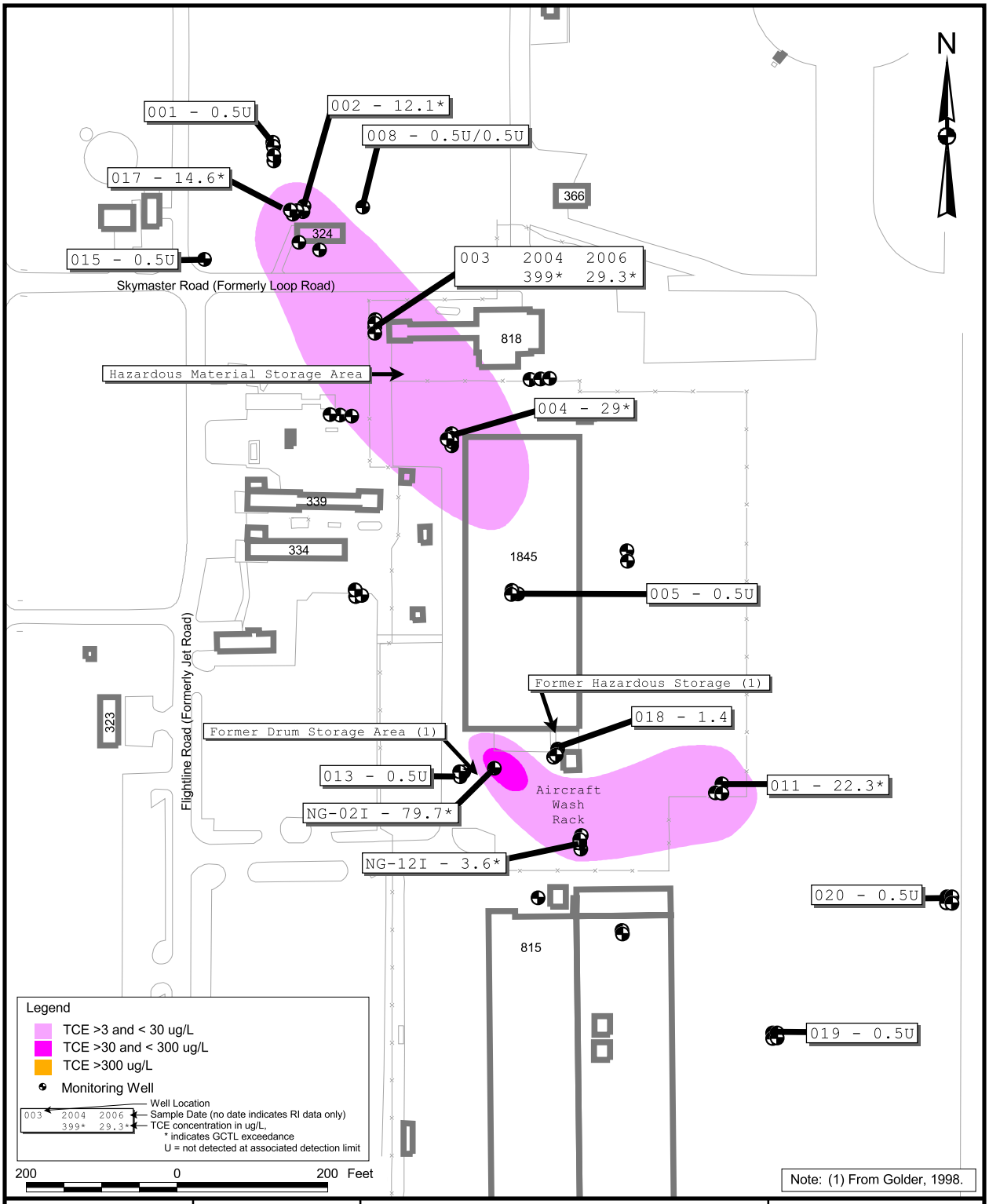

DRAWN BY MJJ	DATE 17Jan06	VOCs IN GROUNDWATER, RI DATA 30-FOOT ZONE OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 / REV 0

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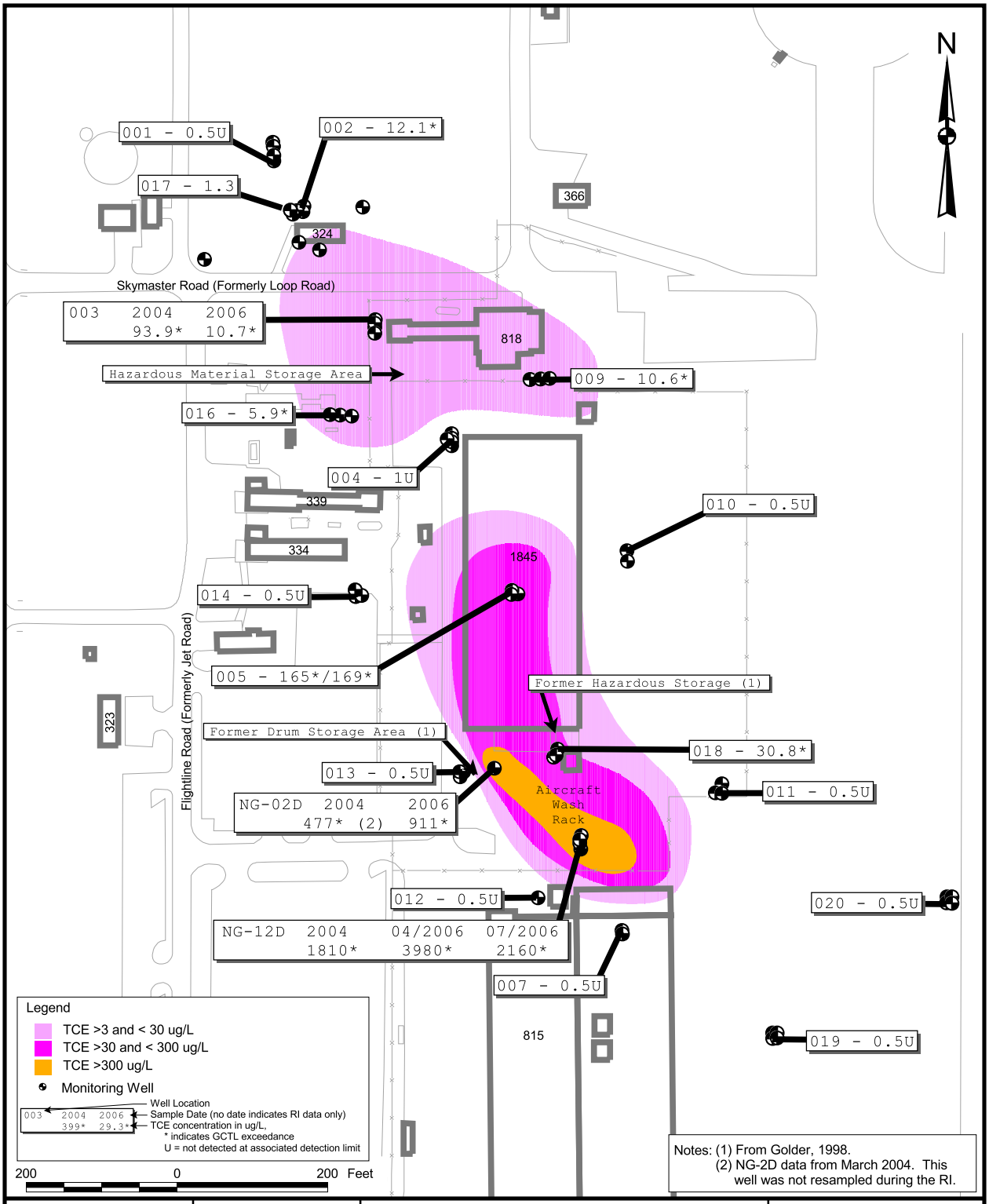

DRAWN BY MJJ	DATE 17Jan06	VOCs IN GROUNDWATER, RI DATA 50-FOOT ZONE OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-5 / REV 0

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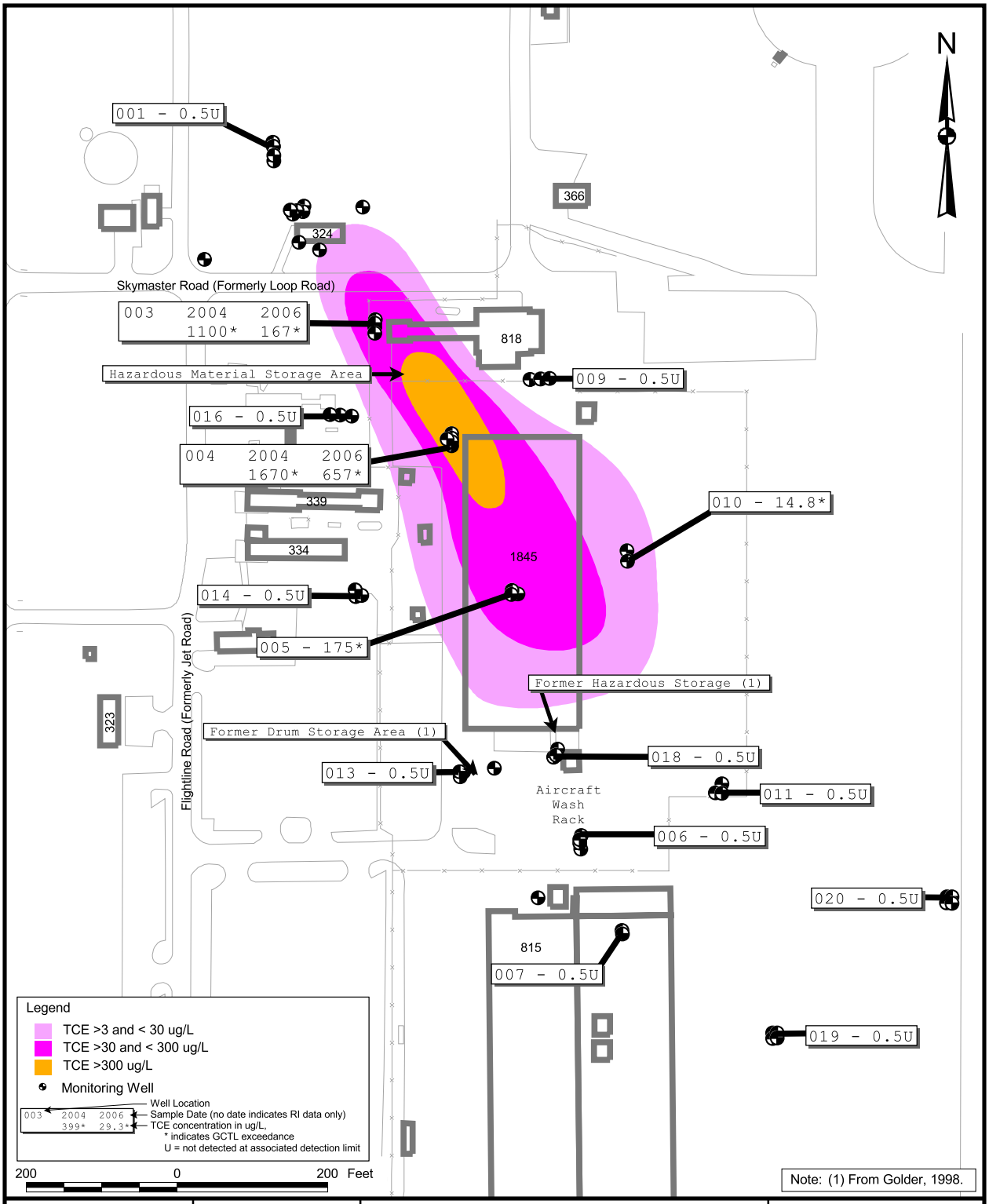

DRAWN BY MJJ	DATE 17Jan06	VOCs IN GROUNDWATER, RI DATA 70- TO 80-FOOT ZONE OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-6 / REV 0

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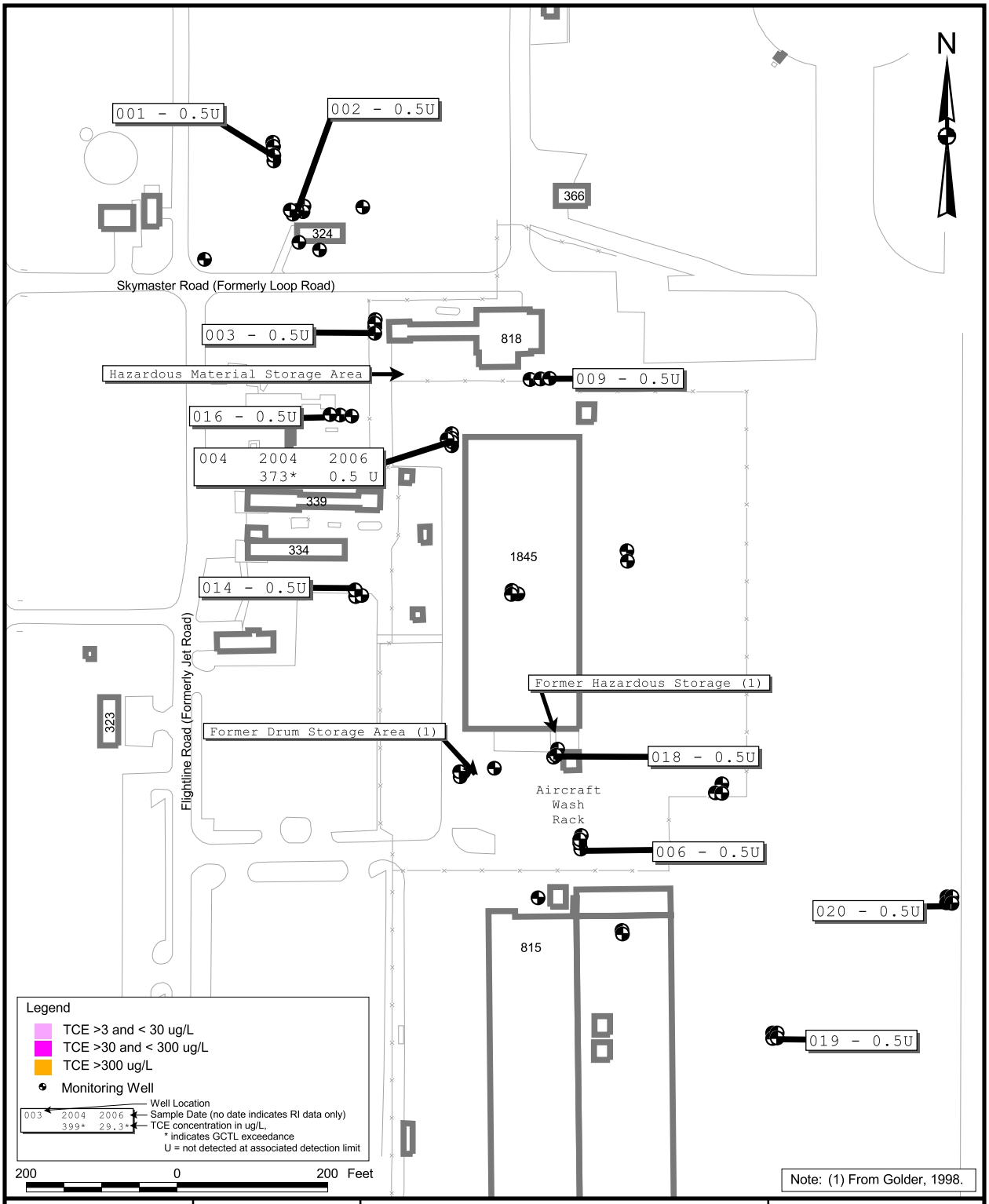

DRAWN BY MJJ	DATE 17Jan06	VOCs IN GROUNDWATER, RI DATA TOP OF ROCK ZONE OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-7 / REV 0

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IN-SITU BIOLOGICAL TREATMENT OF TCE HOT SPOTS AND PETROLEUM PLUME

- INSTALL FOCUSED GROUNDWATER RECIRCULATION SYSTEMS AT HOT SPOT NOS. 2 AND 3 FOR IN-SITU BIOSTIMULATION AND BIOAUGMENTATION

HOT SPOT NO. 2 SYSTEM:
- 10 PAIRS OF RECOVERY AND INJECTION WELLS TO 50 FEET BGS WITH A 30-GPM PUMPING SYSTEM
- 7,650 POUNDS OF SODIUM LACTATE, 10,300 POUNDS OF SODIUM BICARBONATE, AND 16.1 GALLONS OF DHC CULTURE
- 1 YEAR ESTIMATED OPERATION TIME

HOT SPOT NO. 3 SYSTEM:
- 14 PAIRS OF RECOVERY AND INJECTION WELLS TO 75 FEET BGS WITH A 42-GPM PUMPING SYSTEM
- 13,420 POUNDS OF SODIUM LACTATE, 18,100 POUNDS OF SODIUM BICARBONATE, AND 28.3 GALLONS OF DHC CULTURE
- 1 YEAR ESTIMATED OPERATION TIME

- INSTALL A DPT INJECTION SYSTEM FOR IN-SITU BIOSTIMULATION OF THE PETROLEUM PLUME

- 60 DPT WELLS TO 15 FEET BGS
- TOTAL OF 5,400 POUNDS OF MANGANESE PEROXIDE AT RATE OF 10 POUNDS PER FOOT OF DEPTH FROM 6 TO 15 FEET BGS

NATURAL ATTENUATION

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

LAND USE CONTROLS

- PROHIBIT ALL USES OF SURFICIAL AQUIFER GROUNDWATER
- MAINTAIN INTEGRITY OF EXISTING AND/OR FUTURE REMEDIATION SYSTEM(S)

GROUNDWATER MONITORING

- COLLECT GROUNDWATER SAMPLES FROM 33 EXISTING WELLS AND ANALYZE FOR VOCs
- COLLECT SAMPLES FROM TWO EXISTING WELLS AND ANALYZE FOR NAPHTHALENE AND TRPH
- COLLECT GROUNDWATER SAMPLES FROM 13 EXISTING WELLS AND ANALYZE FOR NATURAL ATTENUATION PARAMETERS, METABOLIC ACIDS, AND MICROBIAL PARAMETERS
  - QUARTERLY FOR 1 YEAR
  - SEMI-ANNUALLY FOR 2 YEARS
  - ANNUALLY THEREAFTER
  - BEDROCK WELL SAMPLED ONCE EVERY 5 YEARS

BSG = BELOW GROUND SURFACE.
GPM = GALLON PER MINUTE.
DHC = *DEHALOCOCCOIDES* .
DPT = DIRECT-PUSH TECHNOLOGY.
VOCS = VOLATILE ORGANIC COMPOUNDS.
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS.

DRAWN BY MJJ	DATE 19Jan06	IN-SITU BIOLOGICAL TREATMENT, NATURAL ATTENUATION, LAND USE CONTROLS, AND GROUNDWATER MONITORING OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-8 / REV 0

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LABEL	EASTING	NORTHING
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2	378458.67	2146309.04
3	378458.65	2144900.21
4	378002.16	2144900.19
5	377894.36	2144958.63
6	377894.36	2145171.51
7	377857.64	2145171.51
8	377857.63	2145241.50
9	377902.64	2145241.53
10	377902.54	2145678.82
11	377798.45	2145704.32
12	377798.16	2145967.64
13	377880.83	2145968.26
14	377568.67	2146320.75
15	377840.64	2146323.34
16	377850.07	2146046.74
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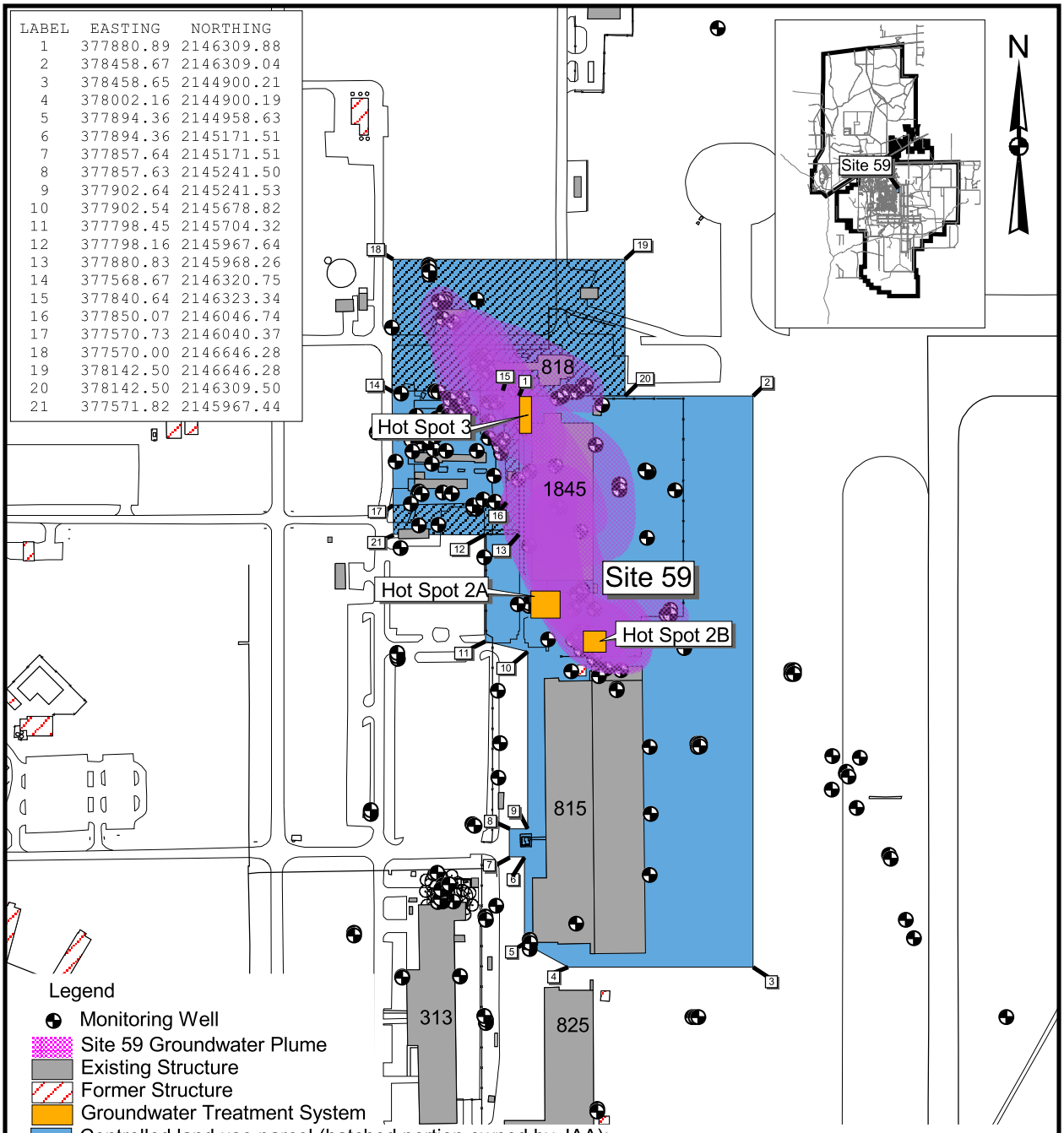

a) All uses of the groundwater (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes and industrial processes) are prohibited*;

b) Disturbance of any existing or future monitoring or remediation system(s) is prohibited*.

(* unless prior written approval is obtained from the Navy and FDEP)

400 0 400 Feet

DRAWN BY MJJ	DATE 18Jan05	LAND USE CONTROL BOUNDARY AREA OU 9, SITE 59 RECORD OF DECISION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 8925
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-9 / REV 0

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REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1994. Environmental Baseline Survey Report, Base Realignment and Closure, Naval Air Station Cecil Field, Jacksonville Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. November.

BCT [Base Realignment and Closure (BRAC) Cleanup Team], 2005. Minutes of February 2005 Meetings, Decision Number 682.

CDM, 2004. Field Investigation Report, Cecil Commerce Center, Building 324, Jacksonville, Florida. CDM, Jacksonville, Florida. January.

FDEP (Florida Environmental Department of Environmental Protection), 1999a. Natural Attenuation Default Concentrations. FAC 62-777, Table V. August.

FDEP, 1999b. Primary and Secondary Drinking Water Quality Criteria. FAC 62-550. September.

FDEP, 2005. Soil and Groundwater Cleanup Target Levels. Florida Administrative Code (F.A.C.) 62-777, Tables I and II. April.

Golder Associates, 1998. Report on Environmental Due Diligence Investigation, Flightline Facilities, Naval Air Station Cecil Field, Jacksonville, Duval County, Florida, August.

Halford, Keith J., 1998. Ground-Water Flow in the Surficial Aquifer System and Potential Movement of Contaminants from Selected Waste-Disposal Sites at Cecil Field Naval Air Station, Jacksonville, Florida. United States Geological Survey Water-Resources Investigations Report 97-4278.

TtNUS (Tetra Tech NUS, Inc.), 2001. Technical Memorandum for No Further Action, Potential Source of Contamination 56, Stormwater Retention Pond, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, February.

TtNUS, 2005. Pilot Study Work Plan for In Situ Bioremediation at Operable Unit 9, Site 59, Building 324/1845 Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command Engineering Field Division South, North Charleston, South Carolina. January.

TtNUS, 2006a. Pilot Study Work Plan for In Situ Bioremediation at Operable Unit 9, Site 59, Building 1845, Southern Area. July.

TtNUS, 2006b. Remedial Investigation Report, Operable Unit 9, Site 59, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command Engineering Field Division South, North Charleston, South Carolina. November.

U.S. EPA (United States Environmental Protection Agency), 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA/540/G-89/004. Office of Solid Waste and Emergency Response (OSWER), Washington, D.C. October.

U.S. EPA, 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Site. OSWER Directive 9200.4-17P. April.

U.S. EPA, 2002. National Primary Drinking Water Standards, List of Contaminants and Their MCLs, EPA 816-F-02-013, Washington, D.C., July. Accessed online at www.epa.gov/safewater/mcl.html.

U.S. EPA, 2004. Region 9 Preliminary Remediation Goals Region 9, San Francisco, California, October. Accessed online at www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf.

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Public notice of the availability of the Proposed Plan was placed in the Florida-Times Union on June 4, 2007. A 30-day public comment period was held from June 4, 2007 to July 3, 2007. Provisions for the public to request a public meeting to discuss the Proposed Plan were also described in the public notice. No comments were received during the 30-day comment period, however a written comment and e-mail was received after the comment deadline on July 27, 2007. An e-mail response from the Navy addressing the concerns of the commenter was provided the same day (attached). The public comments obtained did not require any changes to the ROD or selected remedy.

Notice of Public Comment Period on the U.S. Navy's Proposed Plan for Cleanup of Operable Unit 9, Site 59 at NAS Cecil Field

The Navy, as part of its responsibilities under the Installation Restoration (IR) Program, has completed a Proposed Plan for Operable Unit (OU) 9, Site 59 at NAS Cecil Field. The Proposed Plan is a document that summarizes alternatives that may be used to remove or control a source of contamination and identifies the preferred alternative for cleanup. The Proposed Plan for Site 59 includes in-situ biological treatment of contamination hotspots and contamination plumes, natural attenuation of remaining contamination plumes, land use controls (LUCs) to prevent use of groundwater from the site, and groundwater monitoring to track treatment progress and to verify the absence of plume migration. This proposal was developed by the Navy and the United States Environmental Protection Agency in consultation with the Florida Department of Environmental Protection.

Site 59 is located in the Main Base area of the NAS Cecil Field and contains aircraft hangars and buildings used for engine maintenance activities, a flammable storage locker, and a Jet Engine Test Cell facility. The Navy's studies of the site concluded that trichloroethene (TCE), naphthalene, and total recoverable petroleum hydrocarbons (TRPH) are present in the groundwater at concentrations that are potentially harmful to human health. Implementation of the cleanup activities described in the Proposed Plan would prevent unacceptable risk of exposure to contaminants and eventually restore groundwater quality to meet drinking water standards.

The public is encouraged to review and comment on the U.S. Navy's Proposed Plan. A public comment period for the Site 59 Proposed Plan is scheduled from **June 4, 2007 through July 3, 2007**. Comments may be written or verbal. Written comments should be submitted to the address listed below. Comments must be postmarked no later than **July 3, 2007**. Copies of the OU 9, Site 59 Proposed Plan will be available for review on **June 4, 2007** at the Information Repository located at the Former Memorial Chapel at NAS Cecil Field, 6112 New World Avenue, Jacksonville, Florida, 32221, (904) 777-1900.

Comments may be sent to:
BRAC PMO SE
Attn: Mark Davidson
4130 Faber Place Drive, Suite 202
North Charleston, SC 29405
E-mail: mark.e.davidson@ navy.mil

If requested, a public meeting will be held to discuss the findings and recommendations of the Proposed Plan for Site 59. For more information on the Proposed Plan or to request a public meeting, please contact Mr. Mark Davidson at (843) 743-2135.

Use This Space to Write Your Comments

or to be added to the mailing list

The Navy, U.S. EPA, and the FDEP want your written comments on the options under consideration for dealing with the contamination at OU 5, Site 15. You can use the form below to send written comments. If you have questions about how to comment, please call Mark Davidson at (843) 743-2135. This form is provided for your convenience. Please mail this form or additional sheets of written comments, postmarked no later than June 28, 2007, to

BRAC PMO SE
Attention: Mark Davidson
4130 Faber Place Drive, Suite 202
North Charleston, SC 29405
email: mark.e.davidson@navy.mil

As some of these chemicals have side effect please inform us to the following

(1) We have a well about 2 miles from the contaminated area. ~~[illegible]~~ used for drinking. Will our well be monitored for possible bleed over?

(2) Will we need to purchase drinking water for a time?

(3) Life span of sodium lactate and of Dehalococcoides and ORC since the first 2 have side effects if consumed.

(Attach sheets as needed)

Comment submitted by: Roma Cox

Mailing list additions, deletions, or changes

If you did not receive this through the mail or would like to

- [x] be added to the site mailing list
- [ ] note a change of address
- [ ] be deleted from the mailing list
- [x] obtain additional information concerning the RAB

Name: Roma & Tom Cox
Address: 6252 Buck Dr.
Jacksonville, FL 32221

please check the appropriate box and fill in the correct address information above.

-----Original Message-----
From: Roma Cox [mailto:romacox2000@yahoo.com]
Sent: Friday, July 27, 2007 3:54
To: Davidson, Mark E CIV NAVFAC SE
Subject: zuestions concerning Cecil Field Cleanup

Dear Mr. Davidson,

We have read the Proposed Plan for Operable Unit 9, Site 59 Naval Air station Cecil Field Jacksonville, and have the following questions:

1. All of the cleanup actions mention short-term risks. Please define the risks referred to.

2. Would these risks involve homeowners living near Cecil Field not in the plumes?

3. The report mentions administrative action to restrict groundwater use until cleanup goals are met. Is that referring to wells owned by homeowners living near Cecil Field?

Thank you for your information.

Sincerely,
Roma Cox

Luggage? GPS? Comic books?
Check out fitting gifts for grads
<http://us.rd.yahoo.com/evt=48249/*http://search.yahoo.com/search?fr=oni
_on_mail&p=graduation+gifts&cs=bz> at Yahoo! Search.

Simcik, Robert

From: Davidson, Mark E CIV NAVFAC SE [mark.e.davidson@navy.mil]
Sent: Friday, July 27, 2007 6:21 PM
To: Roma Cox
Cc: Miller, Ralinda; Simcik, Robert; Nwokike, Barbara R CIV NAVFAC SE
Subject: RE: zuestions concerning Cecil Field Cleanup

Attachments: gqv09200.PDF

gqv09200.PDF
(99 KB)

Roma

Thanks for taking the time to write me with your questions. And feel free to email or call me if you should have any questions about the environmental cleanup of the former Cecil Field.

Site 59 is an area where we discovered contamination in the groundwater consisting of old solvents. The groundwater contamination is referred to as a "plume", and the plume is about 900 feet long, 300 feet wide, and 100 feet deep. The plume runs beneath one of the hangars located near the runways at Cecil Field (see attached pdf file. The site 59 plume is below hangar 1845). The plume is about 2.5 miles away from the eastern boundary of the former Cecil Field (which is roughly where Brannon Field-Chaffee road is now). The plume is all contained below the concrete that makes up the flightline of the former Cecil Field (now operated by Jacksonville Aviation Authority). The navy monitors the groundwater to ensure we know exactly where the plume location is at all times, and to ensure it is not impacting residential areas. However, there are no residential housing units near this plume, and thus, no residential housing units are being impacted by this contamination.

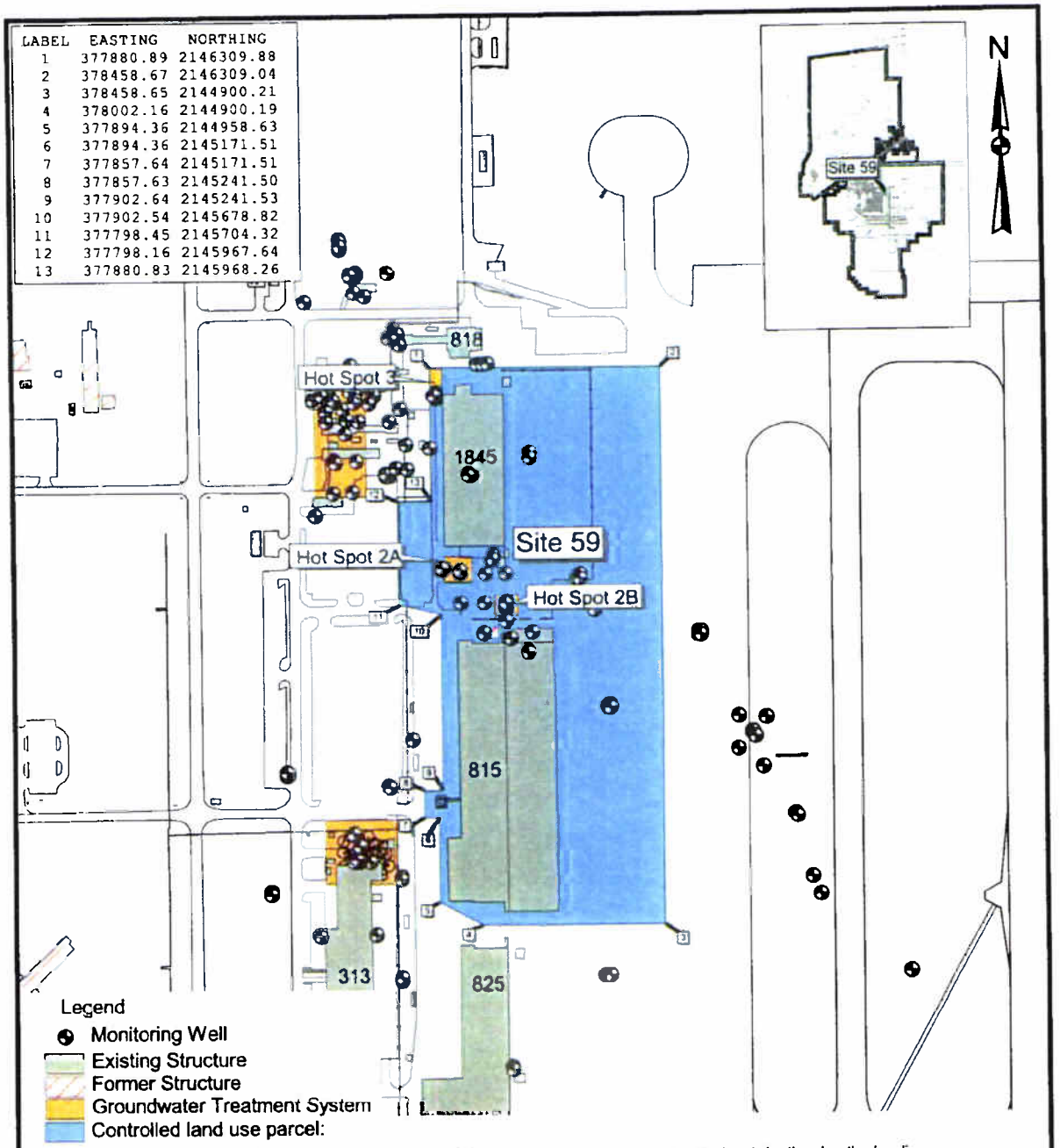
The only way one would suffer short term risks is if they were exposed to this contaminated groundwater by drinking, bathing or inhaling vapors from it. Since the groundwater beneath the Cecil Field flightline (which is all concrete) is not used at all, there is really no way one would be exposed to the contamination. Thus, even though you may live near Cecil Field, you would not be exposed, and thus you are not at risk.

The administrative restrictions mentioned do not refer to wells owned by homeowners living near Cecil Field. The administrative restrictions only apply to the area where the actual plume is, which is depicted in blue in the attached pdf file. Thus, the administrative restrictions prevent one from putting wells directly into the groundwater plume, and prevents anyone from using the groundwater beneath hangar 1845 and 815.

Again, thanks for your questions. If you should have further question please do not hesitate to contact me.
Mark

Mark E. Davidson
Remedial Project Manager
BRAC PMO SE/NAVFAC SE
(843) 743-2135 voice
(843) 743-2142 fax
mark.e.davidson@navy.mil

For mail and FedEx deliveries:
BRAC PMO SE
Attn: Mark Davidson
4130 Faber Place Dr.
Suite 202
N. Charleston, SC 29405



a) All uses of the groundwater (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes and industrial processes) are prohibited*;

b) Disturbance of any existing or future monitoring or remediation system(s) is prohibited*.

(* unless prior written approval is obtained from the Navy and FDEP)

400 0 400 Feet

DRAWN BY MJJ	DATE 18Jan05	LAND USE CONTROL PARCEL OU 9, SITE 59 LAND USE CONTROL REMEDIAL DESIGN NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER N8442
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO Attachment 1 / REV 0

P:\GIS\NAS_CecilField\Site-59_LUC-RD.apr 18Jan05 MJJ Facility Location Layout

Attachment 1

APPENDIX B

SUMMARY OF ANALYTICAL DATA

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-001-028	CEF-059-001-053	CEF-059-001-083	CEF-059-001-121	CEF-059-002-028	CEF-059-002-053	CEF-059-002-120
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	**1.3**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	5.8 J	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	3*	0.5 U	0.5 U	0.5 U	0.5 U	12.1	0.5 U	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-003-035	CEF-059-003-053	CEF-059-003-073	CEF-059-003-121	CEF-059-004-033	
						Sample	Duplicate
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	**1.4 J**	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	**2.9**	**1.1**	**6.1**	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	**0.71 J**	**0.7 J**
TRICHLOROETHENE	3*	399	93.9	1,100	0.5 U	29	28.1
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-004-053			CEF-059-004-073	CEF-059-004-112		CEF-059-004-135
		Nov-04		Feb-05		Nov-04	Feb-05	
		Sample	Duplicate					
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**2.1**
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	**0.85 J**	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	**1.2**	0.5 U	**2.1**	**1.1**	**0.62 J**	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**1.8**
TRICHLOROETHENE	3*	0.5 UJ	529 J	0.5 U	1,670	532	373	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-005-033	CEF-059-005-053		CEF-059-005-073	Location 006	
			Sample	Duplicate		NG-12I***	NG-12D***
ACETONE	6,300	5 U	5 U	5 U	5 U	5 UJ	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 UJ	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 UJ	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	**0.87 J**
CIS-1,2-DICHLOROETHENE	70*	0.5 U	**0.64 J**	**0.58 J**	**0.58 J**	**1.2 J**	**3.8 J**
ETHYLBENZENE	700**	**2**	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 UJ	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
TRICHLOROETHENE	3*	0.5 U	165	169	175	3.6 J	1,810
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-006-078		CEF-059-006-104		CEF-059-007-053	CEF-059-007-078
		Sample	Duplicate	Sample	Duplicate		
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	**0.73 J**	**0.77 J**	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	**2**	**1.7**	**5.3**	**5.4**	0.5 U	**1.4**
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	**1.3**	**0.97 J**	0.5 U	0.5 U	**1.3**	0.5 U
TRICHLOROETHENE	3*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-008-028		CEF-059-009-053	CEF-059-009-083	CEF-059-009-113	CEF-059-010-053
		Sample	Duplicate				
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	**2.7**	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	**0.98 J**	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	**1.6**	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	3*	0.5 U	0.5 U	10.6	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-010-083	CEF-059-011-033	CEF-059-011-053	CEF-059-011-083	CEF-059-012-053	CEF-059-013-032	CEF-059-013-053
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	**2**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.51 J**	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	**0.93 J**	0.5 U	0.5 U
TRICHLOROETHENE	3*	14.8	22.3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.68 J**	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-013-083	CEF-059-014-053	CEF-059-014-083	CEF-059-014-120	CEF-059-015-028	CEF-059-016-053	CEF-059-016-083
ACETONE	6,300	5 U	5 U	5 U	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	3*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.9	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-016-119	CEF-059-017-028	CEF-059-017-053	CEF-059-018-033		CEF-059-018-053
					Sample	Duplicate	
ACETONE	6,300	5 U	**6 J**	**15 J**	**12.5 J**	5 U	**9.4 J**
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	**0.56 J**	**0.53 J**	**0.59 J**
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	0.5 U	0.5 U	0.5 U	**0.74 J**	**0.92 J**	**1.1**
TRICHLOROETHENE	3*	0.5 U	14.6	**1.3**	**1.4**	**1.4**	30.8
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-018-078	CEF-059-018-105	CEF-059-019-032	CEF-059-019-051	CEF-059-019-078	CEF-059-019-106
ACETONE	6,300	5 U	**7.8 J**	5 U	5 U	5 U	5 U
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	70	**2.4**	**2.7**	0.5 U	0.5 U	**1.8**	0.5 U
CHLOROMETHANE	2.7	1 U	1 U	1 U	1 U	1 U	**1.3 J**
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1,000**	**1.5**	**1.5**	0.5 U	0.5 U	**1.3**	**2.3**
TRICHLOROETHENE	3*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 59
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP GCTL	CEF-059-020-033	CEF-059-020-053	CEF-059-020-078	CEF-059-020-099	NG-02I***	REGION 9 PRG	FEDERAL MCL
ACETONE	6,300	**16.9 J**	5 U	5 U	5 U	5 U	5,500	NC
BROMODICHLOROMETHANE	0.6	0.5 U	0.5 U	**0.74 J**	0.5 U	0.5 U	0.18	NC
CARBON DISULFIDE	700	1 U	1 U	1 U	1 U	1 U	1,000	NC
CHLOROFORM	70	0.5 U	0.5 U	**4.5**	0.5 U	0.5 U	0.17	NC
CHLOROMETHANE	2.7	**2.2**	1 U	1 U	1 U	1 U	160	NC
1,1-DICHLOROETHENE	7*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	340	7
CIS-1,2-DICHLOROETHENE	70*	0.5 U	0.5 U	0.5 U	0.5 U	**0.76 J**	61	70
ETHYLBENZENE	700**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1,300	700
METHYLENE CHLORIDE	5*	1 U	1 U	1 U	1 U	1 U	4.3	NC
TOLUENE	1,000**	**0.91 J**	**0.94 J**	**1**	**1.2**	0.5 U	720	1,000
TRICHLOROETHENE	3*	0.5 U	0.5 U	0.5 U	0.5 U	79.7	0.028	5
VINYL CHLORIDE	1*	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.02	2

* Primary.
** Secondary.
***NG-12I screened interval = 32.5 to 37.5 feet below ground surface (bgs); NG-12D screened interval = 45 to 50 feet bgs; NG-2I screened interval = 33 to 38 feet bgs.
FDEP GCTL = Florida Department of Environmental Protection Groundwater Cleanup Target Level, FAC 62-777 (FDEP, 2005).
United States Environmental Protection Agency Region 9 Preliminary Remediation Goal (U.S. EPA, 2004).
Federal Maximum Contaminant Levels (U.S. EPA, 2002).
U = Not detected at associated detection limit.
J = Estimated concentration.
Bolded values exceed detection limits; values in shaded cells exceed one or more criteria.
All concnetrations are in µg/L.

TABLE 2-3

CHEMICAL-SPECIFIC ARARs
OPERABLE UNIT 9, SITE 59 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action To Be Taken
Florida Groundwater Classes, Standards and Exemptions	Chapter 62-520, Florida Administrative Code (F.A.C.)	Applicable	This rule designates the groundwater of the State into five classes and establishes minimum "free from" criteria. This rule also specifies that Classes I and II must meet the primary and secondary drinking water standards listed in Chapter 62-550.	This rule was used to classify groundwater and establish cleanup goals for groundwater. Groundwater at this site is considered a potential source of drinking water (Class II).
Florida Drinking Water Standards. Monitoring, and Reporting	Chapter 62-550.310, F.A.C.	Relevant and appropriate	This rule provides primary drinking water quality standards and maximum contaminant levels (MCLs) for public water supply systems.	Cleanup goals for volatile organic compounds in groundwater are based on Florida MCLs listed in Table 4 of this rule.
Florida Contaminant Cleanup Target Levels Rule	Chapter 62-777.170(1)(a), F.A.C.	Relevant and appropriate	This rule provides default criteria in tables and the process for deriving site-specific Cleanup Target Levels (CTLs) for soil, groundwater, and surface water cleanup.	CTLs for groundwater provided in Table 1 of this rule were used to establish cleanup goals.

APPENDIX C

ESTIMATED COSTS OF SELECTED REMEDY

NAVAL AIR STATION, CECIL FIELD
Jacksonville, Florida
Site 59 - Buildings 324/1845 Areas
Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring
Capital Cost

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Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC RD Documents	300	hr			$35.00		$0	$0	$10,500	$0	$10,500
1.2 Prepare Documents & Plans including Permits	500	hr			$35.00		$0	$0	$17,500	$0	$17,500
2 MOBILIZATION/DEMOBILIZATION & SITE SUPPORT											
2.1 Office Trailer	2	mo				$340.00	$0	$0	$0	$680	$680
2.2 Field Office Support	2	mo		$145.00			$0	$290	$0	$0	$290
2.3 Storage Trailer (1)	2	mo				$109.00	$0	$0	$0	$218	$218
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Construction Survey	1.5	ac	$2,000.00				$3,000	$0	$0	$0	$3,000
2.6 Equipment Mobilization/Demobilization	2	ea			$151.00	$350.00	$0	$0	$302	$700	$1,002
2.7 Site Utilities	2	mo	$150.00				$300	$0	$0	$0	$300
2.8 Field Construction Mgt. (5p * 5 days/week)	9	mwk			$7,500.00		$0	$0	$67,500	$0	$67,500
3 DECONTAMINATION											
3.1 Decontamination Services	2	mo		$1,100.00	$1,850.00	$1,200.00	$0	$2,200	$3,700	$2,400	$8,300
3.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
3.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
3.4 Decon Water Storage Tank, 6,000 gallon	2	mo				$645.00	$0	$0	$0	$1,290	$1,290
3.5 Clean Water Storage Tank, 4,000 gallon	2	mo				$580.00	$0	$0	$0	$1,160	$1,160
3.6 Disposal of Decon Waste (liquid & solid)	2	mo	$950.00				$1,900	$0	$0	$0	$1,900
4 TCE "HOT-SPOT" No. 2A TREATMENT											
4.1 Install Wells (10 wells)	496	lf	$64.80				$32,141	$0	$0	$0	$32,141
4.2 Piping: 1" PVC (includes equiv length for fittings)	2,900	lf		$0.50	$3.89	$6.24	$0	$1,450	$11,281	$18,096	$30,827
4.3 Vehicle Crossover (6' wide)	1	ea		$500.00	$100.00		$0	$500	$100	$0	$600
4.4 Submersible Pumps, 3 gpm @ 115 TDH, 1/3 hp	2	ea		$1,841.00	$191.00		$0	$3,682	$382	$0	$4,064
4.5 Sodium Lactate FS, 100 gal tank	1	ea		$680.98			$0	$681	$0	$0	$681
4.6 Sodium Lactate FS, tank mixer, 1/4 hp	1	ea		$431.08			$0	$431	$0	$0	$431
4.7 Sodium Lactate FS, 10 gpd feed pump	2	ea		$596.44			$0	$1,193	$0	$0	$1,193
4.8 Sodium Bicarbonate FS, 275 gal tank	2	ea		$1,171.48			$0	$2,343	$0	$0	$2,343
4.9 Sodium Bicarbonate FS, tank mixer, 1/3 hp	2	ea		$1,472.13			$0	$2,944	$0	$0	$2,944
4.10 Sodium Bicarbonate FS, 96 gpd feed pump	2	ea		$1,624.50			$0	$3,249	$0	$0	$3,249
4.11 In-line Mixer, Static-type, 1" dia	2	ea		$322.00			$0	$644	$0	$0	$644
4.12 Electrical Service	1	ls	$10,500.00				$10,500	$0	$0	$0	$10,500
4.13 Equipment Shelter with pad, 200 sq ft	1	ls		$6,400.00	$3,600.00		$0	$6,400	$3,600	$0	$10,000
4.14 Instruments and Controls	1	ls		$3,000.00	$2,500.00		$0	$3,000	$2,500	$0	$5,500
4.15 Plumb/Electrify System	1	ls		$1,000.00	$5,000.00		$0	$1,000	$5,000	$0	$6,000
4.16 System Start-Up and Testing	1	ls		$500.00	$1,000.00		$0	$500	$1,000	$0	$1,500
5 TCE "HOT-SPOT" No. 2B TREATMENT											
5.1 Install Wells (12 wells)	616	lf	$64.80				$39,917	$0	$0	$0	$39,917
5.2 Piping: 1" PVC (includes equiv length for fittings)	2,900	lf		$0.50	$3.89	$6.24	$0	$1,450	$11,281	$18,096	$30,827
5.3 Vehicle Crossover (6' wide)	2	ea		$500.00	$100.00		$0	$1,000	$200	$0	$1,200
5.4 Submersible Pumps, 3 gpm @ 115 TDH, 1/3 hp	2	ea		$1,841.00	$191.00		$0	$3,682	$382	$0	$4,064
5.5 Sodium Lactate FS, 150 gal tank	1	ea		$782.05			$0	$782	$0	$0	$782
5.6 Sodium Lactate FS, tank mixer, 1/3 hp	1	ea		$1,472.13			$0	$1,472	$0	$0	$1,472
5.7 Sodium Lactate FS, 24 gpd feed pump	1	ea		$596.44			$0	$596	$0	$0	$596
5.8 Sodium Bicarbonate FS, 275 gal tank	2	ea		$1,171.48			$0	$2,343	$0	$0	$2,343
5.9 Sodium Bicarbonate FS, tank mixer, 1/3 hp	2	ea		$1,472.13			$0	$2,944	$0	$0	$2,944
5.10 Sodium Bicarbonate FS, 96 gpd feed pump	2	ea		$1,624.50			$0	$3,249	$0	$0	$3,249
5.11 In-line Mixer, Static-type, 1" dia	2	ea		$322.00			$0	$644	$0	$0	$644
5.12 Electrical Service	1	ls	$10,500.00				$10,500	$0	$0	$0	$10,500

NAVAL AIR STATION, CECIL FIELD
Jacksonville, Florida
Site 59 - Buildings 324/1845 Areas
Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
5.13 Equipment Shelter with pad, 200 sq ft	1	ls		$6,400.00	$3,600.00		$0	$6,400	$3,600	$0	$10,000
5.14 Instruments and Controls	1	ls		$3,000.00	$2,500.00		$0	$3,000	$2,500	$0	$5,500
5.15 Plumb/Electrify System	1	ls		$1,000.00	$5,000.00		$0	$1,000	$5,000	$0	$6,000
5.16 System Start-Up and Testing	1	ls		$500.00	$1,000.00		$0	$500	$1,000	$0	$1,500
6 TCE "HOT-SPOT" No. 3 TREATMENT											
6.1 Install Wells (13 wells)	969	lf	$64.80				$62,791	$0	$0	$0	$62,791
6.2 Piping: 1" PVC w/trenching (length for fittings)	4,500	lf		$0.50	$3.89	$6.24	$0	$2,250	$17,505	$28,080	$47,835
6.3 Pavement Sawing	4,000	lf		$0.46	$1.32	$0.79	$0	$1,840	$5,280	$3,160	$10,280
6.4 Pavement Replacement	112	sy	$56.00				$6,272	$0	$0	$0	$6,272
6.5 Vehicle Crossover (6' wide)	4	ea		$500.00	$100.00		$0	$2,000	$400	$0	$2,400
6.6 Submersible Pumps, 3 gpm @ 115 TDH, 1/3 hp	4	ea		$1,841.00	$191.00		$0	$7,364	$764	$0	$8,128
6.7 (1 & 2) Sodium Lactate FS, 200 gal tank	1	ea		$869.95			$0	$870	$0	$0	$870
6.8 (1 & 2) Sodium Lactate FS, tank mixer, 1/3 hp	1	ea		$1,472.13			$0	$1,472	$0	$0	$1,472
6.9 (1 & 2) Sodium Lactate FS, 24 gpd feed pump	2	ea		$596.44			$0	$1,193	$0	$0	$1,193
6.10 (1 & 2) Sodium Bicarbonate FS, 200 gal tank	2	ea		$869.95			$0	$1,740	$0	$0	$1,740
6.11 (1 & 2) Sodium Bicarbonate FS, tank mixer, 1/3 hp	2	ea		$1,472.13			$0	$2,944	$0	$0	$2,944
6.12 (1 & 2) Sodium Bicarbonate FS, 60 gpd feed pump	2	ea		$614.00			$0	$1,228	$0	$0	$1,228
6.13 (1 & 2) In-line Mixer, Static-type, 1" dia	2	ea		$322.00			$0	$644	$0	$0	$644
6.14 (3 & 4) Sodium Lactate FS, 100 gal tank	1	ea		$680.98			$0	$681	$0	$0	$681
6.15 (3 & 4) Sodium Lactate FS, tank mixer, 1/4 hp	1	ea		$431.08			$0	$431	$0	$0	$431
6.16 (3 & 4) Sodium Lactate FS, 10 gpd feed pump	2	ea		$596.44			$0	$1,193	$0	$0	$1,193
6.17 (3 & 4) Sodium Bicarbonate FS, 200 gal tank	1	ea		$869.95			$0	$870	$0	$0	$870
6.18 (3 & 4) Sodium Bicarbonate FS, tank mixer, 1/3 hp	1	ea		$1,472.13			$0	$1,472	$0	$0	$1,472
6.19 (3 & 4) Sodium Bicarbonate FS, 60 gpd feed pump	1	ea		$614.00			$0	$614	$0	$0	$614
6.20 (3 & 4) In-line Mixer, Static-type, 1" dia	1	ea		$322.00			$0	$322	$0	$0	$322
6.21 Electrical Service	1	ls	$12,000.00				$12,000	$0	$0	$0	$12,000
6.22 Equipment Shelter with pad, 200 sq ft	2	ls		$6,400.00	$3,600.00		$0	$12,800	$7,200	$0	$20,000
6.23 Instruments and Controls	2	ls		$5,100.00	$4,500.00		$0	$10,200	$9,000	$0	$19,200
6.24 Plumb/Electrify System	2	ls		$2,000.00	$8,500.00		$0	$4,000	$17,000	$0	$21,000
6.25 System Start-Up and Testing	1	ls		$1,000.00	$2,000.00		$0	$1,000	$2,000	$0	$3,000
Subtotal							$180,821	$118,598	$208,477	$74,180	$582,076
Local Area Adjustments							100.0%	113.5%	87.0%	87.0%	
							$180,821	$134,609	$181,375	$64,537	$561,341
Overhead on Labor Cost @ 30%									$54,412		$54,412
G & A on Labor Cost @ 10%									$18,137		$18,137
G & A on Material Cost @ 10%								$13,461			$13,461
G & A on Equipment Cost @ 10%										$6,454	$6,454
G & A on Subcontract Cost @ 10%							$18,082				$18,082
Total Direct Cost							$198,903	$148,070	$253,925	$70,990	$671,888

NAVAL AIR STATION, CECIL FIELD
Jacksonville, Florida
Site 59 - Buildings 324/1845 Areas
Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Indirects on Total Direct Cost @ 35%											$235,161
Profit on Total Direct Cost @ 10%											$67,189
Subtotal											$974,237
Health & Safety Monitoring @ 2%											$19,485
Total Field Cost											$993,722
Contingency on Total Field Costs @ 20%											$198,744
Engineering on Total Field Cost @ 5%											$49,686
TOTAL CAPITAL COST											**$1,242,153**

NAVAL AIR STATION, CECIL FIELD
Jacksonville, Florida
Site 59 - Buildings 324/1845 Areas
Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring
Operation and Maintenance Cost

	Item	Quantity	Unit	Unit Cost	Subtotal	Notes
Treatment System (operate for 1 year)						
1	Energy - Electric	20,000	kWh	$0.08	$1,600	
2	TCE "Hot-Spot" No. 2A Additives					
	a: Sodium Lactate	860	pound	$2.00	$1,720	
	b: Sodium Bicarbonate	4,590	pound	$0.30	$1,377	
	c: Dihalococcides (DHC) bacteria	62	liter	$270.00	$16,740	
3	TCE "Hot-Spot" No. 2B Additives					
	a: Sodium Lactate	1,530	pound	$2.00	$3,060	
	b: Sodium Bicarbonate	4,590	pound	$0.30	$1,377	
	c: Dihalococcides (DHC) bacteria	110	liter	$270.00	$29,700	
4	TCE "Hot-Spot" No. 3 Additives					
	a: Sodium Lactate	2,450	pound	$2.00	$4,900	
	b: Sodium Bicarbonate	4,760	pound	$0.30	$1,428	
	c: Dihalococcides (DHC) bacteria	170	liter	$270.00	$45,900	
5	System Operations Labor					
	First Month	168	hours	$55.00	$9,240	8 hours a day, 5 days a week
	Months 2 through 12	384	hours	$55.00	$21,120	8 hours a day, 1 day a week
6	Process Monitoring Sample Analyses	1	ls	$100,000	$100,000	
7	Quarterly Reports	4	ea	$5,000	$20,000	
				Subtotal	$258,162	
				Contingency @ 10%	$25,816	
				TOTAL	**$283,978**	

NAVAL AIR STATION, CECIL FIELD
Jacksonville, Florida
Site 59 - Buildings 324/1845 Areas
Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring
Annual Cost

Item	Item Cost year 1	Item Cost years 2 & 3	Item Cost years 4 & 5	Item Cost years *1	Item Cost year *2	Item Cost every 5 years	Notes
Site Inspection: Visit	$1,830	$1,830	$1,830	$1,830	$1,830		One-day visit to verify LUC RD
Site Inspection: Report	$800	$800	$800	$800	$800		
Sampling	$96,120	$48,060	$24,030	$24,030	$24,030		Labor and supplies to collect samples from wells using a local crew of two, four times in year 1, two times in years 2 & 3, once a year for years 4 through 30.
Analysis/Water	$22,176	$11,088	$5,544	$5,390	$5,544		Analyze groundwater samples for TCL VOCs in years 1 through 30.
Analysis/Water	$33,880	$16,940	$8,470				Analyze groundwater samples for natural attenuation parameters in years 1 through 5.
Report	$8,000	$4,000	$2,000	$2,000	$2,000		Document sampling events and results
Site Review						$15,000	Five Year Site Reviews
Subtotal	$162,806	$82,718	$42,674	$34,050	$34,204	$15,000	
Contingency @ 10%	$16,281	$8,272	$4,267	$3,405	$3,420	$1,500	
TOTAL	**$179,087**	**$90,990**	**$46,941**	**$37,455**	**$37,624**	**$16,500**	

years *1 = years 6 to 9, 11 to 14, 16 to 19, 21 to 24, 26 to 29
years *2 = 10, 15, 20, 25, 30

NAVAL AIR STATION, CECIL FIELD

Jacksonville, Florida

Site 59 - Buildings 324/1845 Areas

Alternative 4A: In-situ Biological Treatment of TCE "Hot-Spots", National Attenuation, Institution Controls, and Monitoring

Present Worth Analysis

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Year	Capital Cost	Operation & Maintenance Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$1,242,153			$1,242,153	1.000	$1,242,153
1		$283,978	$179,087	$463,065	0.935	$432,966
2			$90,990	$90,990	0.873	$79,434
3			$90,990	$90,990	0.816	$74,248
4			$46,941	$46,941	0.763	$35,816
5			$63,441	$63,441	0.713	$45,234
6			$37,455	$37,455	0.666	$24,945
7			$37,455	$37,455	0.623	$23,334
8			$37,455	$37,455	0.582	$21,799
9			$37,455	$37,455	0.544	$20,376
10			$54,124	$54,124	0.508	$27,495
11			$37,455	$37,455	0.475	$17,791
12			$37,455	$37,455	0.444	$16,630
13			$37,455	$37,455	0.415	$15,544
14			$37,455	$37,455	0.388	$14,533
15			$54,124	$54,124	0.362	$19,593
16			$37,455	$37,455	0.339	$12,697
17			$37,455	$37,455	0.317	$11,873
18			$37,455	$37,455	0.296	$11,087
19			$37,455	$37,455	0.277	$10,375
20			$54,124	$54,124	0.258	$13,964
21			$37,455	$37,455	0.242	$9,064
22			$37,455	$37,455	0.226	$8,465
23			$37,455	$37,455	0.211	$7,903
24			$37,455	$37,455	0.197	$7,379
25			$54,124	$54,124	0.184	$9,959
26			$37,455	$37,455	0.172	$6,442
27			$37,455	$37,455	0.161	$6,030
28			$37,455	$37,455	0.15	$5,618
29			$37,455	$37,455	0.141	$5,281
30			$54,124	$54,124	0.131	$7,090
					TOTAL PRESENT WORTH	**$2,245,118**