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RECORD OF DECISION FOR OPERABLE UNIT 5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA NAS CECIL FIELD FL

6/1/2008

TETRA TECH NUS INC

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

CONTRACT NUMBER N62467-04-D-0055

Record of Decision
Operable Unit 5, Site 15
Blue 10 Ordnance Disposal Area

Naval Air Station
Cecil Field
Jacksonville, Florida

Contract Task Order 0102

June 2008

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

TETRA TECH NUS, Inc.

RECORD OF DECISION

OPERABLE UNIT 5, SITE 15
BLUE 10 ORDNANCE DISPOSAL AREA

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0102

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PREPARED UNDER THE SUPERVISION OF:

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

APPROVED FOR SUBMITTAL BY:

DEBRA M. HUMBERT
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

This document that describes the Record of Decision for Operable Unit 5, Site 15, 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.

Robert F. Simcik, P.E.
Professional Engineer No. 61263

Date: 6/1/08

ROBERT FRANK SIMCIK
LICENSE
No. 00061263
6/1/08
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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LIST OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc
ARAR	Applicable or relevant and appropriate requirement
BaPEq	Benzo(a)pyrene equivalent
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
COE	United States Army Corps of Engineers
COPC	Chemical of potential concern
cPAH	Carcinogenic PAH
CSF	Cancer Slope Factor
CWA	Clean Water Act
EBS	Environmental Baseline Survey
EE	Envirodyne Engineers
ERA	Ecological risk assessment
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
HLA	Harding Lawson Associates
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IBDS	Inorganic background data set
IR	Installation Restoration
JEDC	Jacksonville Economic Development Commission
LDR	Land Disposal Restriction
LUC	Land use control

MCL	Maximum Contaminant Level
MEC	Munitions and explosives of concern
mg/kg	Milligrams per kilogram
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
µg/L	Micrograms per liter
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NPW	Net present worth
O&M	Operation and maintenance
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PEC	Probably effect concentrations
PRE	Preliminary Risk Evaluation
RAB	Restoration Advisory Board
RAC	Remedial Action Contractor
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
SCTL	Soil cleanup target level
SPLP	Synthetic Precipitation Leaching Procedure
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TEC	Threshold effects concentration
TNT	Trinitrotoluene
TRPH	Total recoverable petroleum hydrocarbons
TSDF	Treatment, storage, and disposal facility
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper confidence limit

U.S.C.	United States Code
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
UTS	Universal treatment standard
UXO	Unexploded ordnance
VOC	Volatile organic compound
yd^3	Cubic yards
YWWA	Yellow Water Weapons Area

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Operable Unit (OU) 5, Site 15, Blue 10 Ordnance Disposal Area, consists of the contaminated soil identified at Site 15 at 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 15 is located in the west-central portion of the Main Base, in the southwestern part of the Yellow Water Weapons Area (YWWA).

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for contaminated soil at OU 5, Site 15, NAS Cecil Field. The Site 15 remedial action was selected 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 (U.S. EPA, 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 IV 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 5, Site 15 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 soil at OU 5, Site 15. The selected remedy eliminates unacceptable exposure to surface soil containing benzo(a)pyrene equivalents (BaPEqs), arsenic, lead, and total recoverable petroleum hydrocarbons (TRPH) at concentrations greater

than the established site-specific soil cleanup target levels (SCTLs). The selected remedy also reduces ecological risk associated with exposure to surface soil containing BaPEqs, arsenic, and lead at concentrations greater than the established site-specific ecological target levels.

The remediation of OU 5, Site 15 will not adversely impact the anticipated future land use of the site, which is as a natural and recreational corridor. The selected remedy for OU 5, Site 15 soil includes excavation, on-site solidification/stabilization and off-site treatment and disposal of contaminated soil to allow low-intensity recreational reuse of the site, and land use controls (LUCs) that will limit land use to low-intensity recreational activities.

The selected remedy was determined based on evaluation of 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:

- Excavation, on-site solidification/stabilization, and off-site treatment and disposal of contaminated soil at a permitted landfill, followed by backfilling and revegetating, will enable the site to be used for low-intensity recreational purposes. A confirmation groundwater sample will be collected after the soil excavation is completed to verify that no adverse impacts to the aquifer occurred as a result of excavation activities.

- LUCs, including deed restrictions, will be implemented to limit land use to low-intensity recreational purposes and to prevent residential, commercial/industrial, and medium- and high-intensity recreational development. Annual inspections will be conducted to verify the continued implementation of the LUCs, which will remain applicable during Navy and subsequent ownership of the site.

Low-intensity recreational use consists of activities such as hiking, biking, horseback riding, birding, and hunting. No man-made attractions will be provided that would entice people, particularly small children, to frequently visit the site, which is consistent with the property's proposed reuse as a natural resource corridor. Medium- and high-intensity recreational use will not be permitted. Medium-intensity recreational use includes picnicking and camping. High-intensity recreational use includes children's playgrounds and contact sports such as baseball, football, and soccer.

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 soil remaining on site, LUCs will be instituted to prevent residential, commercial/industrial, and medium- and high-intensity recreational uses 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. If the remedy is determined not to be protective of human health and the environment because the LUCs have failed, the Navy may be required to undertake additional remedial action.

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 OU 5, Site 15.

1.7 AUTHORIZING SIGNATURES

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

June 4, 2008
Date

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

June 6, 2008
Date

TABLE 1-1

ROD DATA CERTIFICATION CHECKLIST
OU 5, SITE 15 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 2-11; Appendix B
Baseline risk represented by the COCs	Section 2.6, pages 2-12 through 2-14
Cleanup goals established for the COCs	Section 2.7, pages 2-14 through 2-16
Disposition of source materials constituting principal threat	Section 2.11 pages 2-24 through 2-29
Current and reasonably anticipated future land use scenario used for risk assessment	Section 2.5.3, page 2-12
Potential land uses available at the sites as a result of the selected remedy	Section 2.11.4, page 2-30
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 2-29; Appendix C
Key factors that lead to the selection of the remedy	Section 2.11.1, page 2-24

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

OU 5, Site 15, Blue 10 Ordnance Disposal Area, 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 5 consists of contaminated soil identified at Site 15. As shown on Figure 2-1, Site 15, Blue 10 Ordnance Disposal Area, is located in the southwestern section of the YWWA of NAS Cecil Field. The site covers approximately 85 acres and is heavily forested and relatively flat (see Figure 2-2). The ordnance burn chamber and static rocket firing pad located in the north-central portion of the site are the only structures currently remaining at the site. The burn chamber is a rounded, steel, tank-like container, approximately 10 feet in length and 4 feet in height. The static rocket firing pad is an L-shaped concrete structure approximately 10 feet long by 4 feet wide by 6 feet high. Several concrete building foundations, remnants of buildings that supported skeet range activities, are located in the area surrounding the burn chamber and firing pad (see Figure 2-3). Site 15 includes five wetland areas designated as Wetlands A to F and covering a combined area of approximately 4.6 acres.

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 5 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 on October 13, 1996. The HSWA permit was renewed 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 15.

2.2.1 Site 15 History

From the early 1940s to the mid-1950s, the site was used as a skeet range. The former skeet range was approximately 1,000 feet by 2,400 feet in size, with the long axis of the range being parallel to and east of the existing access road.

Ordnance was disposed at Site 15 from the mid-1960s through 1977, and disposal consisted of burning of ordnance materials in a large metal chamber and static firing of rockets (EE, 1985). The ordnance disposal structures were located west of the skeet range. The majority of ordnance disposed at the site was burned and included small arms munitions up to 20 millimeters in size, parachute and distress flares, Mark IV signal cartridges, rocket igniters, cartridge activated devices, and 2.75-inch and 5-inch rockets. Rocket propellant also was reportedly placed on the ground and ignited in the area of the burn chamber. Rockets were disposed by static firing of both 2.75-inch and 5-inch rockets from a firing pad located south of the burn chamber. An estimated 2.5 tons of ordnance was disposed at the site each month; overall, an estimated 350 tons of ordnance was disposed at the site while it was in operation.

Review of aerial photographs from 1952, prior to the initiation of ordnance disposal on Site 15, shows an active trap and skeet range facility at the site. The area covered by the skeet range appears relatively large, approximately 50 acres in size, and is centered over the area in which the burn chamber and firing pad were constructed. Photographs taken in 1960 show the lineaments of the skeet range; however, the range did not appear to be active at that time. Photographs taken in 1980 no longer show any indication that a skeet range had once occupied the area. The site appears mostly forested in photographs taken in 1980, with a 3-acre open area immediately to the north of Site 15. No visual evidence of ordnance disposal was apparent at that time, which also supports the historical documentation. Prescribed burning by the Navy and wildfires have occurred in the southwestern corner of Site 15. The latest wildfire took place in the spring of 1999.

2.2.2 Site Investigations

Several environmental investigations were performed at Site 15 starting with an Environmental Baseline Survey (EBS) [ABB Environmental Services, Inc. (ABB-ES), 1994] and continuing through a Remedial Investigation (RI) (ABB-ES, 1997), Feasibility Study (FS) (TtNUS, 2007a), and Amended FS (TtNUS, 2008a). These investigations showed that Site 15 soil is contaminated with polynuclear aromatic hydrocarbons (PAHs), metals (arsenic and lead), and TRPH.

The following investigations and studies have been conducted in and around Site 15:

- 1988 – A base-wide RFI was performed by Harding Lawson Associates (HLA) (1988) to verify the existence of suspected hazardous constituents at various waste disposal sites, to delineate the boundaries of potentially contaminated sites, to investigate the surficial aquifer and potable water supply wells, and to investigate selected surface areas for possible contamination. Only one surface soil sample was collected at Site 15 as part of the RFI. A geophysical survey was also conducted at this site.

- July 1993 – As part of the Basewide Ecological Assessment, one soil sample was collected at Site 15 (HLA, 1998b).

- August 1994 to April 1995 – As part of the RI (ABB-ES, 1997), a field screening program consisting of an unexploded ordnance (UXO) survey, surface and subsurface soil screening, and the installation of piezometers was completed. No UXO was found during the survey, but several pieces of metal shell casings, and similar items were located and removed. The soil screening program, designed to delineate the nature and extent of contamination in surface soil using on-site and off-site data analysis, included the collection of 324 samples for off-site lead analysis, 263 samples for on-site PAH analysis, 146 samples for on-site trinitrotoluene (TNT) analysis, and 136 samples for on-site TRPH analysis. Subsurface soil screening consisted of the collection of 16 subsurface soil samples [to 7 feet below ground surface (bgs)] from four soil borings advanced in the area of the burn chamber and blast platform. Subsurface soil samples were analyzed off site for lead and on site for volatile organic compounds (VOCs), PAHs, and TRPH. Four temporary piezometers were installed to determine the direction of groundwater flow in the surficial aquifer. Evaluation of water level data collected on three separate occasions indicated that flow direction is to the southwest toward Yellow Water Creek. A groundwater screening program was not implemented at Site 15 because the potential chemicals of concern (COCs) were known to be relatively immobile when sorbed to site soil. However, eight monitoring wells, which would be used during the confirmatory sampling event, were installed at locations based on the water level data.

- July and August 1995 – As part of the RI, ABB-ES performed a confirmatory sampling and analysis event for surface and subsurface soil at Site 15 to verify the nature and extent of contamination in soil delineated during the screening process. During this sampling round, 34 surface soil samples were collected at depths of 0 to 1 foot bgs and analyzed for Target Compound List (TCL) organics, Target Analyte List (TAL) inorganics, TRPH, and nitroaromatics. Six additional surface soil samples were analyzed for lead, four additional surface soil samples were analyzed for PAHs, and three additional surface soil samples were analyzed for nitroaromatics. Also during this sampling round, 12 subsurface soil samples were collected at depths of 1 to 3 feet (immediately above the water table) and were analyzed for TCL organics, TAL inorganics, TRPH, and nitroaromatics. One additional subsurface soil sample was analyzed for PAHs only, and one additional subsurface soil sample was analyzed for nitroaromatics only. In addition, groundwater samples collected from eight wells were submitted for analysis for TCL organics, TAL inorganics, TRPH, and nitroaromatics. Finally, a surface water and sediment sampling program was completed to assess potential contaminant migration through groundwater-surface water interaction, surface runoff and/or soil erosion, and to assess potential human health and ecological risks. One surface water/sediment sample upgradient of the site and two downgradient surface water/sediment samples were collected and analyzed for TCL organics, TAL inorganics, TRPH, and nitroaromatics. Analyses of surface water wet chemistry parameters including cyanide, hexavalent chromium, sulfide, total dissolved solids, alkalinity, hardness, total phosphate, and Kjeldahl nitrogen were also completed.

- June 1996 – Soil toxicity testing to evaluate ecological risk was preformed. Six soil samples, including a reference sample, were collected for whole-soil toxicity testing. Two additional soil samples were also collected for definitive (dilution series) toxicity testing.

- February 1997 – To support the RI, 38 additional surface soil samples from 17 screening locations across the site were submitted for sieve and lead analysis. The objective of this additional sampling effort was to determine if it was feasible to separate lead shot and lead shot fragments from soil, if the remaining lead shot was responsible for high lead concentrations or if concentrations are due to lead leached into the soil, if the vertical profile of lead concentrations was localized at the ground surface, and if the soil would be considered under RCRA as characteristically hazardous if excavated. Four samples from each of the seven locations with the highest lead concentrations at the site were collected at 3-inch intervals from the ground surface to a depth of 1 foot. Single samples were collected at a depth of 0 to 1 foot bgs from the remaining 10 locations of lesser lead concentrations, although concentrations at these locations exceeded the U.S. EPA soil screening value [400 milligrams per kilogram (mg/kg)]. All samples were submitted for lead analysis and Toxicity Characteristic Leaching Procedure (TCLP) lead analysis.

- May 1997 – Another sampling event for surface and subsurface soils involved the collection of 14 surface soil samples analyzed for lead, nine surface soil samples analyzed for antimony and arsenic, and eight subsurface soil samples analyzed for PAHs. During this event, four sediment and surface water samples were collected and analyzed for select parameters. Surface water samples were analyzed for lead; sediment samples were analyzed for lead, PAHs, and TRPH. This represented the last data included in the OU 5 (Site 15) RI Report (ABB-ES, 1997).

- December 1997 – An additional sampling event was conducted, which included the collection of nine soil samples from four locations. Seven of these samples were analyzed for antimony and arsenic, and the other two samples were analyzed for PAHs.

- April to June 1999 – A supplemental sampling event for surface soil and sediment at Site 15 took place during the months of April and June 1999. The purpose of this program was to further determine the limits of lead and PAH contamination in site surface soil. This sampling event involved the collection of surface soil samples from 130 new locations. A total of 78 samples were collected for lead analysis, and 60 samples were collected for PAH analysis. Eight of the 130 surface soil locations were analyzed for both PAHs and lead. During this sampling round, six sediment samples were also collected and analyzed for PAHs and lead.

- February 2000 – A supplemental sampling event to obtain data to develop site-specific leachability values for PAHs at Site 15 was conducted. Five surface soil samples were collected from 0 to 1 foot bgs for PAHs and Synthetic Precipitation Leaching Procedure (SPLP) analysis (TtNUS, 2003c).

- April 2000 – Groundwater samples were collected from the eight existing wells at the site and were analyzed for PAHs, nitroaromatics, arsenic, antimony, and lead (TtNUS, 2003c).

- June 2001 – A supplemental sampling event was conducted to support an ecological study. Soil samples were collected from locations with a range of previous lead detections for subsequent invertebrate sampling. Thirty-one surface soil samples were collected and analyzed for lead. The samples consisted of the first 3 inches of mineral soil and the overlying duff (decaying organic matter) atop the mineral horizon. This investigation also included the collection of 15 invertebrate samples that were analyzed for lead. This investigation was conducted to generate ecologically based remediation goals for PAHs and lead in surface soil at the site (TtNUS, 2003a).

- May 2003 – A supplemental sampling event was conducted to delineate the vertical extent of PAH and lead contamination and to delineate the horizontal extent of arsenic contamination. Thirty-eight

surface soil samples were collected; 17 samples from 0 to 1 foot bgs and 21 samples from 1 to 2 feet bgs.

- June to August 2003 – Another supplemental sampling event was conducted to delineate the vertical extent of TRPH and lead contamination and to delineate the horizontal extent of arsenic contamination in soil. Six soil samples were collected, three samples from 0 to 1 foot bgs, one sample from 1 to 2 feet bgs, and two samples from 2 to 3 feet bgs. This investigation also included the installation of six new monitoring wells and collection of groundwater samples from these new wells and one existing well. The new monitoring wells were installed in the locations where soil contaminant concentrations exceeded FDEP SCTLs for leachability based on groundwater criteria (TtNUS, 2003c).

- October 2003 – A wetland delineation study was performed to identify areas meeting the definitions of wetlands used by the U.S. EPA and United States Army Corps of Engineers (COE) under Section 404 of the Clean Water Act (CWA) [33 United States Code (U.S.C.) 1344)]. The delineation also identified areas meeting the definition of wetlands used by the FDEP and St. Johns River Water Management District under Chapter 62-340 of the Florida Administrative Code (F.A.C.). Six areas were identified within Site 15 as meeting the U.S. EPA and COE delineation criteria. These areas were designated as Wetlands A, B, C, D, E, and F. These six areas also meet the FDEP and St. Johns River Water Management District delineation criteria. All are non-tidal, freshwater wetlands. Wetlands A, B, C, D, and E can be classified as “adjacent” wetlands subject to regulation under Section 404 of the CWA. Wetland F can be classified as an “isolated” wetland not under the jurisdiction of Section 404 of the CWA. The study showed that the three larger wetlands (A, C, and D) appear to be of natural origin, providing a good habitat for terrestrial wildlife and offering substantial aesthetic and scientific value as natural features. As such, it was recommended that efforts be made to minimize the disturbance of these three wetlands during any remediation of Site 15 and that they be restored following such remediation. The study also showed that three smaller wetlands (B, E, and F) appear to be of man-made origin and are clearly of lower significance with respect to wetland values and functions. Although these smaller wetlands are still subject to federal and/or State regulation, extraordinary efforts to minimize their disturbance or to restore them were not recommended (TtNUS, 2003b).

- Late 2003 to early 2004 – A Geostatistical Assessment Report (Newfields, 2004) was prepared for soil data to develop more accurate estimates of the areas and volumes requiring remediation based on human health and ecological criteria. This report was used to identify and delineate the following areas:

- Areas where concentrations of lead in soil are greater than the 6,500 mg/kg acute human health toxicity criterion.

- Areas to be excavated so that the mean soil lead concentration of any 2-acre parcel is less than the 2,512 mg/kg mammalian ecological criterion.

- Areas to be excavated so that site-wide 95-percent upper confidence limit (UCL) of the mean concentration of BaPEqs in the remaining soil is less than the 2,250 micrograms per kilogram (µg/kg) human health toxicity criterion.

- Areas where concentrations of BaPEqs in soil are greater than 6,750 µg/kg, or three times the human health toxicity criterion.

Based on the above criteria, the geostatistical assessment determined that the areas to be excavated for lead totaled 1.84 acres and those to be excavated for BaPEqs totaled 5.33 acres, with no overlap. Assuming a 1-foot excavation depth, the total excavation volume was estimated as approximately 11,600 cubic yards (yd^3) (Newfields, 2004).

- January 2005 – Supplemental sampling was performed. The first objective of this sampling was to investigate the potential for dioxins in soil immediately beyond the area earmarked for excavation around the burn chamber and the static rocket stand. The second objective of this sampling was to investigate the potential for perchlorate in groundwater of the same area. During this investigation, two surface soil samples were collected and analyzed for dioxin, and two groundwater samples were collected from two existing monitoring wells and analyzed for perchlorate. Analytical results for these samples showed no exceedances.

- August 2006 – Wells CEF-015-1S and CEF-015-05S were reinstalled (as CEF-015-01SR and CEF-015-05SR) and sampled to address exceedances of RDX (CEF-015-1S only) and 4,4'-DDE FDEP Groundwater Cleanup Target Levels (GCTLs) detected in 1995 in these wells that had since been abandoned (TtNUS, 2006). The results of this resampling showed RDX and 4,4'-DDE concentrations to be less than analytical detection limits (0.07 µg/L for RDX, 0.02 µg/L for 4,4'-DDE) at both locations.

- November 2005 to February 2007 – Three rounds of additional groundwater sampling were performed in the vicinity of well CEF-015-13S where a filtered arsenic concentration of 13.7 µg/L was detected inn July 2003. At that time, this concentration was less than the arsenic federal Maximum Contaminant Level (MCL) and FDEP GCTL, but these criteria were subsequently revised from 50 to

10 µg/L, prompting further investigation. In addition, the groundwater sample collected from well CEF-015-13S in 2003 was very turbid, with a reading of greater than 1,000 nephelometric turbidity units (NTUs), which cast doubt on the validity of the analytical results. In November 2005, well CEF-015-15S was installed and sampled at the location of CEF-015-13S, which had been abandoned along with the other Site 15 wells. The unfiltered arsenic concentration in this sample was 16.5 µg/L, which was still greater than the revised MCL and GCTL, but groundwater turbidity was again very high, measuring approximately 500 NTUs immediately before collection of the filtered sample. Well CEF-015-15S was resampled on March 15, 2006, but sample turbidity was again greater than 1,000 NTUs, and the unfiltered arsenic concentration was 14.7 µg/L. In an effort to obtain a suitable sample, a new smaller (1-inch-diameter) direct-push technology (DPT) well identified as CEF-015-13S(R) was installed a few feet away from CEF-015-15S and sampled on March 21, 2006. However, a clear (non-turbid) sample could not be obtained, and the unfiltered arsenic concentration was 22.4 µg/L. Finally, in February 2007, a new 2-inch well identified as CEF-015-16S was installed at the same location but with a larger-diameter fine sand pack (30/45) and a smaller screen slot size (0.0006-inch). After several days of purging, groundwater turbidity was reduced to approximately 110 NTUs, which is still greater than what standard procedures generally identify as appropriate (10 NTUs), but the sample was relatively clear compared to samples previously submitted. The unfiltered arsenic concentration in this sample was less than the analytical detection limit of 2.8 µg/L.

- April 2007 – The Navy's Remedial Action Contractor (RAC), CH2MHill, conducted a site visit and sampling in preparation for planned excavation at the site. During these activities, unexploded ordnance (UXO) was identified, and it was determined that clearance for munitions and explosives of concern (MEC) was required. A separate munitions response is being conducted at the site in addition to the proposed CERCLA response. Sample data also resulted in a significant revision to the estimated amount of lead-contaminated soil that would be considered hazardous when excavated. Because of the resulting substantial increase in the estimated cost of the proposed remedial alternative for the site (Alternative 3A), the April 2007 FS (TtNUS, 2007a) was revised to include an additional alternative (Alternative 3C) that included on-site solidification/stabilization of lead-contaminated soil to reduce the amount that required disposal as hazardous. An Amended FS was submitted with the alternative in April 2008 (TtNUS, 2008a), and it was proposed as the selected remedy in the Amended Proposed Plan (TtNUS, 2008b).

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. A public notice of the availability of the Amended Proposed Plan for Site 15 (TtNUS, 2008b) was placed in the *Florida Times-Union* on May 1, 2008. A 30-day comment period was held from May 1 through May 31, 2008. The results of the

RI (ABB-ES, 1997), the Preliminary Risk Evaluation (PRE), remedial alternatives evaluated in the FS (TtNUS, 2006a), and the preferred alternative of the Proposed Plan 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 5, Site 15 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 is the final action for OU 5, Site 15. 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, 57, 58, and 59; OU 10, Sites 21 and 25; OU 11, Site 45; and OU 12, Sites 32, 42, 44, and Old Golf Course.

Investigations at OU 5, Site 15 indicated the presence of soil contamination from past operating practices. This contamination would pose an unacceptable human health risk if the land was to be used as a recreational area or for residential or commercial/industrial purposes. No previous actions have been taken in response to the contamination at Site 15.

The remedy documented in this ROD will achieve the RAOs for OU 5, Site 15, as listed in Section 2.7. Implementation of this remedy will allow low-intensity recreational reuse of the site, in accordance with the NAS Cecil Field Master Plan, which calls for reuse of the site as part of a natural and recreational corridor. This is also in accordance with the overall cleanup strategy for Cecil Field, which involves restoring the facility for beneficial reuse.

2.5 SUMMARY OF SITE CHARACTERISTICS

Physical characteristics of OU 5, Site 15 and nature and extent of contamination are discussed in Sections 3.0 and 4.0 of the RI Report (ABB-ES, 1997). These site characteristics are summarized in the following paragraphs.

2.5.1 Surface Hydrology, Soil, and Hydrogeology

Drainage at Site 15 is limited because only two drainage pathways intersect the general area of the site. The primary pathway is a relatively short drainage ditch, 500 feet in length that drains the south-central section of the site. This drainage ditch appears to be a natural drainage conduit, which begins in a shallow depression, and is 3 to 4 feet in depth and 10 to 12 feet in width. The shallow depression is located adjacent to and south of the paved road in the south-central portion of the site and drains into Yellow Water Creek. Flow through the drainage ditch is intermittent, and the rate of flow depends on rainfall. Additionally, flow could also be fed by groundwater at certain times of the year. The second drainage pathway is a drainage ditch that flows past the northwestern perimeter of the site. This drainage ditch is relatively shallow, 8 to 10 inches in depth, and approximately 2 to 3 feet wide. Flow through the drainage ditch is also intermittent, and the rate of flow depends on rainfall. This drainage ditch drains southwest into Caldwell Branch and ultimately into Yellow Water Creek.

Three soil types cover Site 15 in nearly equal percentages, including the Olustee Fine Sand, the Leon Fine Sand, and Ridgeland Fine Sand. Each of the three soil types is described as a nearly level, poorly drained soil found in broad flatwood areas. Natural vegetation on these soil types consists predominantly of oak, pine, and saw palmetto. Depth to groundwater in the soil types ranges from less than 10 inches bgs for 2 to 4 months of the year to 10 to 40 inches bgs during the remainder of the year. Permeability through the upper 6 inches of each soil type is moderate to rapid [United States Department of Agriculture (USDA), 1978].

Three water-bearing systems are present beneath Site 15, including, in descending order, the surficial aquifer system, the intermediate aquifer and confining units, and the Floridan Aquifer system. Only the surficial aquifer was investigated at Site 15. The surficial aquifer at Site 15 is composed predominantly of sand from the ground surface to an approximate depth of 66 feet bgs. The water table is unconfined beneath the site and may range between 1 and 4 feet bgs during the year depending on rainfall events. The maximum total depth of monitoring wells installed in the surficial aquifer at Site 15 is approximately 14 feet bgs. Sand was reported from the ground surface to total depth in the monitoring well lithologic logs.

2.5.2 Nature and Extent of Contamination

2.5.2.1 Surface Soil

Organic compounds detected in surface soil at Site 15 in excess of FDEP residential SCTLs included carcinogenic PAHs (cPAHs), evaluated collectively as BaPEqs. Fourteen PAHs, carbazole, dieldrin, 3- and 4-nitrotoluene, and TRPH were detected at concentrations in excess of FDEP leachability to groundwater SCTLs. Inorganics detected in surface soil in excess of SCTLs and NAS Cecil Field site-specific Inorganic Background Data Set (IBDS) values included antimony, arsenic, and lead. Figures 2-4 and 2-5 present the concentrations of PAHs and lead, respectively, detected in surface soil. A summary of analytical results is provided in Appendix B.

2.5.2.2 Subsurface Soil

Organic compounds detected in Site 15 subsurface soil at concentrations greater than residential SCTLs include BaPEqs. Six PAHs and carbazole were detected at concentrations greater than leachability SCTLs. No inorganics were detected in subsurface soil in excess of SCTL or IBDS values. A summary of analytical results is provided in Appendix B.

2.5.2.3 Groundwater

Concentrations of bis(2-ethylhexyl) phthalate exceeded its GCTL, but because it is a common laboratory and field contaminant, it was not considered a COC at Site 15. A summary of analytical results is provided in Appendix B.

2.5.2.4 Sediment

Maximum concentrations of 11 PAHs exceeded FDEP threshold effects concentrations (TECs) and probable effects concentrations (PECs). Maximum concentrations of three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4' DDT) were greater than TECs but less than PECs. Lead was the only inorganic analyte detected at concentrations exceeding its TEC, and lead concentrations in some samples also exceeded its PEC. A summary of analytical results is provided in Appendix B.

2.5.2.5 Surface Water

Lead was detected in surface water at concentrations greater than the FDEP surface water standard and the IBDS value. The concentration of copper (only one detected value) barely exceeded the FDEP surface water standard and IBDS value. A summary of analytical results is provided in Appendix B.

2.5.3 Current and Potential Future Site Uses

Site 15 is currently not in use. The Jacksonville Economic Development Commission (JEDC) Reuse Plan provides for the future use of the site as a natural and recreation corridor. Based on this reasonably anticipated future land use, low-intensity recreational use is permitted, and residential, industrial/commercial, and high- and medium-intensity recreational uses are prohibited. Low-intensity recreational use consists of activities such as hiking, biking, horseback riding, birding, and hunting. No man-made attractions will be provided that would entice people, particularly small children, to frequently visit the site, which is consistent with the property's proposed reuse as a natural resource corridor. Medium- and high-intensity recreational use will not be permitted. Medium-intensity recreational use includes picnicking and camping. High-intensity recreational use includes children's playgrounds and contact sports such as baseball, football, and soccer. No use of groundwater is expected under the natural and recreational corridor reuse scenario.

2.6 SUMMARY OF SITE RISKS

2.6.1 Human Health Risk Assessment

For Site 15, the human health risk assessment was conducted as a PRE, which is a screening-level evaluation of potential risks from site contaminants to human receptors at the site. Although a site may have numerous hypothetical receptors, the PRE uses the most sensitive receptor for risk calculations. Therefore, the protection of the residential receptor formed the basis for selecting chemicals of potential concern (COPCs) at Site 15 and formed the basis for determining if potential risks are significant at the site.

For surface soil, BaPEqs and arsenic were the carcinogens detected at maximum concentrations greater than residential SCTLs. Together, the potential carcinogenic risk estimated for the maximum detected concentrations of these constituents was 9.8×10^{-3} for potential future residents. This exceeds the FDEP's target risk of 1×10^{-6} and U.S. EPA target risk range of $1 \times 10^{-}4$ to 1×10^{-6}. Using the UCL concentrations for these constituents, the potential carcinogenic risk for industrial exposure is 5.0×10^{-5}. This exceeds FDEP's target risk but is within U.S. EPA's target risk range. For surface soil, TRPH and antimony were the non-carcinogens detected at maximum concentrations greater than residential SCTLs. Together, the Hazard Quotient (HQ) estimated for the maximum detected concentrations of these constituents is 91.4. This exceeds the FDEP and U.S. EPA target HQ of 1.0. Using the UCL concentrations for these constituents, the potential HQ for industrial exposure is 0.98, which is less than the target HQ. With regard to exposure to lead, the maximum lead concentration exceeds the residential SCTL, but the average concentration is less than the industrial SCTL.

Concentrations of 14 PAHs and TRPH in surface soil exceeded leachability SCTLs. However, these constituents were not detected in groundwater at the site; therefore, they would not be expected to pose any adverse impact to human health.

For subsurface soil, BaPEqs was the carcinogen detected at maximum concentrations greater than its residential SCTL. The potential carcinogenic risk estimated for the maximum detected concentration of BaPEqs is 4.9×10^{-4} for potential future residents. This exceeds the target risk for FDEP and U.S. EPA. Using the UCL concentration of BaPEqs, the potential carcinogenic risk for industrial exposure is 7.4×10^{-6}. This exceeds FDEP's target risk but is within U.S. EPA's target risk range.

The unacceptable risks due to potential exposure to BaPEqs, arsenic, TRPH, antimony, and lead in surface soil and BaPEqs in subsurface soil, as described above, necessitate the implementation of LUCs at the site.

Based on several groundwater sampling events, no chemicals were determined to exceed MCLs or risk-based concentrations. Therefore, there are no groundwater COCs, and remedial action for groundwater is not needed because there is no unacceptable human health risk associated with groundwater.

For sediment, exposure is treated in a manner similar to soil because sediments at the site are typically dry. BaPEqs is the carcinogen detected at maximum concentrations greater than its residential SCTL in sediment. The potential carcinogenic risk estimated for the maximum detected concentration of BaPEqs is 3.1×10^{-4} for potential future residents. This exceeds FDEP's target risk and U.S. EPA's target risk range. Using the UCL concentrations for BaPEqs, the potential carcinogenic risk for industrial exposure was 4.4×10^{-5}. This exceeds the target risk for FDEP but is within the target risk range for U.S. EPA. With regard to exposure to lead, the maximum lead concentration exceeds the residential SCTL, but the average concentration is less than the industrial SCTL.

In surface water, lead was detected at concentrations greater than its FDEP surface water cleanup target level. However, the presence of surface water at the site is intermittent, and surface water contamination was determined in the RI not to pose a significant risk to human health.

2.6.2 Ecological Risk Assessment

An ecological risk assessment (ERA) for Site 15 was conducted as part of the RI and was based on data from surface soil, sediment, and surface water samples collected in 1995 and 1997 (ABB-ES, 1997). Chemical concentrations in each of these media were compared to ecological screening values. In addition, the ERA evaluated risks to upper-level receptors by estimating doses for representative wildlife receptors and comparing the doses to literature-derived toxicity reference values. The ERA also

incorporated soil toxicity tests using laboratory-reared earthworms (*Eisenia foetida*) and lettuce seed (*Lactuca sativa*).

The ecological risk assessment concluded that potential risks to ecological receptors existed at the site, due primarily to lead and PAHs in soil. The ERA also concluded that potential risks to some ecological receptors might exist due to aluminum, antimony, and arsenic in soil; lead, PAHs, DDT, and its breakdown products in sediment; and lead in surface water.

Because the ditches from which sediment samples were collected provide no permanent habitat for aquatic communities (fish, etc.), the samples actually represent "damp soil" rather than sediment, and potential risk from lead and PAHs associated with these samples was determined to be more appropriately evaluated in the assessment of soil data. Site-related risk from 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT in sediment samples was determined to be negligible.

Lead concentrations in some surface water samples were elevated relative to ecological guidelines, but as mentioned above, the ditches provide no permanent habitat for aquatic communities. Lead-related risk has been investigated in other studies at NAS Cecil Field and appears to be negligible in water bodies into which these ditches drain. There are no other surface water bodies at Site 15.

For the reasons discussed above, the NAS Cecil Field BCT (composed of representatives from the Navy, U.S. EPA Region 4, and the FDEP) has concluded that ecological COPCs at Site 15 are limited to lead, PAHs, and arsenic in surface soil.

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 5, Site 15:

- Prevent unacceptable human health risk associated with exposure to Site 15 surface soil containing BaPEqs, arsenic, lead, and TRPH at concentrations greater than the established site-specific SCTLs.

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

2.7.1 Cleanup Goals

Cleanup goals are concentrations of contaminants in an environmental medium that, when attained, should achieve RAOs. Pickup levels are developed to ensure that contaminant exposure concentrations left on site are protective of human receptors (based on future low-intensity recreational land-use) and ecological receptors. For OU 5, Site 15, cleanup goals were established with consideration given to the following:

- Protection of human receptors from adverse health effects
- Protection of the environment from detrimental impacts from site-related contamination
- Compliance with ARARs and, to the extent practicable, To Be Considered criteria (TBCs)

2.7.1.1 Site-Specific SCTLs for Human Health

Site-specific SCTLs were developed for Site 15 COCs to be of protective of hypothetical future low-intensity recreational and residential receptors. Exposure assumptions used in the development of the site-specific SCTLs were agreed upon by the Navy, U.S. EPA, and FDEP. The following table summarizes the site-specific recreational SCTLs developed for Site 15 based on protection of human health and the Chapter 62-777, F.A.C., residential SCTLs for Site 15 COCs.

SCTLs for Site 15 COCs

COC	Site-Specific Recreational SCTL	FDEP Residential SCTL
BaPEqs	2,250 µg/kg	100 µg/kg
Lead (Acute exposure)	6,500 mg/kg	NA
Lead (Chronic exposure)	3,281 mg/kg	400 mg/kg
Antimony	1,440 mg/kg	27 mg/kg
Arsenic	36 mg/kg	2.1 mg/kg
TRPH	8,900 mg/kg	460 mg/kg

NA = Not applicable.

Detailed information about the development of site-specific human health SCTLs is provided in the FS and Amended FS Reports (TtNUS, 2007a and 2008a).

2.7.1.2 Site-Specific Ecological Target Levels

The methodologies through which ecological target levels (i.e., remediation goals for protection of ecological receptors) were developed were approved by representatives of the Navy, U.S. EPA Region 4, and FDEP. The following table summarizes the site-specific target levels developed for Site 15 based on protection of ecological receptors.

Site-Specific Ecological Target Levels

COC	Target Level
Total PAHs	1,121,520 µg/kg
Lead (invertebrates)	1,120 mg/kg
Lead (insectivorous birds)	990 mg/kg
Lead (insectivorous mammals)	2,512 mg/kg

Detailed information about the development of site-specific these target levels is provided in the FS and Amended FS Reports (TtNUS, 2007a and 2008a).

2.7.1.3 Soil Cleanup Goals and Pickup Values

A statistically based approach was used to determine the soil concentrations that must be removed to achieve UCLs or average concentrations less than or equal to site-specific SCTLs and ecological target levels. To ensure that the selected remedy achieves soil cleanup levels for human and ecological receptors, an evaluation was conducted to determine corresponding soil pickup levels. If soil with contaminant concentrations greater than pickup levels is removed, the 95-percent UCL, or average in the case of lead, of remaining concentrations will be less than cleanup goals. The evaluation of soil pickup levels to achieve cleanup goals took into account site-specific SCTLs for protection of human health (under a low-intensity recreational use scenario) and site-specific target levels for protection of ecological receptors. The lowest of these SCTLs and target levels determined to be required to protect all receptors within associated exposure units were chosen as pickup levels. Details of these evaluations are provided in the FS and Amended FS. The following table summarizes the ranges of COC concentrations at the site, cleanup goals for low-intensity recreational use, and pickup levels required to achieve these cleanup goals.

Low-Intensity Recreational Pickup Values

COC	Range of Detected Concentrations	Low-Intensity Recreational Use Cleanup Goal	Low-Intensity Recreational Use Pickup Value
BaPEqs	2.6 - 956,000 µg/kg	2,250 µg/kg	6,750 µg/kg
Arsenic	0.91 - 451 mg/kg	36 mg/kg	108 mg/kg
Lead	1.1 - 65,500 mg/kg	3,281 mg/kg (chronic)	6,500 mg/kg
TRPH	9.74 - 450 mg/kg	8,900 mg/kg	340 mg/kg

2.8 DESCRIPTION OF REMEDIAL ALTERNATIVES

This section provides a narrative of each alternative evaluated for the remediation of soil at OU 5, Site 15. For further information on the remedial alternatives, refer to the Site 15 Amended FS Report (TtNUS, 2008a) and Amended Proposed Plan (TtNUS, 2008b). As part of the Amended 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 Amended FS.

This ROD has selected Alternative 3C: Excavation to Meet Low-Intensity Recreational RAOs, On-Site Solidification/Stabilization, Off-Site Treatment and Disposal, and LUCs. A detailed description of the alternatives evaluated is provided in the Site 15 Amended FS Report (TtNUS, 2008a), and these alternatives are summarized below.

2.8.1 Alternative 1: No Action

Under this alternative, no remedial activities would occur to remove soil contamination, and no controls would be implemented to reduce exposure of human receptors. No periodic monitoring would be performed to evaluate the effectiveness of the No Action alternative. Under this alternative, the property would be released for unrestricted use.

This alternative would not protect human health and the environment because concentrations of BaPEqs, arsenic, and lead would remain in surface soil at levels that exceed site-specific SCTLs for human health and target levels for ecological receptors. This alternative would not achieve the RAOs or comply with ARARs. No treatment is 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, 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: Soil Cover To Meet Recreational RAOs and LUCs

A soil cover would be placed over the areas of Site 15 where concentrations of COCs in surface soil are greater than the low-intensity recreational use pickup values. A total of 22 areas with an overall surface area of approximately 7.2 acres would be capped with a 2-foot-thick soil cover. Following cover construction, the capped areas would be revegetated as appropriate, and impacted wetland areas would be restored. Because the cover would need to be maintained to prevent exposure to the contaminants remaining on site, inspection and maintenance of the cover would be required. In addition, LUCs (including enforceable deed restrictions and existing lease provisions) would be required to prohibit the land from being used for residential, commercial/industrial, and medium- and high-intensity recreational purposes and to prohibit the excavation of soil from the site unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. Maintenance of these LUCs 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 and the environment because the soil cover would ensure that the most likely future site users would be protected from exposure to unacceptable levels of contaminants. The use of LUCs would prevent potential residential, commercial/industrial, and medium- and high-intensity recreational receptors from being exposed to unacceptable contaminant levels remaining on site. This alternative would achieve RAOs and comply with location-specific and action-specific ARARs. There would be no reduction of contaminant toxicity, mobility, or volume through active treatment. There would be minimal short-term risks associated with the on-site remedial activities that would be addressed through appropriate health and safety procedures. The time frame for implementation of this alternative is estimated to be 1 year, after which the remedy would be protective assuming LUCs have been implemented. The activities for this alternative would be easy to implement. The capital cost, 30-year net present worth (NPW) of operation and maintenance (O&M) costs, and 30-year NPW cost for this alternative are estimated at $1,373,000, $247,000, and $1,620,000, respectively.

2.8.3 Alternative 3A: Excavation to Meet Recreational RAOs, Off-Site Treatment and Disposal, and LUCs

Soil would be removed from the areas of Site 15 where concentrations of COCs in surface soil are greater than the low-intensity recreational use pickup values. Approximately 11,850 yd^3 of contaminated soil would be excavated from the same 22 areas totaling approximately 7.2 acres that were considered for capping under Alternative 2. Most of the excavated soil (8,090 yd^3) would be disposed off site at a permitted RCRA non-hazardous (Subtitle D) treatment, storage, and disposal facility (TSDF), and the

remainder (3,760 yd^3) would be disposed off site at a permitted RCRA hazardous (Subtitle C) TSDF. The excavated areas would be backfilled with 11,850 yd^3 of clean imported fill material, then the site would be revegetated and impacted wetland areas would be restored. Because the soil remaining on site would continue to contain concentrations of contaminants that would not be protective of future residential, commercial/industrial, and medium- and high-intensity recreational receptors, LUCs (including enforceable deed restrictions and existing lease provisions) would be established and enforced to prevent the land from being used for those purposes. The LUCs would also prohibit excavation of soil from the site unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. Maintenance of LUCs 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 and the environment because the removal of contamination exceeding the established pickup values for low-intensity recreational receptors would ensure that future site users would be protected from exposure to unacceptable levels of contaminants. The use of LUCs would prevent potential future residential, commercial/industrial, and medium- and high-intensity recreational receptors from being exposed to unacceptable contaminant levels remaining on site. This alternative would achieve RAOs and comply with chemical-, location-, and action-specific ARARs. There would be a permanent and irreversible reduction of the mobility of 3,760 yd^3 of the most contaminated portion of the soil, which would be treated by chemical fixation/solidification at an off-site RCRA Subtitle C TSDF. The treated soil and the remaining excavated soil (11,850 yd^3) would be disposed in a Subtitle D landfill where its exposure to the environment would be adequately controlled. There would be minimal short-term risks associated with the on-site remedial activities, which would be addressed through appropriate health and safety procedures. The time frame for the implementation of this alternative is estimated to be 1 year, after which the remedy would be protective assuming LUCs have been implemented. The activities for this alternative would be readily implementable. The capital cost, 30-year NPW of O&M costs, and 30-year NPW cost for this alternative are estimated at $3,872,000, $35,000, and $3,907,000, respectively.

2.8.4 Alternative 3B: Excavation to Meet Recreational RAOs, On-Site Soil Washing and Reuse, and LUCs

Soil would be removed from the areas of Site 15 where concentrations of COCs in surface soil are greater than the low-intensity recreational use pickup values. Approximately 11,850 yd^3 of contaminated soil would be excavated from the same 22 areas totaling approximately 7.2 acres that are considered for excavation under Alternative 3A. The excavated soil would be screened on site, and approximately 600 yd^3 of oversized material would be landfilled at an off-site permitted RCRA Subtitle D facility. The screened soil would be treated on site by soil washing, and approximately 10,200 yd^3 of treated soil would be reused to backfill the excavated areas. The soil washing process would concentrate the contaminants

removed from the treated soil into a residue that would be disposed at an off-site RCRA Subtitle C TSDF. The backfilling of the excavated areas would be completed with 1,660 yd^3 of clean imported fill material, then the site would be revegetated and impacted wetland areas would be restored. Because the soil remaining on site would continue to contain concentrations of contaminants that would not be protective of future residential, commercial/industrial, and high- and medium-intensity recreational receptors, LUCs (including enforceable deed restrictions and existing lease provisions) would have to be established and enforced to prevent the land from being used for those purposes. The LUCs would also prohibit excavation of soil from the site unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. Maintenance of LUCs 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 and the environment because the treatment of contamination exceeding the established pickup values for a low-intensity recreational receptor would ensure that future site users would be protected from exposure to unacceptable levels of contaminants. The use of LUCs would prevent potential residential, commercial/industrial, and medium- and high-intensity recreational receptors from being exposed to unacceptable contaminant levels remaining on site. This alternative would achieve RAOs and comply with chemical-, location-, and action-specific ARARs. There would be a permanent removal from the site of COCs contained in 11,850 yd^3 of contaminated soil. BaPEq concentrations would be reduced by at least 93 percent to meet the recreational pickup value. The residue from the soil washing process would be treated by chemical fixation/solidification at an off-site RCRA Subtitle C TSDF and then be disposed in a Subtitle D landfill where its exposure to the environment would be adequately controlled. There would be minimal short-term risks associated with the on-site remedial activities, which would be addressed through appropriate health and safety procedures. The time frame for the implementation of this alternative is estimated to be 1 year, after which the remedy would be protective assuming LUCs have been implemented. The activities for this alternative would be readily implementable. The capital cost, 30-year NPW of O&M costs, and 30-year NPW cost for this alternative are estimated at $4,415,000, $35,000, and $4,450,000, respectively.

2.8.5 Alternative 3C: Excavation to Meet Recreational RAOs, On-Site Solidification/Stabilization, Off-Site Treatment and Disposal, and LUCs

Soil would be removed from the areas of Site 15 where concentrations of COCs in surface soil are greater than the low-intensity recreational use pickup values. Approximately 11,850 yd^3 of contaminated soil would be excavated from the same 22 areas totaling approximately 7.2 acres that would be excavated under Alternative 3A. Prior to excavation, samples of soil in the lead-contaminated areas would be analyzed by the TCLP to determine whether it would be classified as hazardous or non-hazardous. Soil classified as non-hazardous (estimated at approximately 8,090 yd^3) would be disposed off site at a permitted RCRA non-hazardous (Subtitle D) TSDF, and the remainder (estimated at

approximately 3,760 yd^3) would be solidified/stabilized on site with a Portland cement mixture to reduce the amount of soil that would require hazardous disposal. After solidification/stabilization, soil (and associated treatment material) would be disposed off site as hazardous or non-hazardous based on the results of post-treatment sampling. It is estimated that following treatment, 750 yd^3 of contaminated soil (and 168 tons of treated material) would require off-site treatment and subsequent disposal disposed off site at a permitted RCRA hazardous (Subtitle C) TSDF. The excavated areas would be backfilled with 11,850 yd^3 of clean imported fill material, then the site would be revegetated and impacted wetland areas would be restored. Because the soil remaining on site would continue to contain concentrations of contaminants that would not be protective of future residential, commercial/industrial, and medium- and high-intensity recreational receptors, LUCs (including enforceable deed restrictions and existing lease provisions) would be established and enforced to prevent the land from being used for those purposes. The LUCs would also prohibit excavation of soil from the site unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. Maintenance of LUCs 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 and the environment because the removal of contamination exceeding the established pickup values for low-intensity recreational receptors would ensure that future site users would be protected from exposure to unacceptable levels of contaminants. The use of LUCs would prevent potential future residential, commercial/industrial, and medium- and high-intensity recreational receptors from being exposed to unacceptable contaminant levels remaining on site. This alternative would achieve RAOs and comply with chemical-, location-, and action-specific ARARs. There would be a permanent and irreversible reduction of lead mobility in 3,760 yd3 of the most lead-contaminated portion of the soil, which would be treated by on-site solidification/stabilization. The untreated lead-contaminated soil (with TCLP lead concentrations less than the regulatory limit upon excavation), treated lead-contaminated soil with TCLP lead concentrations less than the regulatory limit and that complies with alternative LDR treatment standards, and soil excavated for BaPEq, TRPH, and arsenic contamination (total of 11,100 yd3) would be disposed in a Subtitle D landfill where its exposure to the environment would be adequately controlled. The treated soil that did not meet the TCLP lead limit and did not comply with alternative LDR treatment standards (750 yd3) is assumed to require additional off-site treatment at a RCRA Subtitle C TSDF prior to disposal. Exposure to this soil would also be adequately controlled. There would be minimal short-term risks associated with the on-site remedial activities, which would be addressed through appropriate health and safety procedures. The time frame for the implementation of this alternative is estimated to be 1 year, after which the remedy would be protective assuming LUCs have been implemented. The activities for this alternative would be readily implementable. The capital cost, 30-year NPW of O&M costs, and 30 year NPW cost for this alternative are estimated at $2,767,000, $35,000, and $2,801,000, respectively.

2.8.6 Alternative 4A: Excavation to Allow Unrestricted Site Use and Off-Site Treatment and Disposal

Soil would be removed from Site 15 to the extent necessary to allow unrestricted reuse of the site. This would require excavation of all site surface soil containing contaminants in excess of FDEP residential SCTLs. A total volume of approximately 118,000 yd^3 of contaminated soil would be excavated over an area of 73 acres. Approximately 108,000 yd^3 of the excavated soil would be disposed at an off-site permitted RCRA Subtitle D TSDF, and the remainder (10,000 yd^3) would be disposed off site at a permitted RCRA Subtitle C TSDF. The excavated areas would be backfilled with 118,000 yd^3 of clean imported fill material, then the site would be revegetated and impacted wetland areas would be restored. Because the soil remaining on site would no longer contain concentrations of contaminants that could be harmful to future residential receptors, LUCs would not be required.

This alternative would protect human health and the environment because the removal of contamination exceeding the established pickup values for a future residential receptor would ensure that unrestricted use of the site would be possible. Protection of ecological receptors would also be achieved. This alternative would achieve RAOs and comply with location-specific and action-specific ARARs. There would be a permanent and irreversible reduction of the mobility of the most contaminated portion of the soil, which would be treated by chemical fixation/solidification at an off-site RCRA Subtitle C TSDF. The treated soil would be deposited in a secure landfill where its exposure to the environment would be adequately controlled. There would be minimal short-term risks associated with the on-site remedial activities, which would be addressed through appropriate health and safety procedures. The time frame for the implementation of this alternative is estimated to be 2 years. The activities for this alternative would be readily implementable. The capital cost, 30-year NPW of O&M costs, and 30-year NPW cost for this alternative are estimated at $20,100,000, $0, and $20,100,000, respectively.

2.8.7 Alternative 4B: Excavation to Allow Unrestricted Site Use and On-Site Soil Washing and Reuse

As in Alternative 4A, soil would be removed from Site 15 to the extent necessary to allow unrestricted reuse of the site. This would require excavation of all site surface soil containing contaminants in excess of residential SCTLs. A total volume of approximately 118,000 yd^3 of contaminated soil would be excavated over an area of 73 acres. The excavated soil would be screened on site, and 6,000 yd^3 of oversized material would be landfilled at an off-site permitted RCRA Subtitle D facility. The screened soil would be treated on site by soil washing, and approximately 102,000 yd^3 of treated soil would be reused to backfill the excavated areas. Approximately 7,870 yd^3 of residue from the soil washing process would be disposed off site at a permitted RCRA Subtitle C TSDF. The backfilling of the excavated areas would

be completed with 14,000 yd^3 of clean imported fill material, then the site would be revegetated and impacted wetland areas would be restored. Because the soil remaining on site would no longer contain concentrations of contaminants that could be harmful to future residential receptors, LUCs would not be required.

This alternative would protect human health and the environment because the removal of contamination exceeding the established pickup values for a future residential receptor would ensure that unrestricted use of the site would be possible. Protection of ecological receptors would also be achieved. This alternative would achieve RAOs and comply with location-specific and action-specific ARARs. There would be a permanent removal from the site of COCs contained in 118,000 yd^3 of contaminated soil. The residue from the soil washing process would be treated by chemical fixation/solidification at an off-site RCRA Subtitle C TSDF and then disposed in a Subtitle D landfill where its exposure to the environment would be adequately controlled. There would be minimal short-term risks associated with the on-site remedial activities, which would be addressed through appropriate health and safety procedures. The time frame for the implementation of this alternative is estimated to be 3 years. The activities for this alternative would be readily implementable. The capital cost, 30-year NPW of O&M costs, and 30-year NPW cost for this alternative are estimated at $27,114,000, $0, and $27,114,000, 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 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 alternatives is presented in the Site 15 Amended FS Report (TtNUS, 2008a). 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 that or 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 a reservoir for migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Although there are no source materials constituting principal threat wastes at this site, 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 excavation and on-

site solidification/stabilization of 3,760 yd^3 of lead-contaminated soil and the subsequent treatment of 750 yd^3 at an offsite RCRA Subtitle C TSDF.

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 15 soil 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 3C was selected to address soil contamination at OU 5, Site 15.

This remedy was selected for the following reasons:

- The selected remedy will meet the RAOs and cleanup goals as well as comply with chemical-, location-, and action-specific ARARs.

- The selected remedy will allow the site to be used for low-intensity recreational purposes and as a natural resources corridor. Implementation and maintenance of LUCs will prevent the land from being used for residential, commercial/industrial, and medium- and high-intensity recreational purposes. This is in accordance with the NAS Cecil Field Master Plan and is not overly burdensome from an economic standpoint.

2.11.2 Remedy Description

The remedy consists of four major components: (1) excavation to meet low-intensity recreational RAOs, (2) on-site solidification/stabilization, (3) off-site treatment and disposal, and (4) LUCs.

2.11.2.1 Component 1: Excavation to Meet Recreational RAOs

Twenty-two areas of contaminated soil with a combined surface area of approximately 7.2 acres, as illustrated on Figure 2-6, will be excavated as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 6,750 µg/kg - nine areas totaling 235,900 square feet (ft^2) from 0 to 1 foot bgs.

- Lead-contaminated soil with concentrations greater than 6,500 mg/kg - nine areas totaling 75,300 ft^2 from 0 to 1 foot bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg - one 500-ft^2 area from a depth of 1 to 2 feet bgs. This area is located within one of the above-mentioned areas of PAH-contaminated soil.

- Arsenic-contaminated soil with concentrations greater than 36 mg/kg - three areas totaling 1,600 ft^2 from the ground surface to the water table (assumed to be 2 feet bgs).

A confirmation groundwater sample will be collected from the arsenic-imported area after the soil excavation is completed to verify that no adverse impacts to the aquifer occurred as a result of excavation activities.

Prior to any construction activities, a survey will be performed to identify the presence of active gopher tortoise burrows in the areas to be remediated. If such burrows are identified, associated tortoises will be relocated prior to disruption of the area.

As part of site preparation, temporary haul routes will be constructed to allow equipment to access the areas to be excavated, and these areas will be cleared. Larger trees will be harvested and their stumps either cut or ground flush with the existing grade. Small trees and underbrush will be cleared using a bulldozer or similar equipment and mulched. It is estimated that approximately 880 larger trees covering a total area of 4.3 acres will have to be removed and that a total area of 2.8 acres of small trees and underbrush will have to be cleared.

Excavation of the duff overlying the surface of the soil and excavation of soil to depths of up to 2 feet bgs will be conducted using a bulldozer, front-end loader, or similar equipment. An estimated total volume of approximately 11,850 yd^3 of contaminated soil will be excavated.

The Geostatistical Assessment Report (Newfield, 2004) stated that significant soil sampling had been conducted at Site 15 and that the delineation of lead and BaPEqs was accurate and complete, and therefore confirmation sampling was not warranted. Additional discussions regarding this topic were held [as identified in BRAC Cleanup Team (BCT) Meeting Minute No. 2208], and it was agreed by the BCT (Decision No. 687) that the area requiring remediation for BaPEqs only would not require confirmation sampling; however, the areas being remediated for lead would require limited confirmation sampling. Confirmation sampling to finalize lead concentration areas was conducted in April 2007, and the sampling plan and results will be discussed in the RD.

Immediately following excavation, soil from lead-contaminated areas will be subjected to TCLP lead analysis. Soil from these areas with TCLP lead concentrations less than the regulatory limit, in addition to

excavated soil from PAH-, TRPH-, and arsenic-contaminated areas, will be disposed off site as non-hazardous (total of 8,090 yd^3) (see Component 3). The remaining excavated soil, 3,760 yd^3 of lead-contaminated soil with TCLP levels greater than the regulatory limit, will be solidified/stabilized on site as described below.

2.11.2.2 Component 2: On-Site Solidification/Stabilization

RCRA requires treatment of hazardous wastes prior to land disposal (such as the portion of lead-contaminated soil at Site 15 determined by TCLP testing to be characteristically hazardous) and requires compliance with LDRs before disposal. The alternative LDR treatment standard for soil contaminated with metals requires 90-percent reduction as measured in leachate from the treated soil (tested by TCLP) when a metal stabilization technology is used. When treatment of any constituent subject to a 90-percent reduction standard would result in a concentration less than 10 times the UTS (10xUTS) for that constituent, additional treatment to achieve constituent concentrations less than 10xUTS is not required.

For lead, the nonwastewater UTS is 0.75 mg/L in TCLP leachate, and 10xUTS is 7.5 mg/L. The purpose of the on-site treatment is to render the contaminated soil nonhazardous such that the lead concentration of the TCLP leachate is less than the TCLP characteristic concentration of 5 mg/L. In this case, meeting the TCLP characteristic concentration requirement will also meet the 10xUTS alternative LDR standard.

Consistent with the U.S. EPA's Guidance on Demonstrating Compliance with the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standards, lead-contaminated soil considered characteristically hazardous (i.e., TCLP lead concentrations greater than or equal to 5 mg/L) will be sampled after treatment to determine whether the on-site treatment is effective in achieving the 10xUTS concentration alternative LDR treatment standard for soil and the TCLP characteristic concentration.

Soil with TCLP lead concentrations greater than or equal to 5 mg/L will be treated on site using a Portland cement mixture to encapsulate, solidify, and/or chemically modify the lead to reduce its leachability. Excavated soil that requires treatment will be thoroughly mixed with a 10 or 15 percent Portland cement and water mixture. A treatability study will be conducted to confirm the effectiveness of the process in reducing TCLP lead concentrations to non-hazardous levels and to determine the appropriate percentage of Portland cement. It is estimated that approximately 3,760 yd^3 (5,640 tons) of soil will have initial TCLP lead concentrations greater than or equal to 5 mg/L and will require on-site treatment prior to disposal. After stabilization/solidification, treated soil will be segregated into 300-ton stockpiles for confirmation sampling. One composite sample from five discrete locations within each stockpile will be collected and analyzed for TCLP lead. Soil with post-treatment TCLP lead concentrations less than 5 mg/L and that meets the alternative LDR treatment standards for contaminated soil will be transported and disposed off site as non-hazardous waste (see Component 3). Soil with post-treatment TCLP lead concentrations

greater than or equal to 5 mg/L and that does not meet the alternative treatment standards will be transported for off-site treatment and disposal at a hazardous waste landfill (see Component 3). It is assumed that no treated soil that meets the alternative LDR treatment standards will have a TCLP lead concentration greater than 5 mg/L. It is also assumed that approximately 3,010 yd^3 of treated soil and 677 tons of treatment media will be disposed as non-hazardous and 750 yd^3 of treated soil and 168 tons of treatment media will be disposed as hazardous.

Following excavation, all excavated areas would be backfilled with clean material, graded to original contours, and revegetated. Also, a total of approximately 0.17 acre of the wetland areas identified in the Site 15 Wetland Delineation Report (TtNUS, 2003b), including approximately 0.14 acre in Wetland A and 0.03 acre in Wetland D, will be restored.

2.11.2.3 Component 3: Off-Site Treatment and Disposal

As stated above, it is assumed that a total of approximately 8,090 yd^3 of untreated lead-, BaPEq-, TRPH-, and arsenic-contaminated soil will be identified as RCRA non-hazardous and will be transported to the RCRA Subtitle D facility located near Folkston, Georgia, 35 miles northeast of Jacksonville, for direct landfilling. In addition, approximately 3,010 yd^3 of treated lead-contaminated soil and 677 tons of treatment media (Portland cement mixed with the soil) will be transported to the RCRA Subtitle D facility for direct landfilling. This treated soil will have post-treatment TCLP lead concentrations less than the regulatory limit and will meet alternative LDR treatment standards for contaminated soil.

It is assumed that approximately 750 yd^3 of treated lead-contaminated soil (and 168 tons of associated treatment media) will have post-treatment TCLP lead concentrations greater than the regulatory limit and will not meet alternative LDR treatment standards. This soil will be classified as RCRA hazardous and will be transported to the RCRA Subtitle C TSDF located in Emelle, Alabama, for treatment to meet TCLP limits followed by landfilling.

The volumes estimated for disposal at the various facilities will be verified based on sampling and analysis of stockpiled soil, followed by profiling as necessary to meet the requirements of the disposal facilities.

2.11.2.4 Component 4: LUCs

Soil contamination will remain at Site 15 at concentrations that preclude unrestricted use and unlimited exposure; therefore, the remedy includes LUCs to prevent unacceptable risk from exposure to this residual contaminated soil.

The area of OU 5, Site 15 to be covered by LUCs is shown on Figure 2-7. Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at Site 15 are as follows:

- To prohibit residential, industrial, commercial, agricultural, and medium- and high-intensity recreational reuse of the site unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP. Prohibited residential uses shall include, but are not limited to, any form of housing, child-care facilities, pre-schools, elementary schools, secondary schools, playgrounds, convalescent, or nursing care facilities. Prohibited high-intensity recreational activities include, but are not limited to, playgrounds and contact sports such as baseball, football, and soccer. Prohibited medium-intensity recreational activities include, but are not limited to, picnic grounds, and camping. Allowable low-intensity recreational activities include, but are not limited to, hiking, biking, horseback riding, birding, and hunting.

- To prohibit the excavation of soils from the site 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) unless prior written approval is obtained from the Navy, U.S. EPA, and FDEP.

The following generally describes those LUCs that will be implemented at Site 15 to achieve the aforementioned LUC performance objectives:

- A deed of conveyance will be executed at the time of property transfer that prohibits residential, industrial, commercial, agricultural, and medium- and high-intensity recreational reuse of the site 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.

- Notice of the Navy's application of LUCs to the site via the deed of conveyance will be provided to those local regulatory agencies that could assist the Navy with their future enforcement.

No man-made attractions will be provided that would entice people, particularly small children, to frequently visit the site, which is consistent with the property's proposed reuse as a natural resource corridor.

The LUCs will be implemented and maintained by the Navy until the concentrations of hazardous substances in soil at the site have been reduced to levels that 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 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 15 that shall contain implementation and maintenance actions, including periodic inspections. The Navy will maintain, monitor, 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 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. Implementation of this remedy will therefore require a survey of the site, annual visual inspections, and a five-year review with report preparation.

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: $2,767,000
- 30-Year NPW of O&M costs: $35,000
- 30-Year NPW cost: $2,801,000

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 may be summarized as follows:

- Human exposure to COCs in soil and sediment at concentrations in excess of cleanup levels will be effectively eliminated.

- Exposure of ecological receptors to COCs in soil and sediment concentrations in excess of cleanup levels will be effectively eliminated.

- LUCs will be required to prevent residential, commercial/industrial, and medium- and high-intensity recreational use of the land at Site 15. Only low-intensity recreational use of the land will be permitted. These LUCs will be implemented and maintained until concentrations of hazardous substances in soil are at levels that allow for unrestricted use and unlimited exposure.

- The JEDC Reuse Plan provides for future use of the site as a natural and recreation corridor. Site 15 is currently scheduled to be used as such for the foreseeable future.

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, Alternative 3C, will protect human health and the environment. Soil containing concentration of COCs greater than low-intensity recreational pickup levels will be excavated, some of the soil will require solidification/stabilization, and all of the soil will be disposed off site. LUCs will restrict Site 15 to low-intensity recreational use; consequently, there will continue to be no unacceptable risk from exposure to soil at Site 15.

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 (known as TBC).

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, 2-4, and 2-5 list the chemical-specific, location-specific, and action-specific ARARs and TBCs, respectively, 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)]. For soil, 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 3C represents a reasonable value for the money spent.

The estimated 30-year NPW cost of the selected remedy is $2,801,000.

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The Navy and U.S. EPA, in consultation with FDEP, have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at Site 15. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Navy and U.S. EPA, in consultation with FDEP, have determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria while also considering the statutory preference for treatment as a principle element and bias against off-site treatment and disposal and considering State and Community acceptance.

2.12.5 Preference for Treatment as a Principal Element

The selected remedy provides for treatment of 3,760 yd^3 of the most lead-contaminated portion of the soil, which will be treated on-site by solidification/stabilization. In addition, an estimate 750 yd^3 of treated sol is assumed to require off-site chemical fixation/solidification at RCRA Subtitle C TSDF. The treated soil and the remaining excavated soil will be disposed in a Subtitle D landfill where its exposure to the environment will be adequately controlled.

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 15 Amended Proposed Plan. A Public Notice was published in the Florida Times-Union Newspaper on May 1, 2008 informing the public that the Amended Proposed Plan was available for review at the Cecil Field Information Repository and requesting that all comments be submitted to the Navy by May 31, 2008. 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; therefore, no significant changes to the remedy, as originally identified in the Amended Proposed Plan, were necessary or appropriate.

TABLE 2-1

EXPLANATION OF REMEDY SELECTION CRITERIA
OU 5, SITE 15 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 CERCLA 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 weighed 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 file, 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 SOIL REMEDIAL ALTERNATIVES
OPERABLE UNIT 5, SITE 15 RECORD OF DECISION
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Evaluation Criteria	Alternative 1: No Action	Alternative 2: Soil Cover To Meet Recreational RAOs and LUCs	Alternative 3A: Excavation To Meet Recreational RAOs, Off-Site Treatment and Disposal, and LUCs	Alternative 3B: Excavation To Meet Recreational RAOs, On-Site Soil Washing and Reuse, and LUCs	Alternative 3C: Excavation To Meet Recreational RAOs, On-Site Solidification/Stabilization, Off-Site Treatment and Disposal, and LUCs	Alternative 4A: Excavation To Allow Unrestricted Site Use and Off-Site Treatment and Disposal	Alternative 4B: Excavation to Allow Unrestricted Site Use and On-Site Soil Washing and Reuse
Overall Protection of Human Health and Environment	Not protective	Protective	More protective than Alternative 2	Slightly more protective than Alternative 3A	Protectiveness between Alternatives 3A/4A and 3B/4B	More protective than Alternatives 3A, 3B, and 3C	Slightly more protective than Alternative 4A
Compliance with ARARs and TBCs							
Chemical-Specific	Would not comply	Would not comply	Would comply	Would comply	Would comply	Would comply	Would comply
Location-Specific	Would not comply	Would comply	Would comply	Would comply	Would comply	Would comply	Would comply
Action-Specific	Not applicable	Would comply	Would comply	Would comply	Would comply	Would comply	Would comply
Long-Term Effectiveness and Permanence	Not effective	Effective	More effective than Alternative 2	Similar to Alternative 3A	Similar to Alternative 3A	More effective than Alternatives 3A,3B, and 3C	Similar to Alternative 4A
Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment	None	None	3,760 yd^3 treated off site for reduction of mobility to meet TCLP levels	11,850 yd^3 treated to reduce lead concentrations to meet UTS (and to reduce BaPEq concentrations by over 90 percent). 790 yd^3 of highly contaminated treatment residue removed from site	3,760 yd^3 solidified/ stabilized on site to reduce lead mobility. 750 yd^3 of solidified/stabilized soil also treated off site for reduction of mobility to meet TCLP and LDR levels	10,000 yd^3 treated for reduction of mobility to meet TCLP and LDR levels	118,000 yd^3 treated to reduce lead concentrations to meet UTS (and to reduce BaPEq concentrations by over 99 percent). 7,870 yd^3 of highly contaminated treatment residue removed from site
Short-Term Effectiveness	No relevant issues to address	Would be effective. Minimum potential for short-term risks. One year to attain RAOs.	Would be effective. Greater potential for short-term risks than Alternative 2. One year to attain RAOs.	Would be effective. Lesser impact on community than Alternative 3A due to lesser amount of soil transported off site. One year to attain RAOs.	Would be effective. Less impact on community than 3A because transported soil would be solidified/ stabilized. One year to attain RAOs.	Would be effective. Greater potential for short-term risks than Alternative 3A because greater volume of soil would be transported off site. Two years to attain RAOs.	Would be effective. Lesser impact on community than Alternative 4A due to lesser amount of soil transported off site. Three years to attain RAOs.
Implementability	Nothing to implement	More difficult to implement than Alternatives 4A and 3A	Somewhat more difficult to implement than Alternatives 4A and 4B	More difficult to implement than Alternative 3B	More difficult to implement than Alternatives 3A and 4A	Easiest to implement	Most difficult to implement
Costs:							
Capital	$0	$1,373,000	$3,872,000	$4,415,000	$2,767,000	$20,100,000	$27,114,000
NPW of O&M	$0	$247,000	$35,000	$35,000	$35,000	$0	$0
NPW	$0	$1,620,000	$3,907,000	$4,450,000	$2,801,000	$20,100,000	$27,114,000

yd^3	Cubic yards	O&M	Operation and maintenance
ARARs	Applicable or Relevant and Appropriate Requirements	RAOs	Remedial Action Objectives
BaPEq	Benzo(a)pyrene equivalent	TBCs	To Be Considered
LDR	Land Disposal Restriction	TCLP	Toxicity Characteristic Leaching Procedure
LUCs	Land use controls	UTS	Universal Treatment Standard
NPW	Net present worth		

TABLE 2-3

CHEMICAL-SPECIFIC ARARs AND TBCs
OU 5, SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Contaminant Cleanup Target Levels Rule	Chapter 62-777.100(2) and 777.170(2), Florida Administrative Code (F.A.C.)	To Be Considered	Provides guidance for soil, groundwater, and surface water cleanup levels that can be developed on a site-by-site basis.	Guidelines were used to determine site-specific cleanup goals for contaminants of concern in soil.
Alternate Soil Cleanup Target Levels (SCTLs)	Chapter 62-780.110(5), F.A.C.	Relevant and Appropriate	Allows the use of alternate SCTLs developed to represent site-specific exposures rather than defaulting to the residential and industrial SCTLs listed in Chapter 62.777.	Alternate SCTLs were developed for COCs in soil at this site.

TABLE 2-4

LOCATION-SPECIFIC ARARs
OU 5, SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Clean Water Act (CWA) 404 Regulations, Guidelines for Specification of Disposal Sites for Dredged or Filled Materials	40 CFR Part 230.10	Applicable	These regulations apply to discharges of dredged or fill material into U.S. waters, including jurisdictional wetlands. Federal agencies must minimize potential adverse impacts.	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action will remove and restore approximately 0.17 acre of wetlands.
Fish and Wildlife Coordination Act	16 United States Code (U.S.C.) 662(a)	Relevant and Appropriate	Requires that the U.S. Fish and Wildlife Service or National Marine Fisheries Service, and related state agencies be consulted prior to structural modification of any body of water, including wetlands.	CERCLA response action involves the alteration of a wetland. These agencies would be consulted to determine protective measures to prevent loss of wildlife resources.
National Environmental Policy Act (NEPA) Regulations, Wetlands, Floodplains, etc.	40 CFR Part 6, Appendix A, Section 6(a)(5)	Applicable	These regulations contain the procedures for complying with Executive Order 11990 on wetlands protection. Appendix A, Section 6(a)(5) states: "If there is no practicable alternative to locating in or affecting the floodplain or wetlands, the Agency shall act to minimize potential harm to the floodplain or wetlands. The Agency shall also act to restore and preserve the natural and beneficial values of floodplains and wetlands as part of the analysis of all alternatives under consideration."	CERCLA response action will remove and restore approximately 0.17 acre of wetlands.

TABLE 2-4

LOCATION-SPECIFIC ARARs
OU 5, SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Florida Environmental Resource Permit Procedures	Chapter 62-343.050 and 070, F.A.C.	Applicable	This rule requires an environmental resource permit when action requires dredging or filling in, on, or over wetlands.	Florida Department of Environmental Protection (FDEP) will be consulted to determine the substantive aspects of an environmental resource permit for restoring wetlands.

TABLE 2-5

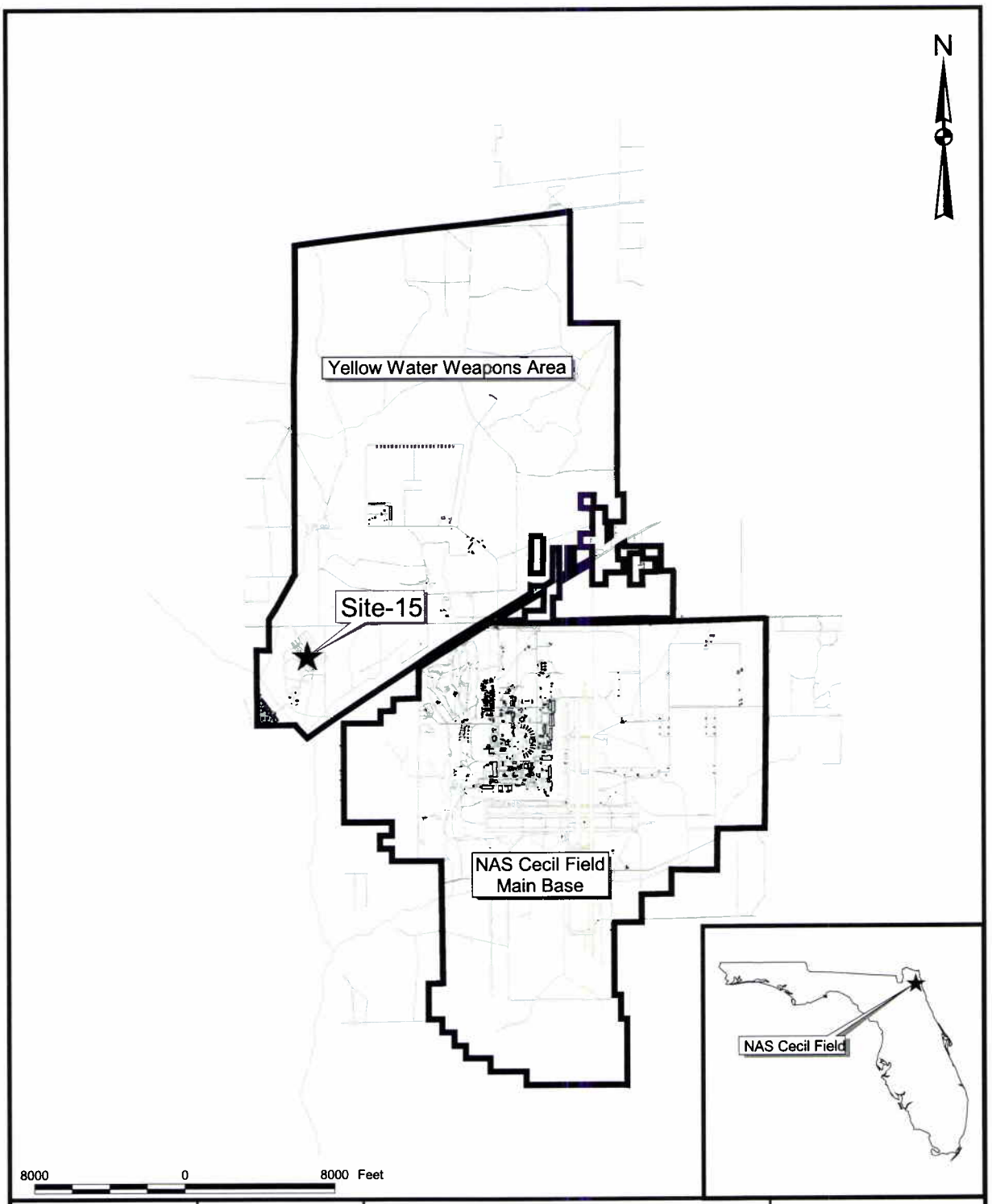
ACTION-SPECIFIC ARARs
OU 5, SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Resource Conservation and Recovery Act (RCRA) Regulations, Identification and Listing of Hazardous Wastes	40 Code of Federal Regulations (CFR) Part 262.11 and 264.13(a)(1)	Applicable	Requires characterization of solid waste and additional characterization of waste determined to be hazardous. Part 261.11 requires determination of whether solid waste is hazardous. Part 264.13(a)(1) requires a detailed chemical and physical analysis of a representative sample of the waste to determine treatment, storage, and disposal requirements.	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action will generate non-hazardous solid waste (contaminated soil determined not to be hazardous) and hazardous waste (contaminated soil determined to be RCRA hazardous due to lead).
RCRA Regulations, Land Disposal Restrictions (LDRs) for Contaminated Soil	40 CFR Part 268.49	Applicable	This regulation prohibits the land disposal of untreated hazardous wastes and provides treatment standards for contaminated soil that is considered hazardous waste.	Excavated soil determined to be hazardous waste will be treated on-site. Treated soil still hazardous after on-site treatment will be transported for off-site treatment and disposal.
Guidance on Demonstrating Compliance with the LDR Alternative Soil Treatment Standards	EPA 530-R-02-003, July 2002	To Be Considered	Provides information on how to demonstrate compliance with alternative treatment standards for certain contaminated soils that may be land disposed and therefore be subject to RCRA LDRs.	This guidance was used to help determine requirements for compliance with the LDR alternative treatment standards that may apply to soil generated during site remediation.
RCRA Regulations, Miscellaneous Units for Treatment	40 CFR 264.600 Subpart X	Applicable	Establishes performance standards for the design, construction, operation, and closure of a unit to prevent releases of hazardous waste or hazardous constituents to the environment.	On-site treatment will consider substantive requirements of this rule to prevent release of hazardous constituents that may have adverse effects on human health and the environment.

TABLE 2-5

ACTION-SPECIFIC ARARs
OU 5, SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
RCRA Regulations, Use and Management of Containers	40 CFR Part 265.171 to 173	Applicable	Establish requirements for use and management of hazardous waste in containers.	Containers that may be used for temporary storage of hazardous waste (i.e., contaminated soil) on site prior to off-site treatment and disposal will comply with these requirements.
Florida Solid Waste Management Facilities	Chapter 62-701.300, F.A.C.	Relevant and Appropriate	Prohibits storage, processing, or disposal except at a permitted solid waste management facility.	Waste generated on site and deemed nonhazardous solid waste will be stored, transported, or disposed of properly.
Florida General Pollutant Emission Limitation Standards	Chapter 62-296.320, F.A.C.	Applicable	Establishes requirements for generation of unconfined emissions of particulate matter from any activity.	Requires reasonable precautions such as application of water or other dust suppressants to control emission from construction and land clearing activities.
Florida Regulation of Stormwater Discharge	Chapter 62-25.025(7), F.A.C.	Relevant and Appropriate	Establishes requirements for stormwater discharges to ensure protection of the surface water of the state.	Considers the impact of the discharge of untreated stormwater from the site. Erosion and stormwater control best management practices will be implemented during construction to retain sediment on site.



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COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV 0

NAVFAC

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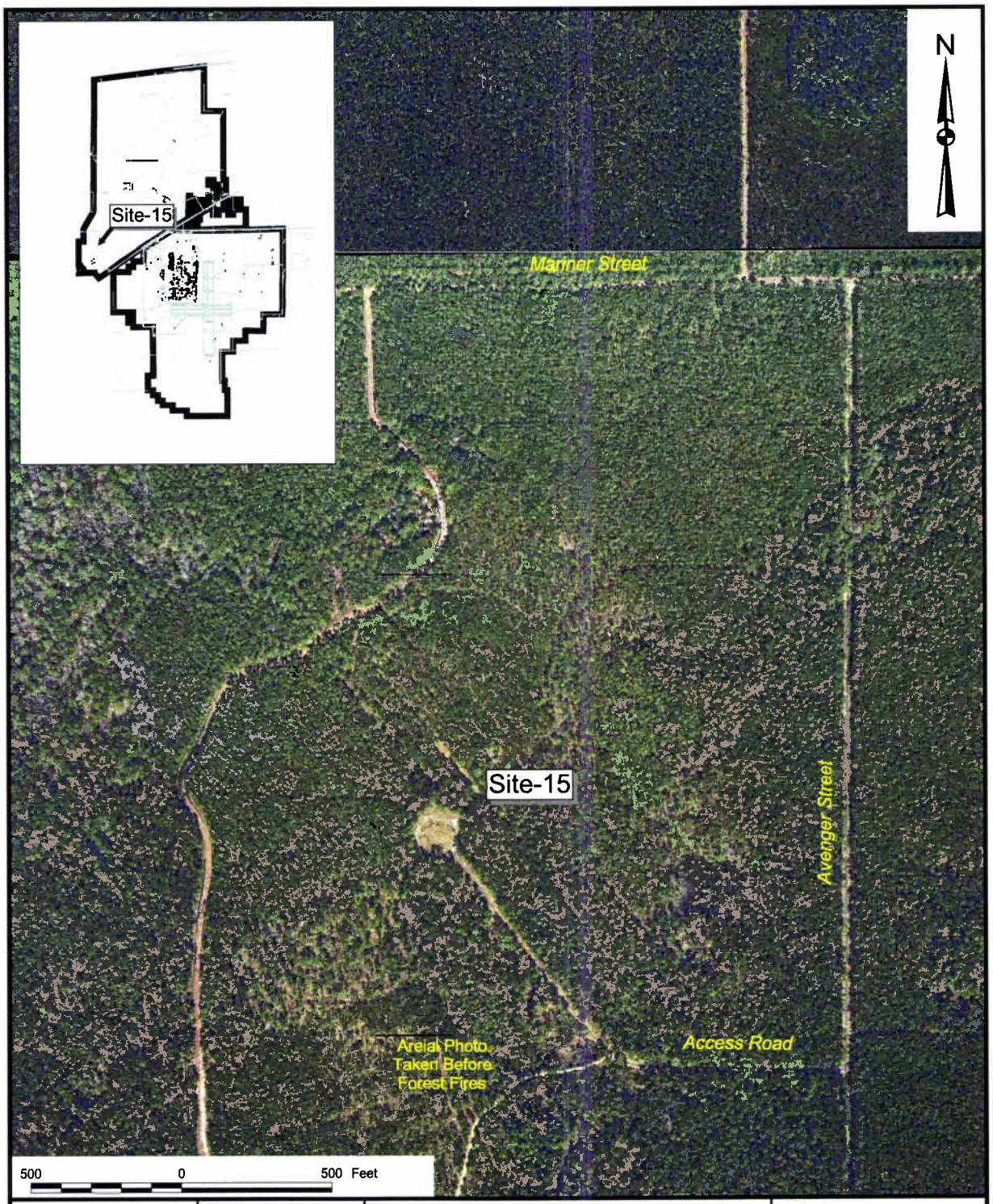

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CHECKED BY	DATE		APPROVED BY	DATE 5/11/05
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-2	REV 0

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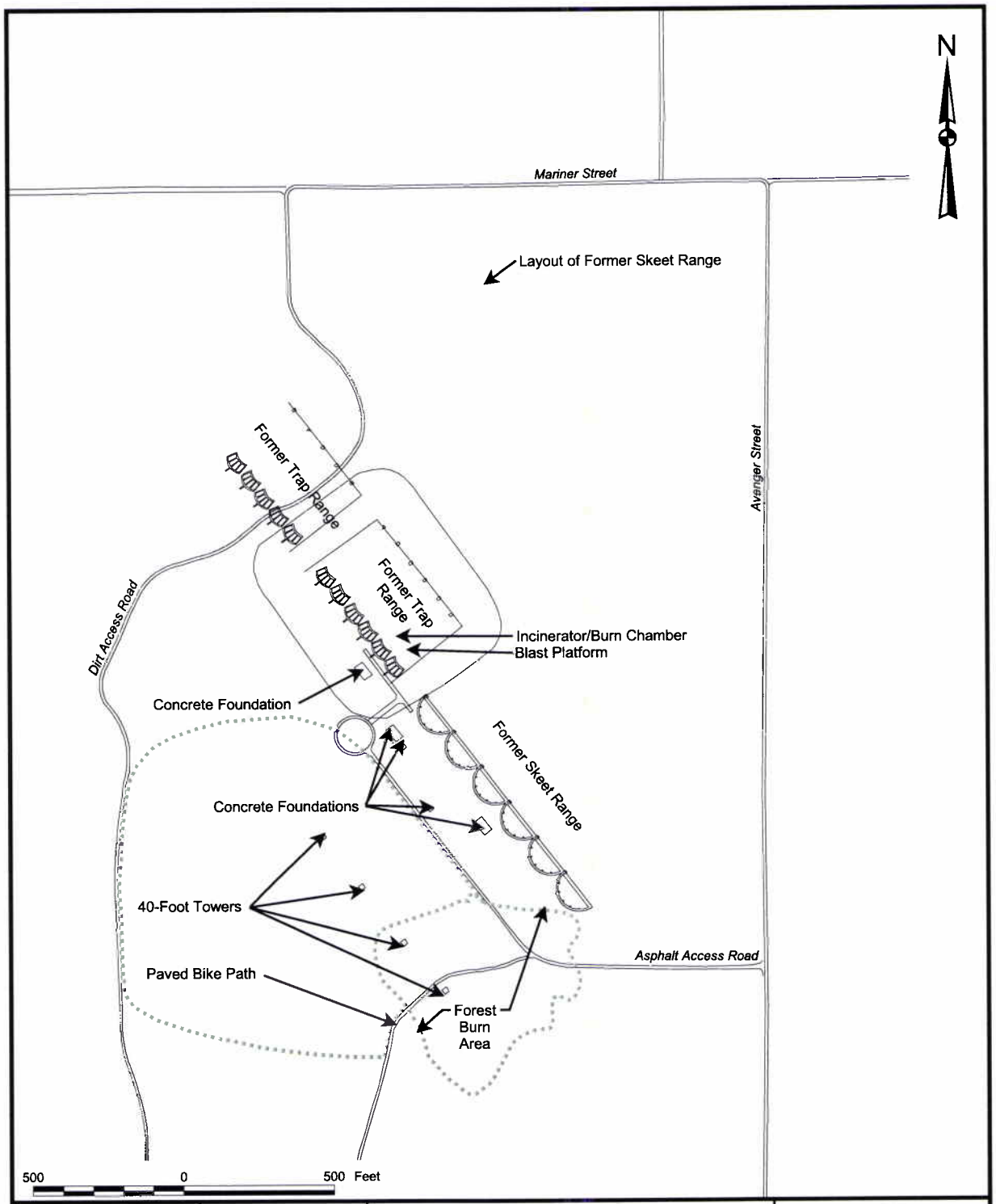

DRAWN BY MJJ	DATE 10Aug06	GENERAL ARRANGEMENT OU 5, SITE 15 RECORD OF DECISION NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE 5/11/05
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 2-3 REV 0

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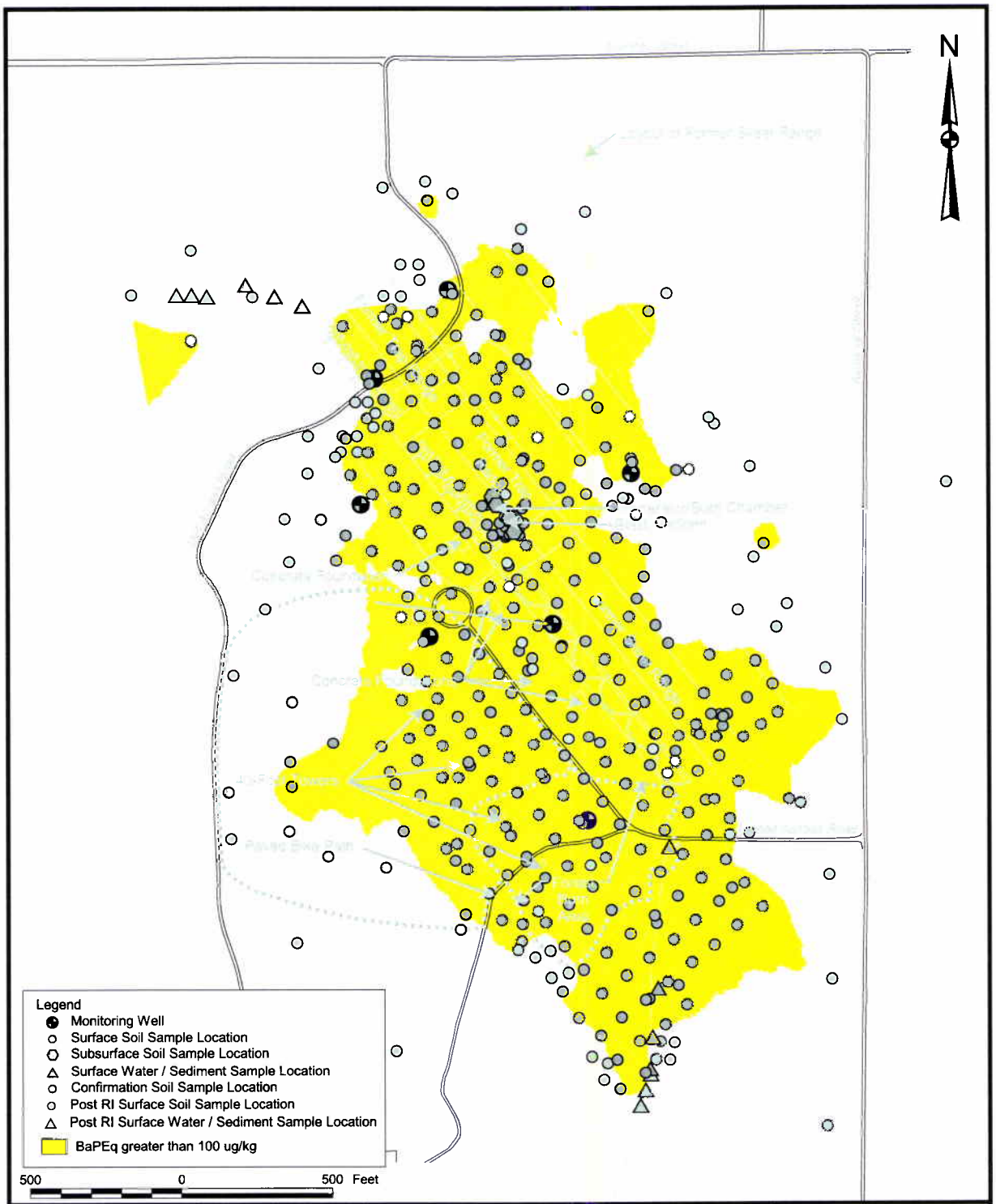

DRAWN BY MJJ	DATE 10Aug06	PAH CONCENTRATIONS IN SURFACE SOIL SAMPLES EXCEEDING FDEP SCTLs OU 5, SITE 15 RECORD OF DECISION NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DCB DATE 5/11/08
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 REV 0

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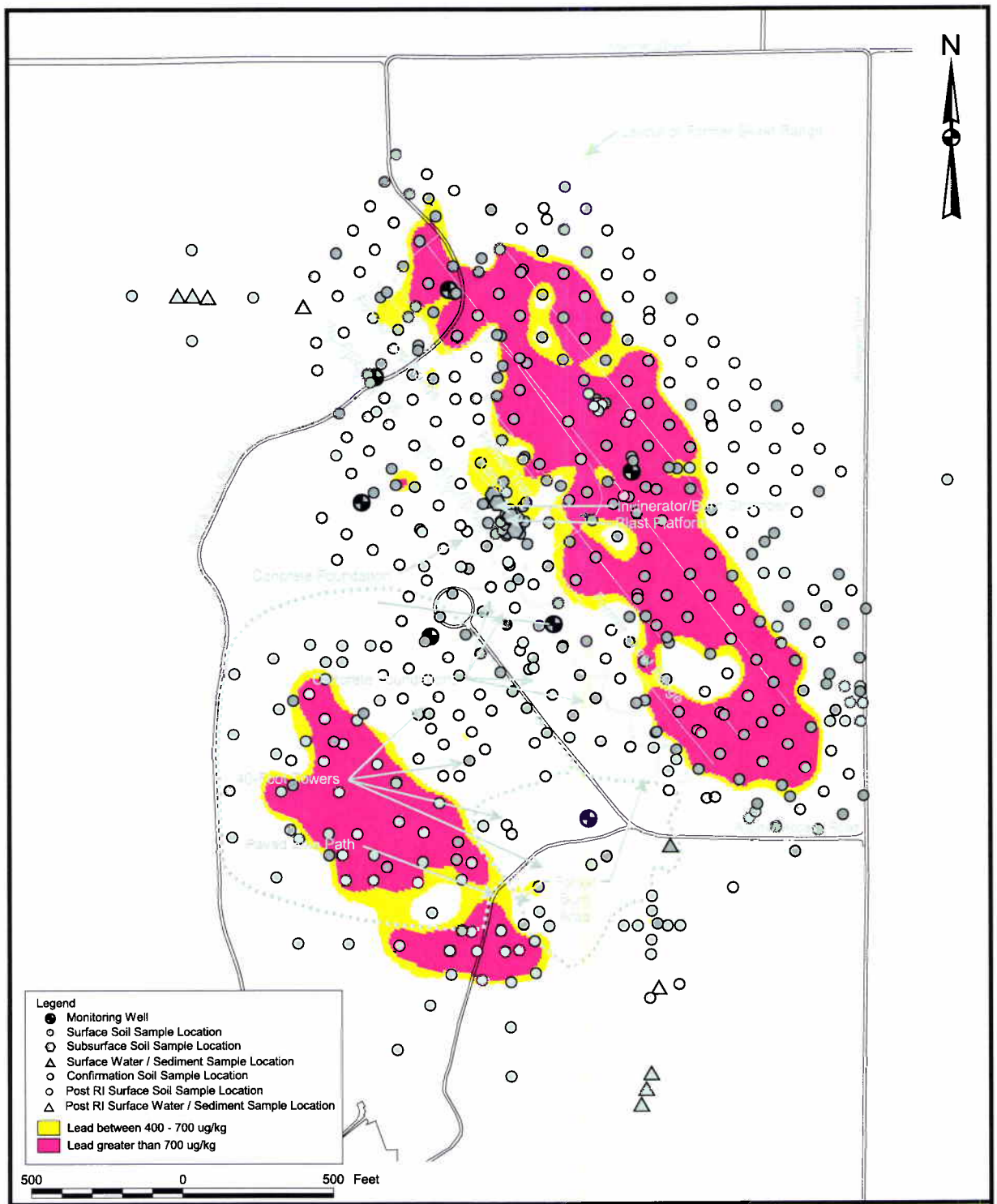

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CHECKED BY	DATE		APPROVED BY DATE 5/11/05
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-5 REV 0

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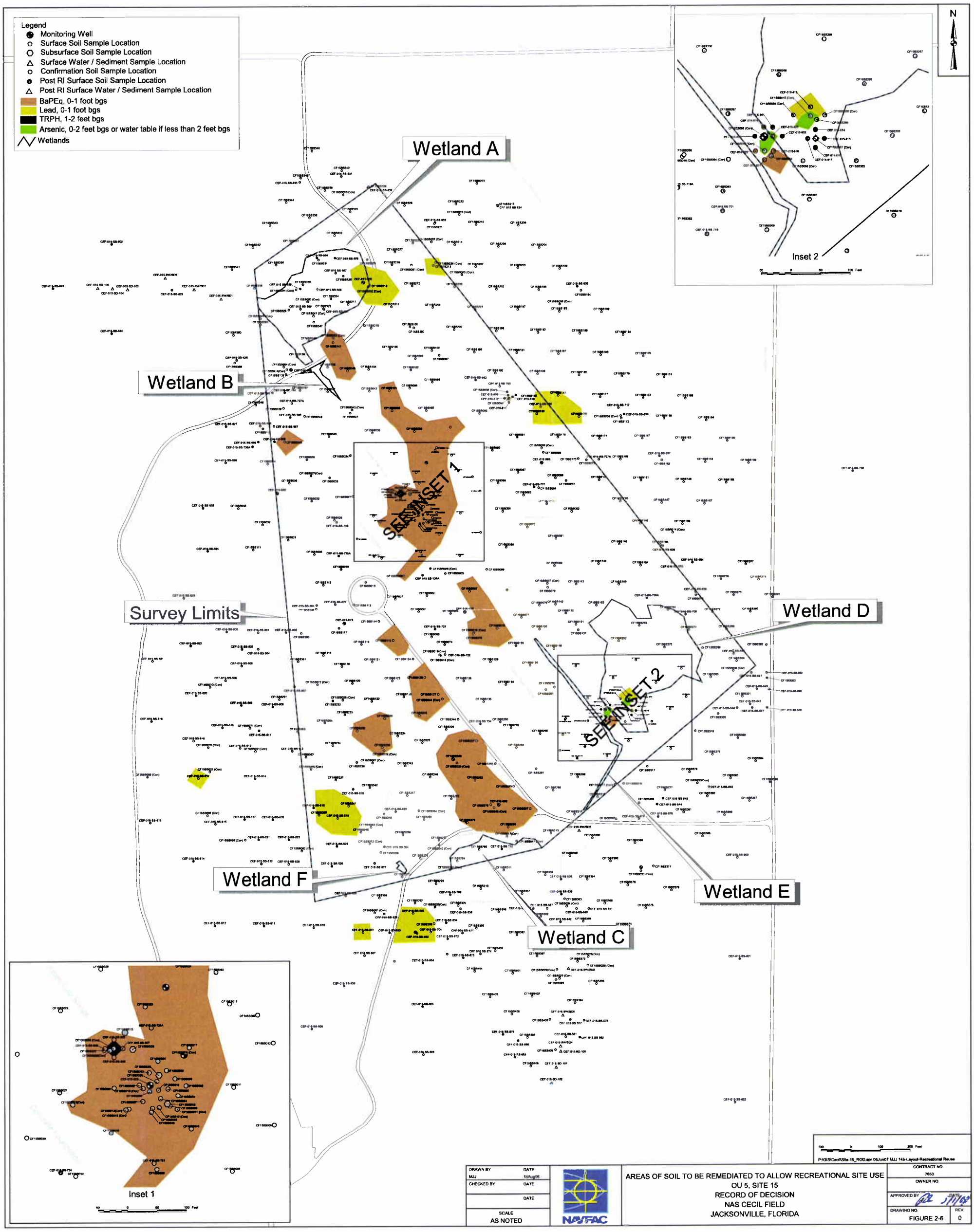
Legend
Monitoring Well
Surface Soil Sample Location
Subsurface Soil Sample Location
Surface Water / Sediment Sample Location
Confirmation Soil Sample Location
Post RI Surface Soil Sample Location
Post RI Surface Water / Sediment Sample Location
BaPEq, 0-1 foot bgs
Lead, 0-1 foot bgs
TRPH, 1-2 feet bgs
Arsenic, 0-2 feet bgs or water table if less than 2 feet bgs
Wetlands
N
Wetland A
Wetland B
Wetland C
Wetland D
Wetland E
Wetland F
Survey Limits
SEDIMSET 1
SEDIMSET 2
Inset 1
Inset 2
100 0 100 200 Feet
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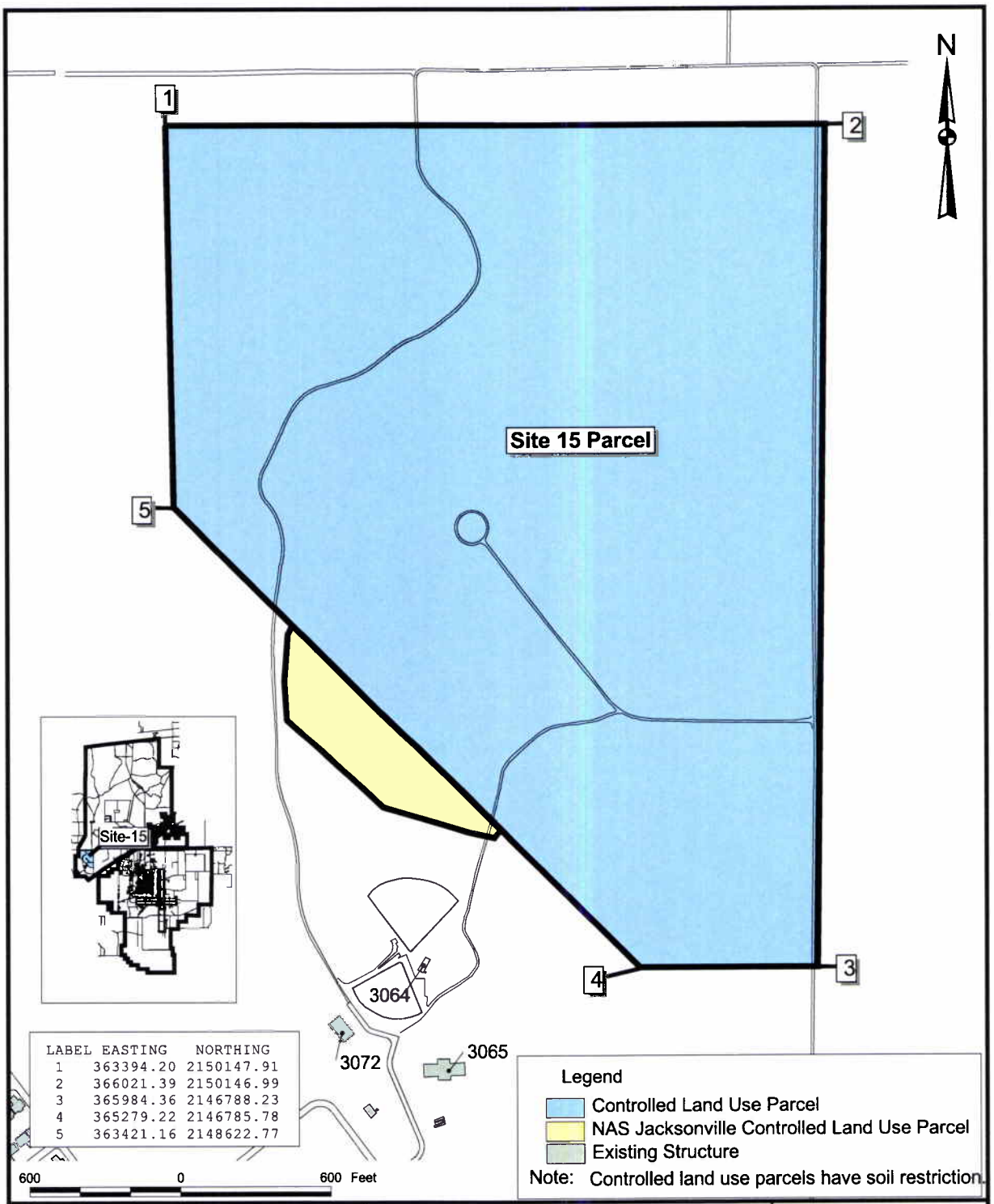
DRAWN BY MJJ DATE 15Aug06
CHECKED BY DATE
DATE
SCALE AS NOTED
NAVFAC
AREAS OF SOIL TO BE REMEDIATED TO ALLOW RECREATIONAL SITE USE
OU 5, SITE 15
RECORD OF DECISION
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 7653
OWNER NO.
APPROVED BY DATE 7/11/07
DRAWING NO. FIGURE 2-6
REV. 0



DRAWN BY MJJ	DATE 15Aug06	LAND USE CONTROL PARCEL OU 5, SITE 15 RECORD OF DECISION NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE 5/11/09
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-7 REV 0

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APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Public notice of the availability of the Proposed Plan was placed in the Florida-Times Union on May 1, 2008. A 30-day public comment period was held from May 1, 2008 to May 31, 2008. Provisions for the public to request a public meeting to discuss the Proposed Plan were also described in the public notice. No comments were received during the 30-day comment period.

APPENDIX B

SUMMARY OF ANALYTICAL DATA

TABLE B-1

SUMMARY OF ORGANICS DETECTED IN SURFACE SOIL
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels [1]	
			Residential	Leachability
Volatile Organic Compounds, mg/kg				
Acetone	1/36	0.006	11,000	25
Xylenes, total	1/44	0.002	130	0.2
Semivolatile Organic Compounds, mg/kg				
1-Methylnaphthalene	15/78	0.057 - 168	200	3.1
2-Methylnaphthalene	29/128	0.022 - 204	210	8.5
Acenaphthene	67/400	0.031 - 410	2,400	2.1
Acenaphthylene	24/400	0.0423 - 17	1,800	27
Anthracene	88/400	0.0068 - 110	21,000	2,500
Benzo(a)anthracene	177/400	0.0058 - 1,300	#	0.8
Benzo(a)pyrene	171/400	0.0066 - 1,100	0.1	8
Benzo(b)fluoranthene	179/400	0.0079 - 1,300	#	2.4
Benzo(g,h,i)perylene	122/400	0.0074 - 820	2,500	32,000
Benzo(k)fluoranthene	150/400	0.0069 - 1,500	#	24
bis(2-Ethylhexyl) phthalate	12/44	0.021 - 0.52	72	3,600
Butylbenzylphthalate	10/44	0.082 - 0.44	17,000	310
Carbazole	15/44	0.021 - 43	49	0.2
Chrysene	195/400	0.0138 - 1,700	#	77
Dibenzo(a,h)anthracene	60/400	0.0216 - 140	#	0.7
Dibenzofuran	8/44	0.035 - 8	320	15
Di-n-butylphthalate	33/44	0.061 - 6.7	7,300	47
Fluoranthene	205/400	0.008 - 2,000	3,200	1,200
Fluorene	40/400	0.043 - 58	2,600	160
Indeno(1,2,3-cd)pyrene	113/400	0.0054 - 560	#	6.6
Naphthalene	44/400	0.024 - 17	55	1.2
Phenanthrene	154/400	0.0056 - 600	2,200	250
Pyrene	198/400	0.0085 - 1,800	2,400	880
BaPEqs	400/400	0.0026 - 956	0.1	NC
Pesticides/Herbicides, mg/kg				
4,4'-DDE	3/41	0.00016 - 0.0013	2.9	18
4,4'-DDT	3/41	0.00069 - 0.021	2.9	11
Dieldrin	1/41	0.00037 - 0.024	0.06	0.002
Endosulfan II	3/41	0.00014 - 0.0019	450	3.8
Endrin aldehyde	1/41	0.0027	NC	NC
Methoxychlor	1/41	0.049	420	160
Nitroaromatic Compounds, mg/kg				
HMX[2]	1/38	3.001	NC	NC
3-Nitrotoluene	1/38	5.08	400	0.9
4-Nitrotoluene	2/38	1.17 - 4.34	640	1.4
Miscellaneous Parameters, mg/kg				
TRPH	33/40	9.74 - 450	460	340

1 - Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
2 - Cyclotetramethylenetetranitramine.
NC - No criterion.
TRPH - Total recoverable petroleum hydrocarbons.
BaPEqs - Benzo(a)pyrene equivalents.
= Based on Chapter 62-777, F.A.C., site concentrations of carginogenic polynuclear aromatic hydrocarbons (PAHs) are converted to BaPEqs before comparison to benzo(a)pyrene (BaP) SCTLs.
** = One-half of the BaP detection limit was used as the BaPEq concentration if no carcinogenic PAHs were detected in a sample.

TABLE B-2

SUMMARY OF INORGANICS DETECTED IN SURFACE SOIL
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels (1)		Background Screening Concentration (2)
			Residential	Leachability	
Inorganic Analytes, mg/kg					
Aluminum	39/40	29.4 - 7,140	80,000	***	4,430
Antimony	30/56	0.46 - 2,440	27	0.03	9.44
Arsenic	41/69	0.91 - 451	2.1	***	2.04
Barium	38/40	0.88 - 107	120**	1,600	14.4
Cadmium	7/40	0.3 - 2.4	82	7.5	1.72
Calcium	31/40	38.3 - 102,000	NC	NC	9.44
Chromium	10/40	0.45 - 26.9	210	38	7.75
Cobalt	7/40	0.22 - 1.8	1,700	***	3.11
Copper	14/40	0.835 - 21.2	150**	***	5.97
Iron	38/40	57.5 - 1,340	53,000	***	1,490
Lead	555/584	1.1 - 65,500	400	***	197
Magnesium	15/40	51.5 - 631	NC	NC	329
Manganese	28/40	0.45 - 32.2	3,500	***	22.0
Mercury	4/39	0.09 - 0.8	3.0	2.1	0.16
Nickel	11/40	0.69 - 2.2	340**	130	3.89
Potassium	18/40	21.7 - 2,130	NC	NC	102
Selenium	6/40	0.88 - 1.7	440	5.2	1.68
Silver	4/40	0.61 - 5.3	410	17	2.13
Sodium	18/40	118 - 1,370	NC	NC	343
Thallium	1/40	0.45	NC	NC	2.84
Vanadium	32/40	0.28 - 5.2	67	980	6.3
Zinc	7/40	20.3 - 57.5	26,000	***	37.0
Cyanide	3/34	0.2 - 0.27	34**	0.8	1.19

1 - Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
2 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998a).
NC - No criterion.
** - Direct exposure value based on acute toxicity considerations. The criterion is applicable in scenarios where children must be exposed to soils (e.g., residences, schools, playgrounds).
*** - Leachability values may be derived using SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

TABLE B-3

SUMMARY OF ORGANICS DETECTED IN SUBSURFACE SOIL
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels [1]	
			Residential	Leachability
Volatile Organic Compounds, mg/kg				
Acetone	2/12	0.009 - 0.013	11,000	25
Xylenes, total	3/23	0.003 - 0.004	130	0.2
Semivolatile Organic Compounds, mg/kg				
2-Methylnaphthalene	2/37	0.051 - 0.11	210	8.5
Acenaphthene	12/49	0.35 - 22	2,400	2.1
Anthracene	13/49	0.032 - 8.2	21,000	2,500
Benzo(a)anthracene	21/49	0.03 - 34	#	0.8
Benzo(a)pyrene	32/49	0.035 - 33	0.1	8
Benzo(b)fluoranthene	33/49	0.042 - 47	#	2.4
Benzo(g,h,i)perylene	21/49	0.034 - 14	2,500	32,000
Benzo(k)fluoranthene	26/49	0.03 - 21	#	24
bis(2-Ethylhexyl) phthalate	2/16	0.052 - 0.053	72	3,600
Butylbenzylphthalate	1/16	0.056	17,000	310
Carbazole	6/16	0.027 - 4.3	49	0.2
Chrysene	20/49	0.04 - 38	#	77
Dibenzo(a,h)anthracene	12/49	0.022 - 5.2	#	0.7
Dibenzofuran	2/16	0.085 - 0.46	320	15
Di-n-butylphthalate	11/16	0.099 - 5.6	7,300	47
Fluoranthene	32/49	0.039 - 61	3,200	1,200
Fluorene	3/49	0.11 - 1.1	2,600	160
Indeno(1,2,3-cd)pyrene	22/49	0.024 - 13	#	6.6
Naphthalene	6/49	0.064 - 1.1	55	1.2
Phenanthrene	26/49	0.033 - 27	2,200	250
Pyrene	31/49	0.041 - 51	2,400	880
BaPEqs	49/49	0.009 - 46	0.1	NC
Miscellaneous Parameters, mg/kg				
TRPH	11/17	9.74 - 103	460	340

1 - Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
NC - No criterion.
TRPH - Total recoverable petroleum hydrocarbons.
BaPEqs - Benzo(a)pyrene equivalents.
= Based on Chapter 62-777, F.A.C., site concentrations of carginogenic polynuclear aromatic hydrocarbons (PAHs) are converted to BaPEqs before comparison to benzo(a)pyrene (BaP) SCTLs.
** = One-half of the BaP detection limit was used as the BaPEq concentration if no carcinogenic PAHs were detected in a sample.

TABLE B-4

SUMMARY OF INORGANICS DETECTED IN SUBSURFACE SOIL
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels (1)		Background Screening Concentration (3)
			Residential	Leachability	
Inorganic Analytes, mg/kg					
Aluminum	12/12	224 - 2,360	80,000	***	4,430
Antimony	4/12	0.93 - 4.2	27	0	9.44
Barium	11/12	0.75 - 17.4	120**	1,600	14.4
Calcium	9/12	62.7 - 2,510	NC	NC	9.44
Chromium	3/12	1.9 - 2.7	210.0	38	7.75
Cobalt	1/12	0.35	1,700	***	3.11
Iron	12/12	66.6 - 298	53,000	***	1,490
Lead	17/19	1.1 - 223	400	***	197
Manganese	8/12	0.82 - 3	3,500	***	22.0
Nickel	8/12	0.73 - 1.4	340**	130	3.89
Potassium	2/12	22.7 - 27.6	NC	NC	102
Sodium	3/12	156 - 251	NC	NC	343
Vanadium	12/12	0.49 - 2.2	67	980	6.30

1 - Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
2 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998).
NC - No criterion.
** - Direct exposure value based on acute toxicity considerations. The criterion is applicable in scenarios where children must be exposed to soils (e.g., residences, schools, playgrounds).
*** - Leachability values may be derived using SPLP to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

TABLE B-5

SUMMARY OF ORGANIC AND INORGANIC ANALYTES DETECTED IN GROUNDWATER
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP GCTL[1]	U.S. EPA MCL[2]	Background Screening Concentration[3]
Semivolatile Organic Compounds, µg/L					
bis(2-Ethylhexyl) phthalate	4/8	1.0 - 240	6.0	NC	NA
Pesticides, µg/L					
4,4'-DDD	1/8	0.065	0.1	NC	NA
4,4'-DDE	0/8	[4]	0.1	NC	NA
4,4'-DDT	1/8	0.067	0.1	NC	NA
Nitroaromatic Compounds, µg/L					
3-Nitrotoluene	8/10	1.87 - 3.39	70	NC	NA
RDX	0/10	[4]	0.3	NC	NA
Nitrobenzene	1/11	0.228	3.5	NC	NA
Inorganic Analytes (Total), µg/L					
Aluminum	8/8	205 - 635	200	50 to 200[5]	13,100
Antimony	1/8	42.9	6.0	6.0	44.5
Arsenic	0/9	[6]	10.0	10.0	7.1
Barium	8/8	14.3 - 28.7	2,000	2,000	88.2
Beryllium	1/8	1.0	4.0	4.0	3.5
Calcium	2/8	5,620 - 6,380	NC	NC	81,100
Cobalt	3/8	1.4 - 1.9	140	NC	12.8
Copper	6/8	4.7 - 8.7	1,000	1,300	12.5
Iron	8/8	633 - 3,140	300	300[5]	7,760
Lead	0/9	ND	15	15	5.35
Magnesium	8/8	598 - 1,500	NC	NC	10,000
Manganese	8/8	8.3 - 49.6	50.0	50[5]	150
Nickel	1/8	17.5	100	NC	24.5
Potassium	1/8	2,010	NC	NC	4,330
Sodium	5/8	5,510 - 10,800	160,000	NC	16,500
Thallium	2/8	5.0 - 6.1	2.0	2.0	13.3
Vanadium	1/8	1.8	49	NC	20.2
Zinc	3/8	92 - 246	5,000	5,000[5]	76.8
Cyanide	3/8	3.1 - 3.8	200	200	22.0

1 - Florida Department of Environmental Protection (FDEP Groundwater Cleanup Target Levels (GCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
2 - United States Environmental Protection Agency (U.S. EPA) Maximum Contaminant Levels (MCLs) (U.S. EPA, 2002)
3 - NAS Cecil Field Inorganic Background Data Set values (HLA, 1998).
4 - Wells with detected concentrations of 4,4'-DDE and RDX were resampled in August 2006, and previous detections were not verified and thus not included in table (see Section 1.4.3).
5 - U.S. EPA Secondary MCLs (U.S. EPA, 2002)
6 - Representative sample from location with previous arsenic detections was non-detect (see Section 1.4.3).
NA - Not applicable.
NC - No criterion.
ND - Not detected.
RDX - Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Only most recent results were included for wells that were sampled more than once.

TABLE B-6

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SEDIMENT
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels[1]		Background Screening Concentration[2]	FDEP Guidelines for Protection of Sediment-Dwelling Organisms[3]	
			Residential	Leachability		TEC	PEC
Volatile Organic Compounds, mg/kg							
2-Butanone	2/3	0.009 - 0.018	16,000	17	NA	NC	NC
Semivolatile Organic Compounds, mg/kg							
2-Methylnaphthalene	3/13	0.189 - 31.7	210	6.1	NA	NC	NC
Acenaphthene	4/13	0.0692 - 46.9	2,400	2.1	NA	0.0067	0.089
Acenaphthylene	2/13	0.0996 - 0.319	1,800	27	NA	0.0059	0.13
Anthracene	4/13	0.043 - 3.48	21,000	2,500	NA	0.057	0.85
Benzo(a)anthracene	12/13	0.0126 - 6.1	#	0.8	NA	0.11	1.1
Benzo(a)pyrene	13/13	0.0231 - 48.2	0.1	8	NA	0.15	1.5
Benzo(b)fluoranthene	12/13	0.0201 - 38	#	2.4	NA	NC	NC
Benzo(g,h,i)perylene	10/13	0.1 - 3.5	2,500	32,000	NA	NC	NC
Benzo(k)fluoranthene	11/13	0.0585 - 10.8	#	24	NA	NC	NC
Carbazole	1/3	0.058	49	0.2	NA	NC	NC
Chrysene	13/13	0.0557 - 7.3	#	77	NA	0.17	1.3
Dibenzo(a,h)anthracene	4/13	0.034 - 1.1	#	0.7	NA	0.033	0.14
Di-n-butylphthalate	3/3	0.38 - 3.5	7,300	47	NA	NC	0.043
Fluoranthene	12/13	0.079 - 73.4	3,200	1,200	NA	0.42	2.2
Fluorene	4/13	0.0303 - 21.9	2,600	160	NA	0.077	0.54
Indeno(1,2,3-cd)pyrene	8/13	0.094 - 4.3	#	6.6	NA	NC	NC
Phenanthrene	9/13	0.073 - 23.3	2,200	250	NA	0.2	1.2
Pyrene	12/13	0.0263 - 65.2	2,400	880	NA	0.2	1.5
BaPEqs	13/13	0.030 - 31	0.1	NC	NA	NC	NC
Nitroaromatic Compounds, mg/kg							
4-Nitrotoluene	1/3	37.5	640	1.4	NA	NC	NC
Pesticides, mg/kg							
Dieldrin	1/3	0.00046	0.06	0.002	NA	0.0019	0.062
4,4'-DDD	2/3	0.0026 - 0.011	4.2	5.8	NA	0.0049	0.028
4,4'-DDE	2/3	0.0032 - 0.0083	2.9	18	NA	0.0032	0.031
4,4'-DDT	2/3	0.004 - 0.0081	2.9	11	NA	0.0042	0.063

TABLE B-6

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SEDIMENT
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Soil Cleanup Target Levels[1]		Background Screening Concentration[2]	FDEP Guidelines for Protection of Sediment-Dwelling Organisms[3]	
			Residential	Leachability		TEC	PEC
Miscellaneous Parameters, mg/kg							
TRPH	4/7	15 - 160	460	340	NA	NC	NC
TOC	3/3	5,600 - 14,000	NC	NC	NA	NC	NC
Inorganic Analytes, mg/kg							
Aluminum	3/3	543 - 2,850	80,000	*	10,200	NC	NC
Barium	3/3	2.3 - 4.1	120	1,600	36.1	20	60
Calcium	3/3	62.8 - 91.4	NC	NC	5,920	NC	NC
Chromium	1/3	3.1	210	38	16.0	43	110
Iron	3/3	87.8 - 207	53,000	*	3,330	NC	NC
Lead	13/13	29 - 840	400	*	44.6	36	130
Magnesium	2/3	29.5 - 58.8	NC	NC	379	NC	NC
Sodium	3/3	145 - 221	NC	NC	388	NC	NC
Vanadium	3/3	0.72 - 2.7	67	980	15.0	NC	NC

1 - Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chpater 62-777, Florida Adminstrative Code (F.A.C.) (FDEP, 2005).
2 - NAS Cecil Field Inorganic Background Data Set values (HLA, 1998a).
3 - MacDonald, et al., 2003.
NA - Not applicable.
NC - No criterion.
TEC - Threshold effects concentration.
PEC - Probable effects concentration.
= Based on Chapter 62-777, F.A.C., site concentrations of carginogenic polynuclear aromatic hydrocarbons (PAHs) are converted to benzo(a)pyrene equivalents (BaPEqs) before comparison to benzo(a)pyrene (BaP) SCTLs.
* = Leachability values may be derived using the Synthetic Precipitation Leaching Procedure (SPLP) test to calculate site-specific SCTLs or may be determined using the Toxicity Characteristic Leaching Procedure (TCLP) in the event that oily wastes are present.

TABLE B-7

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SURFACE WATER
SITE 15 RECORD OF DECISION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detections	FDEP Surface Water Criterion (Freshwater)(1)	Background Screening Concentration(2)
Nitroaromatic Compounds, µg/L				
1,3,5-Trinitrobenzene	1/3	6.73	19	NA
3-Nitrotoluene	1/3	4.95	380	NA
4-Nitrotoluene	3/3	1.11 - 46.1	550.0	NA
Tetryl	2/3	18.1 - 18.7	NC	NA
Miscellaneous Parameters, mg/L				
TRPH	1/3	0.6	5000 (3)	NA
Inorganic Analytes, µg/L				
Aluminum, Total	3/3	441 - 649	13	1,040
Aluminum, Dissolved	3/3	403 - 585	13	1,040
Arsenic, Total	3/3	4 - 12	50(3)	5.45
Arsenic, Dissolved	2/3	5.6 - 12.2	50(3)	5.45
Barium, Total	3/3	9.3 - 17.1	NC	43.7
Barium, Dissolved	3/3	8.3 - 14.9	NC	43.7
Calcium, Total	3/3	620 - 4,940	NC	43,000
Calcium, Dissolved	3/3	538 - 3,960	NC	43,000
Copper, Total	1/3	9	8.7	7.35
Iron, Total	3/3	605 - 1,980	1000(3)	3,030
Iron, Dissolved	3/3	468 - 1,650	1000(3)	3,030
Lead, Total	7/7	91 - 398	1.30	5.35
Lead, Dissolved	3/3	79.5 - 225	2.0(4)	5.35
Magnesium, Total	3/3	429 - 557	NC	5,580
Magnesium, Dissolved	3/3	396 - 493	NC	5,580
Potassium	1/3	362	NC	2,060
Potassium, Dissolved	1/3	528	NC	2,060
Sodium, Total	3/3	3,650 - 5,220	NA	12,200
Sodium, Dissolved	3/3	3,400 - 4,070	NA	12,200
Vanadium, Total	1/3	3.3	NC	4.5

1 - Florida Department of Environmental Protection (FDEP) surface water criteria based on freshwater classification, Chapter 62-777, Florida adminstrative Code (F.A.C.) (FDEP, 2005).
2 - NAS Cecil Field Inorganic Background Data Set values (HLA, 1998a).
3 - Surface water criteria based on Class III freshwater (Chapter 62-302.530, F.A.C.).
4 - Hardness dependent.
TRPH - Total recoverable petroleum hydrocarbons.
NC - No xriterion.
NA - Not applicable.

APPENDIX C

ESTIMATED COSTS OF SELECTED REMEDY

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3C: Excavation (Recreational), On-Site Solidification/Stabilization, Off-Site Treatment and Disposal
CAPITAL COST

4/30/2008 6:08 PM

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 PRE-CONSTRUCTION											
1.1 Prepare Deed Restrictions	100	hr			$32.00		$0	$0	$3,200	$0	$3,200
1.2 Prepare Remedial Action Plan	200	hr			$32.00		$0	$0	$6,400	$0	$6,400
1.3 Post Construction Documents	100	hr			$32.00		$0	$0	$3,200	$0	$3,200
1.4 Tortoise Survey	1	ls		$675.00	$964.00		$0	$675	$964	$0	$1,639
2 MOBILIZATION/DEMOBILIZATION AND FIELD SUPPORT											
2.1 Equipment Mobilization/Demobilization	5	ea			$110.00	$224.00	$0	$0	$550	$1,120	$1,670
2.2 Professional Oversight (2 person)	18	mwk			$3,696.00		$0	$0	$66,528	$0	$66,528
3 DECONTAMINATION											
3.1 Temporary Decon Pad	1	ls		$550.00	$500.00	$175.00	$0	$550	$500	$175	$1,225
3.2 Decontamination Services	3	mo			$1,500.00	$2,075.00	$0	$0	$4,500	$6,225	$10,725
3.3 Decon Water Storage Tank, 6,000 gallon	3	mo				$645.00	$0	$0	$0	$1,935	$1,935
3.4 Disposal of Decon Waste (liquid & solid)	3	mo	$900.00				$2,700	$0	$0	$0	$2,700
4 INCINERATOR & ROCKET LAUNCHER REMOVAL											
4.1 Demolition & Removal	1	day			$1,612.00	$616.80	$0	$0	$1,612	$617	$2,229
4.2 Transport/Disposal	18	ton	$23.50				$423	$0	$0	$0	$423
5 SITE PREPARATION											
5.1 Clearing - Brush Mowing (medium density)	2.8	ac			$185.00	$153.00	$0	$0	$518	$428	$946
5.2 Clearing/Chipping - Tree Removal - 12" dia.	4.4	ac			$1,250.00	$2,875.00	$0	$0	$5,500	$12,650	$18,150
5.3 Chipping Stumps	880	ea			$19.80	$5.05	$0	$0	$17,424	$4,444	$21,868
5.4 Pre-Excavation Sampling - Lead (1 sample per 2,500 fl	30	samp	$55.00				$1,650	$0	$0	$0	$1,650
6 TREATABILITY STUDY											
6.1 Pre-Excavation Treatability Testing	1	ls	$17,778.00				$17,778	$0	$0	$0	$17,778
7 EXCAVATION, ON-SITE SOLIDIFICATION/STABILIZATION, TRANSPORTATION AND DISPOSAL OF CONTAMINATED SOIL											
7.1 Excavation - Dozer	20	day			$97.40	$384.30	$0	$0	$1,948	$7,686	$9,634
7.2 Excavation - Backhoe Excavator	20	day			$112.90	$607.15	$0	$0	$2,258	$12,143	$14,401
7.3 Excavation - Track Loader	20	day			$85.90	$461.30	$0	$0	$1,718	$9,226	$10,944
7.4 On-Site Lead Stabilization (6,485 tons)	6,485	ton	$53.45				$346,623	$0	$0	$0	$346,623
7.5 Post-Treatment Confirmation Sampling (1 per 300-ton	25	ea	$175.00				$4,375	$0	$0	$0	$4,375
7.6 Transport & Disposal Non-haz (subtitle D) (pre-treatme	12,140	ton	$28.75				$349,025	$0	$0	$0	$349,025
7.7 Transport & Disposal Non-haz (subtitle D) (post-treatm	5,192	ton	$28.75				$149,270	$0	$0	$0	$149,270
7.8 Transport & Disposal Haz (subtitle C) (post-treatment -	1,263	ton	$262.40				$331,411	$0	$0	$0	$331,411
7.9 Waste Characterization Test, 1 per 300 ton	25	ea	$175.00	$6.00	$35.00		$4,375	$150	$875	$0	$5,400
8 COVER AND RESTORATION											
8.1 Import Clean Backfill	11,853	cy		$10.10			$0	$119,715	$0	$0	$119,715
8.2 Place, Grade, Compact Backfill	11,853	cy			$3.34	$1.46	$0	$0	$39,589	$17,305	$56,894
8.3 Revegetation - soil nutrients	306	msf		$6.65	$0.38	$0.25	$0	$2,035	$116	$77	$2,228
8.4 Revegetation (grasses)	34,025	sy		$0.35	$1.35	$0.22	$0	$11,909	$45,934	$7,486	$65,328
8.5 Revegetation - wetland nutrients	7.4	msf		$8.90	$0.38	$0.25	$0	$66	$3	$2	$71
8.6 Wetland Restoration	74	csf		$19.67	$10.35		$0	$1,456	$766	$0	$2,221
Subtotal							$1,207,630	$136,555	$204,103	$81,518	$1,629,807
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$1,207,630	$157,995	$177,978	$71,084	$1,614,687

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3C: Excavation (Recreational), On-Site Solidification/Stabilization, Off-Site Treatment and Disposal
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
Overhead on Labor Cost @ 30%									$53,393		$53,393
G & A on Labor Cost @ 10%									$17,798		$17,798
G & A on Material Cost @ 10%								$15,799			$15,799
G & A on Subcontract Cost @ 10%							$120,763				$120,763
Total Direct Cost							$1,328,393	$173,794	$249,169	$71,084	$1,822,440
Indirects on Total Direct Cost @ 25%								$43,449	$62,292	$17,771	$123,512
Profit on Total Direct Cost @ 10%											$182,244
Total Field Cost											$2,128,196
Contingency on Total Field Cost @ 20%											$425,639
Engineering on Total Field Cost @ 10%											$212,820
TOTAL COST											**$2,766,655**

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3C: Excavation (Recreational), On-Site Solidification/Stabilization, Off-Site Treatment and Disposal
Annual Cost

Item	Item Cost per Year	Item Cost Year 5	Notes
Annual Inspection	$1,844		2 people for 1 day, reports, vehicle, etc.
Site Review		$5,500	Perform 5-Year reviews.
TOTALS	$1,844	$5,500	

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Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$2,766,655		$2,766,655	1.000	$2,766,655
1		$1,844	$1,844	0.935	$1,724
2		$1,844	$1,844	0.873	$1,610
3		$1,844	$1,844	0.816	$1,505
4		$1,844	$1,844	0.763	$1,407
5		$7,344	$7,344	0.713	$5,236
6		$1,844	$1,844	0.666	$1,228
7		$1,844	$1,844	0.623	$1,149
8		$1,844	$1,844	0.582	$1,073
9		$1,844	$1,844	0.544	$1,003
10		$7,344	$7,344	0.508	$3,731
11		$1,844	$1,844	0.475	$876
12		$1,844	$1,844	0.444	$819
13		$1,844	$1,844	0.415	$765
14		$1,844	$1,844	0.388	$715
15		$7,344	$7,344	0.362	$2,659
16		$1,844	$1,844	0.339	$625
17		$1,844	$1,844	0.317	$585
18		$1,844	$1,844	0.296	$546
19		$1,844	$1,844	0.277	$511
20		$7,344	$7,344	0.258	$1,895
21		$1,844	$1,844	0.242	$446
22		$1,844	$1,844	0.226	$417
23		$1,844	$1,844	0.211	$389
24		$1,844	$1,844	0.197	$363
25		$7,344	$7,344	0.184	$1,351
26		$1,844	$1,844	0.172	$317
27		$1,844	$1,844	0.161	$297
28		$1,844	$1,844	0.150	$277
29		$1,844	$1,844	0.141	$260
30		$7,344	$7,344	0.131	$962
				TOTAL PRESENT WORTH	**$2,801,395**