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AMENDED FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA NAS CECIL FIELD FL

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TETRA TECH NUS INC

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Amended Feasibility Study Report for Operable Unit 5, Site 15 Blue 10 Ordnance Disposal Area

Naval Air Station Cecil Field
Jacksonville, Florida

Contract Task Order 0102

April 2008

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

TETRA TECH NUS, Inc.

AMENDED
FEASIBILITY STUDY REPORT
FOR
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

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This document, which describes the Amended Feasibility Study Report for Operable Unit 5, Site 15, Naval Air Station Cecil Field, Jacksonville, Florida, was prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc
ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criterion
BAF	Bioaccumulation factor
BaPEq	Benzo(a)pyrene equivalent
BCT	BRAC Cleanup Team
BEHP	bis(2-Ethylhexyl) phthalate
bgs	Below ground surface
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylenes
^{o}C	Degrees Celsius
CAA	Clean Air Act
CAD	Cartridge activated devices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CKD	Cement kiln dust
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of concern
cm^2	Square centimeters
COE	United States Army Corps of Engineers
COPC	Chemical of potential concern
cPAH	Carcinogenic PAH
CSF	Cancer Slope Factor
CTO	Contract Task Order
CWA	Clean Water Act
DPT	Direct-push technology
ERA	Ecological risk assessment
°F	Degrees Fahrenheit
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facility Agreement
FGS	Florida Geologic Survey
FL-UCL	Florida UCL

FS	Feasibility Study
ft^2	Square feet
GAC	Granular activated carbon
GCTL	Groundwater cleanup target level
GRA	General Response Action
HI	Hazard index
HLA	Harding Lawson Associates
HMX	Cyclotetramethylenetetranitramine
HQ	Hazard quotient
IAS	Initial Assessment Study
IBDS	Inorganic Background Data Set
IR	Installation Restoration
kg	kilogram
LDR	Land Disposal Restriction
LUC	Land use control
m^3/day	Cubic meter per day
mg/day	Milligrams per day
mg/cm^2	Milligrams per centimeters squared
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
µg/dL	Micrograms per deciliter
µg/kg	Micrograms per kilogram
mg/L	Milligrams per liter
µg/L	Micrograms per liter
NAAQS	National Ambient Air Quality Standard
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFA	No further action
NGVD	National Geodetic Vertical Datum
NESHAP	National emission standards for hazardous air pollutant
NPDES	National pollution discharge elimination system
NPW	Net present worth
NSPS	New source performance standards
NTU	Nephelometric turbidity unit

O&M	Operation and maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PEC	Probable effects concentration
PCDD	Polychlorinated dibenzo-p-dioxin
PCDF	Polychlorinated dibenzofuran
POTW	Publicly Owned Treatment Works
PPE	Personal protective equipment
PRE	Preliminary Risk Evaluation
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SCTL	Soil Cleanup Target Level
SDWA	Safe Drinking Water Act
SMCL	Secondary MCL
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total dissolved solids
TEC	Threshold effects concentration
TEF	Toxicity equivalent factor
TNT	Trinitrotoluene
TOC	Total organic carbon
TRPH	Total recoverable petroleum hydrocarbons
TSDF	Treatment, storage, and disposal facility
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper confidence limit
USC	United States Code
USDA	U.S. Department of Agriculture

U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USN	United States Navy
UTS	Universal Treatment Standard
UXO	Unexploded ordnance
VOC	Volatile organic compound
yd^3	Cubic yard
YWWA	Yellow Water Weapons Area

EXECUTIVE SUMMARY

E.1 PURPOSE OF THE REPORT

The purpose of this Amended Feasibility Study (FS) Report is to develop and evaluate options for the remediation of contaminated soil for Operable Unit (OU) 5, Site 15, Blue 10 Ordnance Disposal Area, at Naval Air Station (NAS) Cecil Field in Jacksonville, Florida. Investigation of groundwater at this site indicated that no further action (NFA) was required, and this conclusion is documented in the Technical Memorandum for No Further Groundwater Monitoring at Site 15 included in Appendix A.1 and in the addendum to this Technical Memorandum that specifically addresses arsenic contamination in groundwater and is included in Appendix A.2.

This Amended FS provides revisions to the Final FS for OU 5, Site 15, submitted in April 2007. Revisions were required because pre-excavation sampling at the site resulted in updated estimates of the amount of lead-contaminated soil that would require disposal as hazardous waste. Based on these revised estimates and the associated increased costs, an alternative evaluating on-site solidification/stabilization of lead-contaminated soil prior to off-site disposal was added to the alternatives evaluated in the April 2007 FS.

E.2 SITE DESCRIPTION AND HISTORY

Site 15, Blue 10 Ordnance Disposal Area, is located in the southwestern section of the Yellow Water Weapons Area (YWWA) of NAS Cecil Field. The site covers approximately 85 acres and is heavily forested and relatively flat. The ordnance burn chamber and static rocket firing pad located in the north central portion of the site are the only structures still existing 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. Five wetland areas designated as Wetlands A to F and covering a combined area of approximately 4.6 acres have been delineated and are discussed in the Wetlands Delineation Report provided in Appendix C.

From the early 1940s to the mid-1950s, Site 15 was used as a skeet range. Ordnance was disposed by incineration in the burn chamber and static firing on the firing pad from the mid-1960s through 1977. Overall, an estimated 350 tons of ordnance were disposed at the site. Several forest burning events have taken place in the area designated as “forest burn area” located in the southwestern portion of the site. The latest burning event in this area took place in the spring of 1999.

E.3 SUMMARY OF INVESTIGATION FINDINGS

Several environmental investigations were performed at Site 15 under the Navy's Installation Restoration (IR) Program conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as administered by the Federal Facility Agreement (FFA) signed by the United States Environmental Protection Agency (U.S. EPA), Navy, and Florida Department of Environmental Protection (FDEP). Investigation at the began with an Initial Assessment Study (IAS) performed in 1985 and included a Remedial Investigation (RI) conducted in 1994 and 1995 and complemented by 13 rounds of supplemental sampling performed from 1996 to 2005. These investigations showed that soil contains several chemicals of concern (COCs) at concentrations that could result in unacceptable human health risks under the currently planned recreational use of Site 15. A human health Preliminary Risk Evaluation (PRE) identified several polynuclear aromatic hydrocarbons (PAHs) collectively designated as benzo(a)pyrene equivalents (BaPEqs), two metals (arsenic and lead), and total recoverable petroleum hydrocarbons (TRPH), as chemicals of potential concern (COPCs). An ecological risk assessment (ERA) also identified PAHs, arsenic, and lead in soil as COPCs.

Investigations showed that groundwater beneath the site does not contain unacceptable concentrations of the chemicals detected in soil and associated with the past use of Site 15. Detailed information regarding the investigation of groundwater at Site 15 is presented in the Groundwater Technical Memorandum for No Further Action and Supplement to the Groundwater Technical Memorandum for No Further Action provided in Appendices A.1 and A.2, respectively.

E.4 REMEDIAL ACTION OBJECTIVES, PRELIMINARY REMEDIAL ACTION GOALS, AND VOLUMES OF CONTAMINATED SOIL

The Remedial Action Objectives (RAOs) identified for Site 15 soil are as follows:

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

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

The COCs and corresponding pickup values established to permit recreation use of the site are as follows:

COC	Maximum Concentration Detected	Recreational Use Cleanup Goal	Recreational Use Pickup Value(1)
BaPEqs	956,000 µg/kg	2,250 µg/kg	6,750 µg/kg(2)
Arsenic	451 mg/kg	36 mg/kg	108 mg/kg(2)
Lead	41,400 mg/kg	3,281 mg/kg (chronic)	6,500 mg/kg(3)
TRPH	2,380 mg/kg	8,900 mg/kg	340 mg/kg(4)

µg/kg: Micrograms per kilogram.
mg/kg: Milligrams per kilogram.

1 The "pickup value" is the COC concentration that, if soil with a greater concentration is removed or treated, the 95-percent upper confidence (UCL) (or average in the case of lead) of COC concentrations in remaining soil would be less than the cleanup goal.
2 Three times the site-specific recreational SCTL as per Chapter 62-780, Florida Administrative Code (F.A.C.) for acute toxicity.
3 Site-specific acute toxicity SCTL.
4 Chapter 62-777 leachability SCTL.

Based on the Site 15 soil database provided in Appendix E and on the findings of the Geostatistical Assessment Report provided in Appendix D (Newfields, 2004) and confirmation sampling in the lead-contaminated areas, it is estimated that a total volume of approximately 11,850 cubic yards (yd^3) of contaminated soil from 22 areas with a combined surface area of approximately 7.2 acres contain concentrations of COCs greater than the recreational site-specific SCTLs. These areas are as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 6,750 µg/kg – nine areas totaling 235,900 square feet (ft^2), or 5.42 acres, from 0 to 1 foot below ground surface (bgs).

- Lead-contaminated soil with concentrations greater than 6,500 mg/kg – nine areas totaling 75,300 ft^2, or 1.73 acres, from 0 to 1 foot bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg – one 500 ft^2 area from 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, or 0.04 acre, from ground surface to the water table (assume to be 2 feet bgs). At the time of sample collection in these arsenic-contaminated areas, the water table was within 1 foot of the ground surface, limiting unsaturated soil sample collection to this depth. Because the water table has decreased, overexcavation to a depth of 2 feet bgs will be conducted.

Preliminary surface areas and volumes of soil that would need to be remediated to allow the potential future unrestricted use of Site 15 were also estimated. Based on a comparison of the Site 15 soil

database to the site-specific SCTLs for a hypothetical future residential use scenario, it was estimated that a total volume of approximately 118,000 yd^3 of contaminated soil over a surface area of approximately 73 acres would need to be remediated, as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 100 µg/kg: 1,772,803 ft^2, or 40.7 acres, from 0 to 1 foot bgs.

- Lead-contaminated soil with concentrations greater than 400 mg/kg – 632,460 ft^2, or 14.5 acres, from 0 to 1 foot bgs.

- PAH- and lead-contaminated soil with BaPEq concentrations greater than 100 µg/kg and lead concentrations greater than 400 mg/kg – 789,651 ft^2, or 18.1 acres, from 0 to 1 foot bgs.

- Arsenic-contaminated soil with concentrations greater than 2.1 mg/kg – included within the other areas from 0 to 2 foot bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg – included within the PAH-contaminated area noted above from a depth of 1 to 2 ft bgs.

The Geostatistical Assessment Report (Appendix D) stated that significant soil sampling was conducted at Site 15 and that the delineation of lead and BaPEqs was accurate and complete, and therefore confirmation sampling is not warranted. Additional discussions regarding this topic were held (BCT Meeting Minute No. 2208) and it was agreed by the Base Realignment and Closure (BRAC) Cleanup Team (BCT) (Decision No. 687) that the areas requiring remediation for BaPEqs only would not require confirmation sampling; however, the areas being remediated for lead would require limited confirmation sampling. Six areas have been identified as exceeding the lead pickup level for recreational use and therefore would require confirmation sampling. A confirmation sampling plan was developed and implemented to support remedial efforts at Site 15.

E.5 SCREENING OF GENERAL RESPONSE ACTIONS, REMEDIATION TECHNOLOGIES, AND PROCESS OPTIONS

General Response Actions (GRAs) and the remediation technologies and process options associated with these GRAs were screened for effectiveness, implementability, and cost. Remediation technologies that were determined to be ineffective or too difficult to implement were eliminated from further consideration. The following GRAs, remediation technologies, and process options were retained to develop remedial alternatives for Site 15:

- No Action

- Limited Action: Land Use Controls (LUCs)

- Containment: Soil Cover

- Removal: Excavation

- Ex-Situ Treatment: On-Site Screening, Size Reduction, On-Site Soil Washing/Chemical Extraction, On-Site Solidification/Stabilization, and Off-Site Chemical Fixation/Solidification

- Disposal: On-Site Beneficial Reuse, Off-Site Resource Conservation and Recovery Act (RCRA) Non-Hazardous (Subtitle D) Landfill, and Off-Site RCRA Hazardous (Subtitle C) Landfill

E.6 DEVELOPMENT OF REMEDIAL ALTERNATIVES

The following remedial alternatives were developed for Site 15:

- **Alternative 1: No Action**. This alternative is required as a baseline for comparison to other alternatives.

- **Alternative 2: Soil Cover To Meet Recreational RAOs and LUCs**. This alternative would place a soil cover over the areas of Site 15 where concentrations of COCs in soil are greater than the recreational use pickup value. A total of 20 areas with an overall surface area of approximately 7.2 acres would be capped with a 2-foot-thick soil cover. Because the cover would need to be maintained to prevent exposure to the contaminated soil remaining on site, LUCs would have to be established through a LUC Remedial Design (RD) and enforced. These LUCs would include establishing an inspection and maintenance schedule for the cover and preventing, commercial/industrial, and high- and medium-intensity recreational uses.

- **Alternative 3A: Excavation To Meet Recreational RAOs, Off-Site Treatment and Disposal, and LUCs**. This alternative would remove soil from the areas of Site 15 where concentrations of COCs are greater than the recreational use pickup level. A total of 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 capping under Alternative 2. Most of the excavated soil (approximately 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 (approximately 3,760yd^3) would be disposed at an off-site

permitted RCRA hazardous (Subtitle C) TSDF. The excavated areas would then be backfilled with 11,850 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Because the soil remaining on site would continue to contain concentrations of COCs that would not be protective of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors, LUCs would have to be established and enforced. These LUCs would prevent residential, commercial/industrial, and high-and medium-intensity recreational uses.

- **Alternative 3B: Excavation To Meet Recreational RAOs, On-Site Treatment and Reuse, and LUCs**. As with Alternative 3A, Alternative 3B would remove soil from the areas of Site 15 where concentrations of COCs are greater than the recreational use pickup level. A total of 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. 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 10,470 yd^3 of treated soil would be reused to backfill the excavated areas. The soil washing process would concentrate the COCs removed from the treated soil in a wet (65 percent moisture by weight) filter cake residue and approximately 790 yd^3 (or 1,600 tons) of this wet filter cake residue would be disposed at an off-site permitted RCRA Subtitle C TSDF. The backfilling of the excavated areas would be completed with 1,380 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Alternative 3B would also incorporate the same LUCs as Alternative 3A to prevent unacceptable risks from exposure of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors to contaminated soil remaining on site. These LUCs would prevent residential, commercial/industrial, and high- and medium-intensity recreational uses.

- **Alternative 3: Excavation To Meet Recreational RAOs, On-Site Solidification/Stabilization, Off-Site Treatment and Disposal, and LUCs:** As with Alternative 3A, Alternative 3C would remove soil from areas of Site 15 where concentrations of COCs are greater than the recreational use pickup values. A total of approximately 11,850 yd^3 of contaminated soil would be excavated from 22 areas totaling approximately 7.2 acres that would be excavated under Alternative 3A. TCLP testing would be conducted for soil from lead-contaminated areas, and the results would be used to determine if soil was transported off site for disposal at a non-hazardous landfill or subjected to on-site solidification/stabilization. Soil from areas with initial TCLP lead concentrations less than 5 mg/L (estimated volume of approximately 8,090 yd^3) would be disposed off site at a permitted RCRA non-hazardous (Subtitle D) landfill. Soil from areas with TCLP concentrations greater than or equal to the toxicity characteristic value of 5 mg/L (estimated volume of approximately 3,760 yd^3) would be

subjected to on-site solidification/stabilization. After treatment, soil would be retested, and if the TCLP concentration decreased to less than 5 mg/L and the alternative LDR treatment standards are met, the soil would be transported and disposed at a non-hazardous (Subtitle D) landfill. If restesting results were greater than or equal to 5 mg/L and the alternative LDR treatment standards were not met, the soil would be transported and disposed at an off-site permitted RCRA hazardous (Subtitle C) TSDF (estimated volume of approximately 750 yd^3). The excavated areas would then be backfilled with 11,850 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Alternative 3C would incorporate the same LUCs as Alternative 3A to prevent unacceptable risks from exposure of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors to contaminated soil remaining on site. These LUCs would prevent land use other than low-intensity recreational activities.

- **Alternative 4A: Excavation To Allow Unrestricted Site Use and Off-Site Treatment and Disposal**. This alternative would remove contaminated soil to the extent necessary to allow unrestricted use of the site. This would essentially require excavation of all of the site surface soil because the areas identified as exceeding the site-specific residential SCTLs encompass the entire site. 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 remaining 10,000 yd^3 would be disposed at an off-site permitted RCRA Subtitle C TSDF. The excavated areas would then be backfilled with 118,000 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Because the soil remaining on site would no longer contain concentrations of COCs that could be harmful to hypothetical future residential receptors, LUCs would not be required.

- **Alternative 4B: Excavation To Allow Unrestricted Site Use and On-Site Treatment and Reuse**. As with Alternative 4A, Alternative 4B would remove contaminated soil to the extent necessary to allow unrestricted use of the site, and 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 approximately 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 (or 15,900 tons) of wet filter cake residue from the soil washing process would be disposed at an off-site permitted RCRA Subtitle C TSDF. The backfilling of the excavated areas would be completed with 14,000 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. As for Alternative 4A, no LUCs would be required.

E.7 DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

The remedial alternatives were analyzed in detail using seven of the nine criteria provided in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA. These seven criteria are as follows:

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBC) guidance criteria
- Long-Term Effectiveness and Permanence
- Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

Two other criteria, State and Community Acceptance, were not evaluated in this report. They will be evaluated after regulatory and public comments are available.

E.8 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

The remedial alternatives were compared to each other using the same criteria that were used for detailed analysis. The following is a summary of these comparisons:

- **Overall Protection of Human Health and Environment.** Alternative 1 would not be protective. Alternatives 2, 3A, 3B, 3C, 4A, and 4B would be protective. However, because of the dependence on LUCs to prevent residential, commercial/industrial, and high- and medium-intensity recreational uses in the future, Alternatives 2, 3A, 3B, and 3C would be ranked lower than Alternatives 4A and 4B. Alternatives 3A, 3B, and 3C would be ranked higher than Alternative 2 because of the removal of contaminated soil in the former. Alternatives 3B and 4B would be ranked marginally higher than Alternatives 3A and 4A, respectively, because of their use of on-site treatment to remove COCs. The protectiveness of Alternative 3C would be between 3A/4A and 3B/4B because on-site treatment would solidify/stabilize lead before the stabilized soil is removed from the site.

- **Compliance with ARARs and TBCs.** Alternative 1 would not comply with chemical- and location-specific ARARs. Action-specific ARARs do not apply to Alternative 1. Alternative 2 would not comply with chemical-specific ARARs but would comply with location- and action-specific ARARs. Alternatives 3A, 3B, 3C, 4A, and 4B would comply with chemical-, location-, and action-specific ARARs.

- **Long-Term Effectiveness and Permanence.** Alternative 1 would not be effective in the long term and offers no permanent solution. Alternatives 2, 3A, 3C, 3B, 4A, and 4B offer varying degrees of long-term effectiveness and permanence.

  Alternatives 4A and 4B offer remedies that remove COCs from the site without the need for LUCs to prevent residential, commercial/industrial, and high- and medium-intensity recreational development. Alternatives 2, 3A, 3B, and 3C depend on LUCs and may be somewhat less effective in the long term. However, because of the removal of COCs from the site with on-site and/or off-site treatment/disposal, Alternatives 3A, 3B, and 3C are superior to Alternative 2, which depends on the maintenance of a soil cover for its effectiveness. Alternative 3B is marginally superior to Alternatives 3A and 3C because the volume of contaminated material requiring off-site treatment/disposal is smaller, and therefore the relative magnitude of future liability of the disposed material is less under Alternative 3B.

- **Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment.** Alternatives 1 and 2 do not employ any treatment. Alternatives that employ treatment are ranked in the following order of decreasing volumes of soil treated: Alternative 4B (112,000 yd^3), Alternative 3B (11,250 yd^3), Alternative 4A (10,000 yd^3), and Alternatives 3A and 3C (3,760 yd^3). However, only Alternatives 3B and 4B would reduce the mass of COCs (and hence toxicity) at the site by irreversible treatment. Alternative 3B would treat 11,250 yd^3 of contaminated soil to reduce BaPEq concentrations by over 90 percent and would treat 3,760 yd^3 of high lead-content soil (included in the 11,250 yd^3) to attain the lead Universal Treatment Standard (UTS), resulting in approximately 790 yd^3 (or 1,600 tons) of highly contaminated filter cake treatment residue being removed from the site. Alternative 4B would treat 112,000 yd^3 of contaminated soil to reduce BaPEq concentrations by over 99 percent and would treat 10,000 yd^3 of high lead-content soil (included in the 112,000 yd^3) to attain the lead UTS, resulting in approximately 7,870 yd^3 (or 15,900 tons) of highly contaminated filter cake treatment residue being removed from the site. Alternatives 3A and 4A would reduce the mobility of COCs by off-site treatment of a portion of the excavated soil, and Alternative 3C would reduce the mobility of COCs by on-site and off-site treatment of a portion of the excavated soil. Alternative 4A would treat 10,000 yd^3 of lead-contaminated soil compared to 3,760 yd^3 for Alternative 3A to achieve mobility reduction. Alternative 3C would include on-site treatment of 3,760 yd^3 of lead-contaminated soil to reduce mobility and subsequent additional off-site treatment of 750 yd^3 of this soil to further reduce mobility.

- **Short-Term Effectiveness.** All of the alternatives would be effective in the short term with respect to short-term risks to workers, the community, and the environment, except Alternative 1 for which there

are no relevant issues to address. Alternatives 3B and 4B would require less off-site transport of soil and therefore would have less of an impact on the community during implementation. Alternative 2 would involve the least volume of excavation and movement of contaminated soil and is likely to pose the least short-term risk. Alternatives 3A and 3C have similar amounts of soil transported and disposed, but lead-contaminated soil transported under Alternative 3C would be stabilized and therefore present less risk to transportation workers, the community, and the environment. However, Alternative 3C involves more potential worker contact with the soil during on-site solidification/stabilization. Alternative 3A is less likely to pose a short-term risk than Alternative 4A because of the lower volume of contaminated soil being excavated. Short-term risks for all alternatives, except Alternative 1, would be properly mitigated by application of engineering controls and adherence to appropriate health and safety procedures.

The approximate time frame for implementation and attainment of RAOs would be 1 year for Alternatives 2, 3A, 3B, and 3C, 2 years for Alternative 4A, and 3 years for Alternative 4B.

- **Implementability.** Alternative 1 is readily implementable because there is no action to implement. The other alternatives would be ranked in the following decreasing order of ease of implementability: Alternative 4A, Alternative 3A, Alternative 2, and Alternatives 3B, 3C, and 4B. Alternative 4A is the easiest to implement because no on-site treatment or long-term maintenance would be required. Alternative 3A is expected to be somewhat more difficult than Alternative 4A to implement because of the need to conduct long-term site monitoring and to maintain LUCs. Alternative 2 would require maintenance of LUCs as well as maintenance of a cap. Alternatives 3B, 3C, and 4B employ on-site treatment, which requires specialized engineering and trained technicians, and therefore they are likely to be more difficult to implement. Alternative 4B is more dependent than Alternative 3B on treatability studies and additional processing to meet more stringent on-site reuse requirements. A treatability study would also be required for Alternative 3C.

- **Cost.** The capital and operation and maintenance (O&M) costs and net present worth (NPW) of the soil remedial alternatives were estimated to be as follows:

Alternative	Capital ($)	30-Year NPW of O&M ($)	30-Year NPW ($)
1	0	0	0
2	1,373,000	247,000	1,620,000
3A	3,872,000	35,000	3,907,000
3B	4,415,000	35,000	4,450,000
3C	2,767,000	35,000	2,801,000
4A	20,100,000	0	20,100,000
4B	27,114,000	0	27,114,000

The above cost figures have been rounded to the nearest $1,000 to reflect the preliminary nature of these estimates. A detailed breakdown of cost estimates is provided in Appendix G.

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF REPORT

This Amended Feasibility Study (FS) Report for Operable Unit (OU) 5, Site 15 at Naval Air Station (NAS) Cecil Field in Jacksonville, Florida, has been prepared by Tetra Tech NUS, Inc. (TtNUS) for Naval Facilities Engineering Command Southeast (NAVFAC SE) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0039. This report describes the formulation and evaluation of remedial action alternatives for soil at Site 15, the Blue 10 Ordnance Disposal Area.

This FS was conducted to establish Remedial Action Objectives (RAOs) and remedial pickup levels, to screen remedial technologies, and to assemble, evaluate, and compare remedial alternatives. The FS focuses on soil contamination at Site 15 identified during pre-Remedial Investigation (RI) sampling, the RI, and subsequent supplemental sampling.

This Amended FS provides revisions to the Final FS for OU 5, Site 15, submitted in April 2007. Revisions were required because pre-excavation sampling at the site resulted in updated estimates of the amount of lead-contaminated soil that would require disposal as hazardous waste. Based on these revised estimates and the associated increased costs, an alternative evaluating on-site solidification/stabilization of lead-contaminated soil prior to off-site disposal was added to the alternatives originally evaluated.

1.2 SITE BACKGROUND

Figure 1-1 provides a site location map. Figure 1-2 is an aerial photograph that shows features in the vicinity of the site. Figure 1-3 provides the general arrangement of the site.

1.2.1 Site Description

Site 15 is located in the southwestern section of the Yellow Water Weapons Area (YWWA) portion of NAS Cecil Field (Figure 1-1). The area of investigation is approximately 85 acres with elevations ranging from approximately 72 to 79 feet above mean sea level [referenced to the National Geodetic Vertical Datum (NGVD)]. The site is heavily forested, primarily with slash pine and understory vegetation and includes a paved access road, oriented northwest to southeast (Figure 1-2). Several forest fires have occurred in the area designated as the "forest burn area" on Figure 1-3, which is located in the southwestern portion of the site.

The ordnance burn chamber and static rocket firing pad are the only structures currently at the site. The burn chamber is a rounded, steel, tank-like container approximately 10 feet in length and 4 feet in height. The chamber has a burn stack that rises approximately 3 feet above the body of the chamber. Access is gained to the chamber through a 2-foot by 2-foot hinged door. When full, the burn chamber can accommodate 1.5 cubic yards (yd^3) of material. The static rocket firing pad is an L-shaped concrete structure approximately 10 feet long by 4 feet wide by 6 feet high. Steel firing rods are seated in the concrete at 45-degree angles. Several concrete building foundations, remnants of buildings that supported skeet range activities, are located in the area surrounding the burn chamber and firing pad.

An area of stressed vegetation, referred to as the forest burn area, is present in the southwestern portion of the site, approximately 900 feet southwest of the burn chamber and firing pad. Several slash pines are partially burned in this area. Controlled burns (burning of low-level vegetation in and around the trunks of slash pines) were commonly undertaken in this area to control understory growth in the planted pine forests. This is an area where elevated polynuclear aromatic hydrocarbon (PAH) concentrations were detected.

The primary drainage feature is a drainage ditch located south of the ordnance disposal area that drains the southern part of the site into a low-lying, swampy area and eventually into Yellow Water Creek. The northern part of the site drains overland into a swamp, which drains into Caldwell Branch (located approximately 1,000 feet west of the site) and eventually into Yellow Water Creek. Drainage features are not distinct in the central portion of the site. The majority of Site 15 remains dry throughout the year; however, the central area of the site may contain 2 to 4 inches of standing water during portions of the year. Site 15 was originally defined as an approximately 10-acre area around the burn chamber and firing pad. However, evaluation of surface soil screening data indicated PAH and lead contamination over a larger area, and the size of the site was increased to approximately 85 acres. The site boundaries were extending radially around the burn chamber and firing pad, to the south to include the forest burn area, and to the north and west to include the areas of the former trap and skeet ranges. The trap and skeet ranges were included because it was interpreted that lead shot from shooting activities was the main source of lead contamination. The forest burn area was included because combustion products of wood may produce organic residue similar to other organic burning reactions. This area is heavily planted with slash pines and typically supports a 4- to 6-inch cover of duff (pine straw and other forest detritus) over the land surface. The primary residuals produced from wood and forest floor duff and litter burning would be PAHs.

1.2.2 Site 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 parallel to and east of the access road to the burn chamber.

Ordnance was disposed at Site 15 from the mid-1960s through 1977, and disposal activities consisted of burning of ordnance materials in a large metal chamber and static firing of rockets (Envirodyne Engineers, 1985). 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 (CADs), 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 were disposed during site operations.

Review of aerial photographs from 1952, prior to the initiation of ordnance disposal on Site 15, shows an active 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 north of Site 15. No visual evidence of ordnance disposal was apparent at that time, which supports the historical documentation. Forest burning has continued in the southwestern corner of Site 15. The latest burning event took place in the spring of 1999.

1.2.3 Site Characteristics

The following sections discuss the site-specific physical characteristics of Site 15, including surface hydrology, soil characteristics, and groundwater.

1.2.3.1 Surface Hydrology

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. It appears to be a natural drainage conduit that begins in a shallow depression 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 and could 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.

1.2.3.2 Soil

Three soil types cover Site 15 in nearly equal percentages, the Olustee Fine Sand, 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 associated with these soil types consists predominantly of oak, pine, and saw palmetto. Depth to groundwater ranges from less than 10 inches below ground surface (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 (USDA, 1978).

1.2.3.3 Groundwater

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 because the other two aquifers, the intermediate and Floridan, are much deeper and overlaid by confining formations that shield them from typical environmental impacts.

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 was approximately 14 feet bgs. Sand was reported from the ground surface to the total depth of each of the monitoring wells.

1.2.4 <u>Site Investigations</u>

Several environmental investigations were performed at Site 15 as part of the Navy's Installation Restoration (IR) Program conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as administered by the Federal Facility Agreement (FFA) signed by the United States Environmental Protection Agency (U.S. EPA), Navy, and Florida Department of Environmental Protection (FDEP). Extensive investigations of Site 15 were conducted beginning in 1985 and continuing through the preparation of this FS. During this period, 853 soil samples, 13 sediment samples, 7 surface

water samples, 40 groundwater samples, and 15 ecological samples were collected and analyzed. Figure 1-5 shows all sample locations. Figure 1-6 shows the PAH sampling locations selected during the RI screening and confirmatory sampling of surface soil, subsurface soil, and sediment. Figure 1-7 shows the lead sampling locations selected during the RI screening and confirmatory sampling of surface soil, subsurface soil, and sediment. Figures 1-8 and 1-9 show the trinitrotoluene (TNT) and total recoverable petroleum hydrocarbon (TRPH) sampling locations selected during the RI screening of surface soils. Figures 1-10, 1-11, 1-12, and 1-13 show supplemental sample locations for PAH, lead, arsenic, and TRPH analyses, respectively, with respect to the historical sample locations for the same analyses during the RI. Figures 1-14 and 1-15 show isoconcentration contours for PAHs in terms of benzo(a)pyrene equivalents (BaPEqs) and lead based on all surface soil samples collected during screening, confirmatory, and supplemental programs. Figure 1-16 shows monitoring well locations and groundwater sampling results for arsenic during the RI and subsequent sampling at Site 15.

The following provides a chronological list of the investigations conducted at Site 15:

- 1985 - An Initial Assessment Study (IAS) was prepared for NAS Cecil Field by Envirodyne Engineers under the Navy Assessment and Control of Installation Pollutants (NACIP) program, which was eventually replaced by the Navy's Installation Restoration (IR) Program. The IAS consisted of the following stages: (1) records search, (2) on-site survey, (3) confirmation study ranking, (4) site ranking, and (5) confirmation study recommendations.

- 1988 - A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was performed for NAS Cecil Field by Harding Lawson Associates (HLA) (1988a). The goals of the RFI were 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. One surface soil sample was collected at Site 15 as part of the RFI. A geophysical survey was also conducted at the 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 OU 5 RI (ABB-ES, 1997) a field screening program consisting of an unexploded ordnance (UXO) survey, surface and subsurface soil screening, and installation of piezometers was completed. The UXO survey was completed at the site prior to the sampling activities. No UXO was found; however, several pieces of metal shell casings and similar items were located and removed. The soil screening program was designed to delineate the nature

and extent of PAH, lead, TNT, and TRPH contamination in surface soil using on-site and off-site data analysis. Surface soil screening consisted of sample collection from 0 to 1 foot bgs at 100-foot grid spacing over an area approximately 2,000 feet by 3,000 feet, except in the area around the burn chamber and blast platform, where the grid spacing was increased to 25 feet over an area of 100 feet by 100 feet. Collection and analysis of samples for target screening parameters continued outward from the burn chamber and firing pad until a "no detection" result was obtained for that particular parameter, thus delineating the extent of contamination for that parameter. Analyses for other target parameters with detections continued outward. This screening technique resulted in varying combinations of analyses for samples collected from 409 locations. A total of 324 samples were collected for off-site lead analysis, 263 samples were collected for on-site PAH analysis, 146 samples were collected for on-site TNT analysis, and 136 samples were collected for on-site TRPH analysis during the surface soil screening program. Subsurface soil screening consisted of the collection of 16 subsurface soil samples from four soil borings advanced in the area of the burn chamber and blast platform. Samples were collected at depths of 0 to 1 foot bgs, 1 to 3 feet bgs, 3 to 5 feet bgs, and 5 to 7 feet bgs at each of the four borings. 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 groundwater flow is to the southwest toward Yellow Water Creek. A groundwater screening program was not implemented at Site 15 because the 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 selected based on water level data.

- July and August 1995 - As part of the OU 5 RI, ABB-ES performed confirmatory sampling and analysis for surface and subsurface soil at Site 15 to refine the nature and extent of contamination in soil determined 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. Two of the surface soil samples were also analyzed for pH, moisture content, sieve and hydrometer size distribution, bulk density, and cation exchange capacity. 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. In addition, four of these samples were analyzed for total organic carbon (TOC). One additional subsurface soil sample was analyzed for PAHs only, and one additional subsurface soil sample was analyzed for nitroaromatics only. Confirmatory groundwater samples collected from the eight Site 15 monitoring wells were analyzed

for TCL organics, TAL inorganics, TRPH, and nitroaromatics. Selected groundwater samples were also submitted for TOC analysis, and slug tests on the monitoring wells were performed. A confirmatory 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 aid in assessment of 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. Surface water samples were analyzed for cyanide, hexavalent chromium, sulfide, total dissolved solids (TDS), alkalinity, hardness, total phosphate, and Kjeldahl nitrogen. Field measurements of surface water pH, temperature, turbidity, conductivity, and dissolved oxygen were recorded at each location at the time of sample collection.

- 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 lead concentrations were localized vertically at the ground surface, and if the soil would be considered under RCRA as characteristically hazardous if excavated. Four samples from the seven locations with the highest lead concentrations were collected at 3-inch intervals from the ground surface to a depth of 1 foot. Single samples were collected from 0 to 1 foot from the remaining 10 locations of lesser lead concentrations, although concentrations at these locations exceeded the United States Environmental Protection Agency (U.S. EPA) soil screening value (400 mg/kg). All samples were submitted for lead analysis and Toxicity Characteristic Leaching Procedure (TCLP) lead analysis. Sieve analyses were not performed.

- 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 also collected. Surface water samples were analyzed for lead; sediment samples were analyzed for lead, PAHs, and TRPH. These were the last data included in the OU 5 RI Report (ABB-ES, 1997).

- December 1997 - An additional sampling event was conducted that 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/June 1999 - A supplemental sampling event for surface soil and sediment was conducted in April and June 1999 to further determine the limits of lead and PAH contamination in surface soil to avoid having to extrapolate analytical data to verify delineation of these contaminants. 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 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. The results of the soil SPLP analysis are presented in Appendix A.

- April 2000 - Groundwater samples were collected from the eight existing wells at the site and analyzed for PAHs, nitroaromatics, arsenic, antimony, and lead. Because of high turbidity, one of the wells was redeveloped and resampled for the inorganics. The results of the groundwater analyses are presented in Appendix A.

- 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 from the first 3 inches of mineral soil and the overlying duff (decaying organic matter) and analyzed for lead. Based on results of this sampling, 15 invertebrate samples were collected and analyzed for lead. This investigation was conducted to generate ecologically based remediation goals for PAHs and lead in surface soil at the site. The results of this sampling event are presented in the Development of Ecologically Based Remediation Goals for Lead and PAHs in Soil (TtNUS, 2001b) provided in Appendix B.

- 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 at locations where soil contaminant concentrations exceeded Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for leachability based on groundwater criteria. The results of this investigation were used to eliminate groundwater as a medium of concern as identified in the Groundwater Technical Memorandum for No Further Action in Appendix A.1 and in the addendum to this report entitled Supplement to Groundwater Technical Memorandum for No Further Action provided in Appendix A.2, which specifically addresses potential arsenic contamination identified in one well due to a change in the regulatory criteria subsequent to this sampling effort.

- October 2003 - A wetland delineation study was performed to identify areas meeting the U.S. EPA and United States Army Corps of Engineers (COE) definition of wetlands under Section 404 of the Clean Water Act [33 United States Code (USC) 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, 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 was classified as “adjacent” wetlands subject to regulation under Section 404 of the Clean Water Act. Wetland F was classified as an “isolated” wetland not under Section 404 jurisdiction. 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 disturbance of these three wetlands during any remediation at 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 are still subject to federal and/or state regulation, extraordinary efforts to minimize their disturbance or to restore them were not recommended. The Wetland Delineation Report (TtNUS, 2003b) is provided as Appendix C.

- 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 the site-wide 95-percent upper confidence limit (UCL) of the mean concentration of BaPEqs in post-excavation soil is less than the 2,250 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 yd^3. The assessment also concluded that Site 15 has been thoroughly sampled for both lead and BaPEqs and that available data more than adequately characterized surficial soil at the site. Because of this and also because excavated soil would be replaced with clean fill, confirmation (post-excavation) sampling would not be warranted. A copy of the Geostatistical Assessment Report is provided as Appendix D.

- January 2005 - Supplemental sampling was performed. The first objective of this sampling was to investigate the potential for dioxins [polychlorinated dibenzo-p-dioxin (PCDD)/polychlolrinated dibenzofuran (PCDF)] to be present in soil immediately beyond the proposed excavation area around the burn chamber and static rocket stand. The second objective of this sampling was to investigate the potential for perchlorate to be present 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 existing monitoring wells CEF-015-02S and -11S and analyzed for perchlorate. Analytical results for these samples showed no exceedances.

- August 2006 - Wells CEF-015-01S and -05S were reinstalled (as CEF-015-01SR and CEF-015-05SR, respectively) and sampled to investigate exceedances of the RDX (CEF-015-01S only) and 4,4'-DDE FDEP Groundwater Cleanup Target Levels (GCTLs) detected in 1995 in these wells, which had since been abandoned (TtNUS, 2006b). RDX and 4,4'-DDE concentrations were 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 had been detected in 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 well CEF-015-13S, which had been abandoned along with the other Site 15 wells. The unfiltered arsenic concentration measured in that 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 the location of CEF-015-15S and sampled on March 21, 2006. However, a clear sample still 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 (0.006-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 the samples previously submitted. The unfiltered arsenic concentration of this sample was less than the analytical detection limit of 2.8 µg/L.

  As presented in the Supplement to Groundwater Technical Memorandum for No Further Action provided in Appendix A.2, the monitoring wells installed in the CEF-015-13S area were never able to be developed to provide a representative groundwater sample due to high turbidities, and these samples should not have been submitted for analysis with turbidities in the ranges identified. The NAS Cecil Field Base Realignment and Closure (BRAC) Cleanup Team (BCT) discussed conducting additional groundwater investigation using DPT at the site; however, based on the problems with the temporary wells installed using DPT in the CEF-015-13S area, the decision to install the permanent, 2-inch well identified as CEF-015-16S was made, which did produce a more representative groundwater sample with lower turbidity.

1.3 SUMMARY OF SITE INVESTIGATION RESULTS

The analytical results obtained during the investigation of Site 15 have been organized by medium and are provided in Appendix E. The following sections provide details regarding the investigation of these media.

1.3.1 Summary of 1988 RFI Results

The one surface soil sample collected at Site 15 during the base-wide RFI contained lead and 14 PAHs at concentrations greater than detection limits. The geophysical survey identified several anomalies located along the southwestern edge of the site. The RFI identified that additional investigation of Site 15 was warranted.

1.3.2 Summary of Field Investigations

Surface soil, subsurface soil, groundwater, surface water, and sediment were collected during the screening, confirmatory, and supplemental sampling programs. As part of the OU 5 RI, assessments of contaminant fate and transport, human health risks, and ecological risks were also performed.

1.4 NATURE AND EXTENT OF CONTAMINATION

Surface soil, subsurface soil, surface water, sediment, and groundwater results will be discussed in this section, with the focus on those contaminants that determine the extent of remediation.

1.4.1 Surface Soil

During the initial field screening program, conducted from April 1994 to April 1995, a total of 409 samples were collected and analyzed on site for PAHs (U.S. EPA Method 8310), TNT (U.S. EPA Draft Method 8515), TRPH (U.S. EPA Method 418.1), and off site at a fixed-base laboratory for lead (U.S. EPA Method 6010). Only data from the samples analyzed at the fixed-base laboratory are included in tables. All of the samples collected during the subsequent confirmatory and supplemental sampling programs were analyzed off site at a fixed-base laboratory.

During various sampling events at Site 15, a total of 783 surface soil samples were collected and analyzed for a variety of constituents. Tables 1-1 and 1-2 summarize the frequencies of detection, concentration ranges, and cleanup goals for organics and inorganics, respectively, in surface soil. Only constituents detected at least once in screening, confirmatory, or post-RI sampling of surface soil at Site 15 are presented in these tables. The cleanup goals presented are the most restrictive of the FDEP

residential direct exposure or leachability to groundwater SCTLs. The NAS Cecil Field Inorganic Background Data Set (IBDS) concentrations are also shown in Table 1-2 for inorganics (HLA, 1998a).

During the field screening, confirmatory sampling, and supplemental sampling programs, lead was detected in 555 of 584 samples at concentrations ranging from 1.1 to 65,500 mg/kg. Maximum concentrations were detected downrange of the trap and skeet field and approximately 750 feet north of the ordnance disposal areas. Lead concentrations greater than the U.S. EPA recommended lead screening criterion and FDEP SCTL of 400 mg/kg were distributed over a wide area associated with the trap and skeet range.

During the field screening program, PAHs were detected in 171 of 263 samples at concentrations ranging from 0.2 to 13,000 mg/kg (expressed as total PAHs). These results indicated a widespread distribution of PAHs, with the greatest concentrations in samples collected in the burn chamber and blast platform area and in the forest burn area. TNT was detected during the field screening program in 30 of 146 samples at concentrations ranging from 1.0 to 68 mg/kg. TNT was not detected during the confirmatory sampling program. The greatest concentrations of TNT were detected about 100 feet north of the burn chamber and blast platform areas. TRPH was detected in 26 of 136 field screening samples at concentrations ranging from 10 to 430 mg/kg. Maximum concentrations of TRPH were detected along the southwestern side of the former trap and skeet range.

The confirmatory and supplemental sampling programs verified that surface soil contamination at the site is generally continuous and widespread, covering an area of approximately 75 acres, with discrete areas of greater concentrations not always coincident for each of the contaminants.

During the field screening, confirmatory sampling, and supplemental sampling programs, the following organics were detected in surface soil samples from Site 15:

- VOCs – acetone and xylenes.
- Nitroaromatics – 3-nitrotoluene, 4-nitrotoluene, and cyclotetramethylenetetranitramine (HMX), and TNT.
- Pesticides – 4,4’ DDE, 4,4’-DDT, dieldrin, Endosulfan II, endrin aldehyde, and methoxychlor.
- Semivolatile organic compounds (SVOCs) – 18 PAHs, three phthalates, carbazole, and dibenzofuran.
- TRPH.

Twenty-three inorganics were also detected in surface soil samples from Site 15.

Organic compounds detected at concentrations greater than SCTLs included the following:

- Benzo(a)pyrene equivalents (BaPEqs) – greater than the benzo(a)pyrene residential SCTL
- Fourteen PAHs – greater than leachability SCTLs
- Carbazole, dieldrin, 3-nitrotoluene, 4-nitrotoulene – greater than leachability SCTLs
- TRPH – greater than leachability SCTLs

Inorganics detected at concentrations greater than SCTLs and IBDS values include antimony, arsenic, and lead.

Soil samples collected in February 1997 were used to evaluate the leachability of lead and particulate distribution characteristics of lead contamination at the site. The results of this sampling effort indicated that most of the lead shot at the site had been oxidized and by that time was associated with medium- to fine-grained sand, with smaller amounts associated with silt and clay soil fractions. As a result, there would be little benefit in sieving out the remaining lead shot from Site 15 soil. The data also showed that, although lead concentrations decreased with depth, decreases were not significant enough to warrant remediation to a depth of less than 1 foot. Finally, based on the results of lead TCLP data, soil samples containing lead concentrations greater than 700 mg/kg generally failed to meet the TCLP lead regulatory level of 5.0 milligrams per liter for classifying potential solid waste (excavated contaminated soil) as hazardous waste (ABB-ES, 1998). Prior to off-site disposal, the soil being excavated for lead contamination would be tested for leachability characteristics to determine proper classification.

1.4.2 Subsurface Soil

During various investigations at Site 15, a total of 45 subsurface soil samples were collected and analyzed for a variety of constituents. Tables 1-3 and 1-4 summarize the frequencies of detection, concentration ranges, and cleanup goals (the most restrictive of the residential direct exposure and leachability to groundwater SCTLs) for organics and inorganics, respectively, detected at least once during screening, confirmatory, or supplemental sampling of subsurface soil at Site 15. IBDS concentrations are also shown in Table 1-4 for inorganics. Only results for samples analyzed at fixed-base laboratories are included in these tables.

Total PAHs were detected in 30 of 37 subsurface soil samples, with concentrations ranging from 1.5 to 366 mg/kg to a depth of 7 feet bgs. Generally, PAH concentrations decreased with depth. TRPH was detected in 11 of 17 subsurface samples collected, with concentrations ranging from 9.74 mg/kg to 103 mg/kg. Lead was detected in 17 of 19 samples to a depth of 7 feet bgs. Subsurface lead concentrations ranging from 1.1 to 223 mg/kg and were generally several orders of magnitude less than concentrations in corresponding surface soil samples.

Organics detected in subsurface soils at Site 15 included the following:

- VOCs – acetone and xylenes
- SVOCs – 16 PAHs, three phthalates, carbazole, and dibenzofuran
- TRPH

Thirteen inorganics were also detected in subsurface soil samples from Site 15.

Organic compounds detected in subsurface soil samples at concentrations greater than SCTLs included the following:

- BaPEqs – greater than the benzo(a)pyrene residential SCTL
- Six PAHs and carbazole – greater than leachability SCTLs

No inorganics were detected in subsurface soil samples at concentrations greater than SCTLs and IBDS values.

1.4.3 Groundwater

Table 1-5 summarizes the frequencies of detection, concentration ranges, FDEP GCTLs, U.S. EPA MCLs, and background screening concentrations for organic and inorganic analytes detected during groundwater sampling. Because bis-(2-ethylhexyl) phthalate (BEHP) is a common laboratory and field equipment contaminant, its detection at concentrations greater than the GCTL was determined not to be of concern. Aluminum was detected at concentrations greater than its GCTL but less than its IBDS value. Total arsenic concentrations in groundwater exceeded the FDEP GCTL, U.S. EPA MCL, and IBDS value. One exceedance of the 4,4'-DDE GCTL (0.26 µg/L at CEF-015-05S) and two exceedances of the RDX GCTL (0.451 µg/L at CEF-015-01S and 0.404 µg/L at CEF-015-05S) were also detected in 1995 but were not confirmed by the results of the resampling conducted in August 2006 in new wells installed at the same locations. Resampling results showed concentrations of 4,4'-DDE and RDX to be less than their respective analytical detection limits of 0.02 µg/L and 0.07 µg/L. One exceedance of the arsenic MCL and GCTL (13.7 µg/L at CEF-015-13S) was detected in July 2003 from a groundwater sample identified as having very high turbidity (greater than 1,000 NTUs). Although this exceedance was confirmed in November 2005 (16.5 µg/L at reinstalled CEF-015-13S) and in March 2006 (14.7 µg/L at reinstalled CEF-015-13S and 21.6 µg/L at new CEF-015-15S installed at same location), it was determined that the very high sample turbidities (up to 1,000 NTUs) observed in all of the collected samples were causing the elevated arsenic concentrations. All of the filtered samples had arsenic concentrations less than the FDEP GCTL and U.S. EPA MCL. Because of the high turbidities in the groundwater samples, the wells were not considered adequate to provide a representative sample from the aquifer. A third well,

CEF-015-16S, was installed at the same location in February 2007. This monitoring well was a 2-inch well with a larger diameter and fine sand pack. Additionally, this well was purged for several days until the groundwater was relatively clear. The turbidity recorded prior to sample collection was reported as 110 NTUs. The unfiltered arsenic concentration detected in this last sample was less than the analytical detection limit of 2.8 µg/L, which is also less than the MCL and GCTL.

1.4.4 Sediment

Table 1-6 summarizes the frequencies of detection and the ranges of concentrations for analytes detected during confirmatory and supplemental sampling of Site 15 sediments. FDEP guidelines for the protection of freshwater sediment organisms are shown in Table 1-6. Because the ditches are typically dry and provide no permanent aquatic habitat, the table also includes FDEP SCTLs and IBDS concentrations. Sediment samples collected during the supplemental sampling program were collected in drainage ditches that are typically dry and contain water only intermittently after rain events (surface water samples could not be collected during the supplemental sampling program due to the lack of surface water in the ditches). One VOC, several SVOCs (including one phthalate, carbazole, and 16 PAHs), one nitroaromatic, four pesticides, TRPH, and eight inorganics were detected in sediment samples collected from the two ditches at Site 15. Maximum concentrations of 11 PAHs exceeded their respective probable effects concentrations (PECs). Maximum concentrations of three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4' DDT) were greater than their respective threshold effects concentrations (TECs) but less than their respective PECs. Concentrations of these pesticides detected in Site 15 ditches were comparable to those detected at other Cecil Field locations and therefore it is probable that they are the result of previous base-wide applications for pest control. Lead was the only inorganic analyte detected at concentrations exceeding its TEC, and lead concentrations in some samples also exceeded the PEC.

1.4.5 Surface Water

Table 1-6 summarizes the frequencies of detection, concentration ranges, and Florida Water Quality Criteria for organics and inorganics detected during confirmatory sampling of surface water at Site 15. IBDS concentrations are also shown in Table 1-5 for inorganics. No VOCs or pesticides were detected in the three surface water samples analyzed for these constituents. Four nitroaromatics (1,3,5-trinitrobenzene, 3-nitrotoluene, 4-nitrotoluene, and tetryl), TRPH, and 11 inorganics were detected in surface water samples at Site 15. Arsenic, which was present in all three samples in which it was analyzed, was detected at concentrations less than Florida surface water standards but greater than the IBDS value. Lead, which was present in all seven samples in which it was analyzed, and aluminum and iron, which were present in all three samples in which they were analyzed, were detected at concentrations less than the IBDS value but greater than Florida surface water standards. The

concentration of copper (only one detected value) slightly exceeded the surface water standard. In general, the maximum concentrations of these metals occurred in the surface water sample collected approximately 1,700 feet south of the ordnance disposal area.

1.5 PRELIMINARY RISK EVALUATION

The objective of a human health risk assessment is to characterize the risks associated with potential exposures to site-related constituents. As part of this FS, a human health Preliminary Risk Evaluation (PRE) was conducted. The PRE is a screening-level evaluation of potential risks from site constituents to human receptors at the site. Although a site may have numerous hypothetical receptors, it is common to use the most sensitive receptor as a site-screening tool for risk calculations. For Site 15, the protection of a hypothetical future residential receptor formed the basis for selecting chemicals of potential concern (COPCs) and for determining if potential risks at the site are significant.

1.5.1 Selection of Chemicals of Potential Concern

In the first step of the PRE, COPCs were selected for each medium. COPCs are potentially site related and have maximum detected concentrations greater than the lesser of the medium-specific FDEP Cleanup Target Levels (FDEP, 2005). Metals are regarded as COPCs if their concentrations are greater than background screening concentrations (IBDS values) and the lesser of the medium-specific FDEP Cleanup Target Levels.

1.5.1.1 Surface Soil

To select COPCs in surface soil at Site 15, maximum detected concentrations of site constituents were compared to FDEP SCTLs for residential exposure and leachability (FDEP, 2005). For metals, the maximum concentrations were also compared to NAS Cecil Field IBDS values (HLA, 1998a). The data for surface soil are summarized in Tables 1-1 and 1-2. Table 1-8 includes the surface soil COPCs that were detected at concentrations greater than screening criteria.

No VOCs were detected In surface soil at Site 15 at concentrations greater than FDEP residential or leachability criteria. BaPEqs were identified as COPCs based on exceedances of the residential SCTL, and TRPH was identified as a COPC based on exceedances of leachability SCTLs. Antimony was identified as a COPC based on exceedances of residential and leachability SCTLs and its IBDS value. Arsenic and lead were identified as COPCs based on exceedances of residential SCTLs and IBDS values. Fourteen PAHs and carbazole were identified as COPCs in surface soil based on exceedances of leachability SCTLs (see Table 1-8).

The maximum detected concentrations of 3-nitrotoluene, 4-nitrotoluene, and dieldrin exceeded their leachability SCTLs, but these compounds were detected in less than 5 percent of the samples collected. Therefore, they are not considered COPCs based on their frequency of detection.

1.5.1.2 Subsurface Soil

To select COPCs in subsurface soil at Site 15, maximum detected concentrations of site constituents were compared to the same criteria as for surface soils, FDEP SCTLs for residential exposure and leachability and IBDS values for inorganics. The data for subsurface soil are summarized in Tables 1-3 and 1-4. Table 1-9 includes the COPCs detected at concentrations greater than screening criteria.

In subsurface soil at Site 15, only SVOCs were identified as COPCs. BaPEq concentrations exceeded the residential SCTL, and six PAHs and carbazole were identified as COPCs in subsurface soil based on exceedances of leachability SCTLs.

1.5.1.3 Groundwater

To select COPCs in groundwater at Site 15, maximum detected concentrations of site constituents were compared to FDEP GCTLs (FDEP, 2005), U.S. EPA MCLs (U.S. EPA, 2002), and NAS Cecil Field-specific IBDS values for inorganics (HLA, 1998a). The results of these comparisons are summarized in Table 1-5, which shows that none of the detected concentrations from samples identified as representative of the aquifer at Site 15 exceeded the screening criteria. Therefore, no groundwater COPCs were retained.

1.5.1.4 Sediment

To select COPCs in sediment at Site 15, maximum detected concentrations of site constituents were compared to FDEP SCTLs (FDEP, 2005) for residential exposure and to IBDS values for inorganics. The data for sediment are summarized in Table 1-6. Table 1-10 includes COPCs detected in sediment at concentrations greater than FDEP SCTLs.

In sediment at Site 15, BaPEq concentrations were greater than the residential SCTL, and the following were identified as COPCs based on exceedances of leachability SCTLs:

- 1-Methylnaphthalene
- Acenaphthene
- Benzo(a)anthracene
- Benzo(a)pyrene

- Benzo(b)fluoroanthene
- Dibenzo(a,h)anthracene
- 4-Nitrotoluene

Lead was also identified as a COPC based on exceedances of its residential SCTL and IBDS value.

1.5.1.5 Surface Water

To select COPCs in surface water at Site 15, maximum detected concentrations of site constituents were compared to FDEP freshwater surface water criteria (FDEP, 2005), and to IBDS values for inorganics. The data for surface water are summarized in Table 1-5. Table 1-11 includes COPCs detected at concentrations greater than their respective FDEP surface water criteria.

Lead was the only constituent identified as a COPC in surface water. Copper was detected at a concentration of 9 µg/L in one sample, which marginally exceeds the FDEP surface water criterion of 8.7 µg/L; therefore, it is not regarded as a COPC.

1.5.2 Risk Characterization

The risk characterization step of the PRE is conducted by generating a ratio between the exposure concentration and the appropriate screening value. For residential exposure, the exposure concentration is represented by the maximum detected concentration of the analyte. For industrial exposure, the exposure concentration is represented by the lesser of the 95-percent UCL of the mean or the maximum detected concentration (except for lead, see below). The maximum concentration is used for residential exposure because the exposure unit area for a residential site is typically expected to be less than 1 acre. Because industrial exposure may occur across the entire site, the UCL of the mean is generally used to represent industrial exposure. If the UCL exceeded the maximum detected concentration of a constituent, the maximum detected concentration was used as the industrial exposure concentration. UCLs of the mean were calculated using the Florida UCL (FL-UCL) tool. The statistical output of FL-UCL is presented in Appendix D.

In assessing risk for residential exposure to lead, the maximum detected concentration was compared to the residential SCTL. In assessing risk for industrial exposure to lead, the average concentration was compared to the industrial SCTL. The average concentration for lead was used because this is the input value for U.S. EPA's Adult Lead Model (U.S. EPA, 1996).

For soil and sediment, residential and industrial SCTLs correspond to a carcinogenic risk of 1×10^{-6} and a hazard quotient (HQ) of 1.0 for carcinogens and non-carcinogens, respectively. Therefore, the ratio of

the exposure concentration and the SCTL provides an indication of the total carcinogenic and non-carcinogenic risk associated with each constituent. For example, a ratio of 3 for a carcinogen indicates that the risk associated with that constituent is equivalent to 3×10^{-6}. This risk exceeds Florida's action level of 1×10^{-6} but is within the U.S. EPA target risk range of 1×10^{-4} to 1×10^{-6}. A ratio of 3 for a noncarcinogen indicates that the HQ is greater than 1, and there is a potential for non-carcinogenic effects upon exposure to that concentration. Also, comparisons of metals concentrations to NAS Cecil Field IBDS values (HLA, 1988a) were used to identify whether the data were truly site related.

For soil, leachability SCTLs correspond to levels protective of groundwater. Comparison to these levels are only relevant if groundwater data indicate that the constituent is present in groundwater at the site. Leachability criteria are based on conservative assumptions regarding site conditions. Therefore, the absence of a constituent's detection in groundwater in conjunction with an exceedance of its leachability SCTL is sufficient evidence that site-specific conditions do not favor leaching.

Based on FDEP guidance (FDEP, 2005), concentrations of carcinogenic PAHs (cPAHs) were converted to BaPEq concentrations and compared to benzo(a)pyrene SCTLs for direct exposure (residential and industrial). Leachability SCTLs are available for individual cPAHs. If a specific cPAH was not detected in a sample, one-half of its detection limit was used in the calculation of BaPEqs. If no cPAHs were detected in a sample, one-half of the benzo(a)pyrene detection limit was used as the BaPEq concentration. Non-carcinogenic PAH results were compared to individual FDEP SCTLs for direct exposure and leachability to groundwater.

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 and U.S. EPA target risk range. Using the UCL concentrations for these constituents, the potential carcinogenic risk for industrial exposure is 5.0×10^{-5} (Table 1-12). 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 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 (Table 1-12), which is less than the target HQ. With regard to exposure to lead, the maximum lead concentration exceeded the residential SCTL, but the average concentration was less than the industrial SCTL.

For surface soil, acenaphthene, fluoranthene, naphthalene, phenanthrene, pyrene, 1-methylnaphthalene 2 methylnaphthalene, and TRPH concentrations 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 was 4.9 x 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 x 10^{-6} (Table 1-13). This exceeds the target risk for FDEP but is within U.S. EPA's target risk range.

For groundwater, no chemicals were detected at concentrations greater than their MCL or GCTL. Therefore, no unacceptable human health risk is associated with groundwater.

For sediment, exposure is treated in a manner similar to soil because sediments at the site are typically dry. BaPEqs was 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 was 3.1 x 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 x 10^{-5} (Table 1-14). 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 exceeded the residential SCTL, but the average concentration was 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 would not be regarded as posing a significant risk to human health.

1.5.3 Summary of Ecological Risk Assessment

An ecological risk assessment (ERA) for Site 15 was conducted by ABB-ES as part of OU 5 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 initial ERA represents Step 1 (Screening Level Problem Formulation and Ecological Effects Evaluation) and Step 2 (Screening Level Exposure Estimate and Risk Calculation) of U.S. EPA's eight-step process for designing and conducting ERAs. The ERA 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. Subsequent to the initial ERA, several additional sampling events were conducted to further characterize locations of elevated concentrations of lead and PAHs in soil at the site. The results of the additional sampling were used to develop a draft Work Plan and Sampling and Analysis Plan, which were completed in March 2001. These plans represent Step 3 (Baseline Risk Assessment Problem Formulation) and Step 4 (Study Design and Data Quality Objective Process) of the eight-step process. Step 5 (Field Verification of Sampling Design) was conducted on May 3, 2001. The Work Plan and the Sampling and Analysis Plan were finalized on June 12, 2001 (TtNUS, 2001a). The field sampling component of Step 6 (Site Investigation and Data Analysis) was conducted from June 18 to 28, 2001. The development of remediation goals for the protection of ecological receptors is described in the document Ecologically Based Remediation Goals for Lead and PAHs in Soil, which is included in this report as Appendix B and represents the remainder of Step 6 (Data Analysis) and Step 7 (Risk Characterization). The methodologies through which the ecological cleanup goals were developed have been approved by representatives of the Navy, U.S. EPA Region 4, and FDEP. Subsections 1.5.3.1, 1.5.3.2, 1.5.3.3, and 1.5.3.4 below discuss ecological risk associated with Site 15 surface soil, groundwater, sediment, and surface water, respectively.

1.5.3.1 Surface Soil

There was a moderate correlation ($r^2 = 0.79$) between aluminum concentrations and earthworm growth in toxicity tests, suggesting that aluminum in surface soil might pose risks to soil invertebrates (ABB-ES, 1997). However, statistical analyses showed that aluminum concentrations in Site 15 samples were not significantly different than aluminum concentrations in background samples (ABB-ES, 1997). Aluminum concentrations at Site 15 (88 to 7,140 mg/kg, average of 1,190 mg/kg) exceeded the Cecil Field IBDS value (4,430 mg/kg) in only 2 of 35 samples. Furthermore, earthworm 30-day survival rates in toxicity tests were not correlated with aluminum concentrations, and lettuce seed germination tests showed no adverse impacts associated with aluminum. As indicated in the 1997 ERA, aluminum would not be expected to be related to past activities at the site. Aluminum does not significantly bioaccumulate or biomagnify, and food-chain modeling showed that aluminum concentrations at Site 15 do not pose potential risks to upper-level terrestrial or aquatic receptors. Overall, ecological risk posed by aluminum was concluded to be negligible.

Toxicity data for antimony are sparse, resulting in uncertainty regarding potential toxicity at Site 15. However, antimony does not significantly bioaccumulate or biomagnify, thus it would not pose potential risks to upper-level receptors. This conclusion was supported by food-chain modeling, which showed that antimony concentrations at Site 15 do not pose potential risk to upper-level terrestrial or aquatic receptors (ABB-ES, 1997). Lettuce seed germination tests conducted in support of the 1997 ERA showed poor germination in only one sample, and antimony concentrations were lower in this sample than in other

samples for which no adverse effects were observed. Thus, the germination tests did not show phytotoxic effects from antimony. In summary, although potential risk to soil invertebrates from antimony was uncertain based on the 1997 earthworm toxicity tests, the germination tests did not show phytotoxic effects from antimony. In addition, food-chain modeling showed that antimony did not pose potential risks to upper-level terrestrial or aquatic receptors. Overall risk posed by antimony appears to be negligible or minor at worst.

Arsenic was detected in 26 of 44 samples, and concentrations exceeded the U.S. EPA Region 4 ecological screening value (10 mg/kg based on plant toxicity) in 11 samples. However, lettuce seed germination tests showed poor germination in only one sample, and concentrations were lower in this sample than in other samples for which no adverse effects were observed (ABB-ES, 1997). Thus, the site-specific germination tests did not show phytotoxic effects from arsenic. Arsenic concentrations were not correlated with earthworm toxicity test results (ABB-ES, 1997). Nevertheless, arsenic can potentially be toxic to soil invertebrates at concentrations of 60 mg/kg or greater (Efroymson et al, 1997). Arsenic concentrations exceeded 60 mg/kg in two samples (451 and 96.5 mg/kg), thus arsenic could pose risk to soil invertebrates in the vicinity of these two samples (CF15SS015 and CF15SS055). Food-chain modeling indicated that arsenic might pose risk to small birds; however, associated HQs were relatively low. The maximum HQ was only 3.0 using a conservative area use factor of 100 percent (ABB-ES, 1997), which assumes that birds forage only in the vicinity of the maximum arsenic concentration. In summary, lettuce germination tests indicated negligible risk to plants. Potential risk to soil invertebrates and upper-level receptors such as birds exists only in the vicinity of two samples.

See Appendix B for an evaluation of ecological risks posed by lead and PAHs in surface soil.

1.5.3.2 Groundwater

Ecological risks associated with groundwater were not evaluated during the ERA. The pathways of groundwater exposure to ecological receptors are limited to the two ditches where sediment and surface water samples were collected. The two ditches are typically dry, except in the vicinity of the culvert under the access road into the site. The ditches provide no permanent habitat for aquatic communities.

1.5.3.3 Sediment

The 1997 ERA concluded that potential risks to some ecological receptors might exist due to lead, PAHs, DDT, and DDT breakdown products in sediment. The ditches from which sediment samples were collected include one in the northwestern portion of the site and one in the southern portion of the site. The northwestern ditch is typically dry, but the southern ditch often contains shallow standing water in the vicinity of the culvert under the access road into the site. The ditches provide no permanent habitat for

aquatic communities, and the samples actually represent “damp soil” rather than sediment. Therefore, potential risk from lead and PAHs associated with the 13 sediment samples was evaluated as part of the assessment of soil data (see Appendix B).

Maximum concentrations of 4,4’-DDD, 4,4’-DDE, and 4,4’-DDT slightly exceeded their respective FDEP TECs for inland sediments but were less than their respective PECs. Food-chain modeling conducted during the 1997 ERA showed that these compounds did not pose potential risks to upper-level terrestrial or aquatic receptors. Concentrations of these pesticides detected in Site 15 ditches were comparable to those detected at other Cecil Field locations, and it is likely that they are the result of previous base-wide applications for pest control. Site-related risk from 4,4’-DDD, 4,4’-DDE, and 4,4’-DDT appears to be negligible.

1.5.3.4 Surface Water

The 1997 ERA concluded that potential risks to some ecological receptors might exist due to lead in surface water. The surface water samples were collected from the same two ditches as the sediment samples. Lead concentrations in some surface water samples were elevated relative to ecological guidelines, but as mentioned above, the two ditches are typically dry except in the vicinity of the culvert under the access road into the site. 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.

1.5.3.5 Ecological Risk Conclusions

Based on the results of the ERA and subsequent associated evaluations, the NAS Cecil Field Base BCT (composed of representatives from the Navy, U.S. EPA Region 4, and FDEP) concluded that ecological COPCs at Site 15 were limited to lead, PAHs, and arsenic in surface soil.

TABLE 1-1

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 1-2

SUMMARY OF INORGANICS DETECTED IN SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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 1-3

SUMMARY OF ORGANICS DETECTED IN SUBSURFACE SOIL
SITE 15 AMENDED 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	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 1-4

SUMMARY OF INORGANICS DETECTED IN SUBSURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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 1-5

SUMMARY OF ORGANIC AND INORGANIC ANALYTES DETECTED IN GROUNDWATER
SITE 15 AMENDED FEASIBILITY REPORT
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 1-6

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SEDIMENT
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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 1-6

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SEDIMENT
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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 1-7

SUMMARY OF ORGANICS AND INORGANICS DETECTED IN SURFACE WATER
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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.

TABLE 1-8

SURFACE SOIL ANALYTES DETECTED AT CONCENTRATIONS GREATER THAN SCREENING CRITERIA
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	Frequency of Detection[1]	Screening Concentration[2]	IBDS Value[3]	FDEP SCTL[4]		
				Residential	Industrial	Leachability
Semivolatile Organic Compounds (mg/kg)						
1-Methylnaphthalene	15/78	168	NA	200	1,800	**3.1**
2-Methylnaphthalene	29/128	204	NA	210	2,100	**8.5**
Acenaphthene	67/400	410	NA	2,400	20,000	**2.1**
Benzo(a)anthracene	177/400	1,300	NA	#	#	**0.8**
Benzo(a)pyrene	171/400	1,100	NA	**0.1**	**0.7**	**8**
Benzo(b)fluoranthene	179/400	1,300	NA	#	#	**2.4**
Benzo(k)fluoranthene	150/400	1,500	NA	#	#	**24**
Carbazole	15/44	43	NA	49	240	**0.2**
Chrysene	195/400	1,700	NA	#	#	**77**
Dibenzo(a,h)anthracene	60/400	140	NA	#	#	**0.7**
Fluoranthene	205/400	2,000	NA	3,200	59,000	**1,200**
Indeno(1,2,3-cd)pyrene	113/400	560	NA	#	#	**6.6**
Naphthalene	44/400	17	NA	55	300	**1.2**
Phenanthrene	154/400	600	NA	2,200	36,000	**250**
Pyrene	198/400	1,800	NA	2,400	45,000	**880**
BaPEqs	400/400	965	NA	**0.1**	**0.7**	NC
Pesticides/Herbicides (mg/kg)						
Dieldrin	1/41	0.024	NA	0.06	0.3	**0.002**
Nitroaromatic Compounds (mg/kg)						
3-Nitrotoluene	1/38	5.08	NA	400	3,300	**0.9**
4-Nitrotoluene	2/38	4.34	NA	640	12,000	**1.4**
Metals (mg/kg)						
Antimony	30/56	2,440	**9.44**	**27**	**370**	**0.03**
Arsenic	41/69	451	**2.04**	**2.1**	**12**	*
Lead	555/584	65,500	**197**	**400**	**1,400**	*
Miscellaneous Parameters (mg/kg)						
TRPH	33/40	450	NA	460	2,700	460

1 Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2 Maximum detected concentration.
3 NAS Cecil Field Inorganic Background Data Set values (HLA, 1998a).
4 Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
Bold indicates exceedance of SCTL.
NA Not applicable.
NC No criterion.
TRPH - Total recoveralbe 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.
* = 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 1-9

SUBSURFACE SOIL ANALYTES DETECTED AT CONCENTRATIONS GREATER THAN SCREENING CRITERIA
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	Frequency of Detection(1)	Screening Concentration(2)	FDEP SCTL(3)		
			Residential	Industrial	Leachability
Semivolatile Organic Compounds (mg/kg)					
Acenaphthene	13/49	22	2,400	20,000	**2.1**
Benzo(a)anthracene	21/49	36	#	#	**0.8**
Benzo(a)pyrene	32/49	35	**0.1**	**0.7**	**8**
Benzo(b)fluoranthene	33/49	53	#	#	**2.4**
Carbazole	6/16	4.6	49	240	**0.2**
Dibenzo(a,h)anthracene	12/49	5.2	#	#	**0.7**
Indeno(1,2,3-cd)pyrene	22/49	14	#	#	**6.6**
BaPEqs	49/49	49	**0.1**	**0.7**	NC

1 Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2 Maximum detected concentration.
3 Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
Bold indicates exceedance of SCTL.
NA Not applicable.
NC No criterion.
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.
* = 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 1-10

SEDIMENT ANALYTES DETECTED AT CONCENTRATIONS GREATER THAN SCREENING CRITERIA
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	Frequency of Detection[1]	Screening Concentration[2]	NAS Cecil Field IBDS	FDEP SCTL[4]		
				Residential	Industrial	Leachability
Semivolatile Organic Compounds (mg/kg)						
1-Methylnaphthalene	3/13	31.7	NC	210	2,100	**8.5**
Acenaphthene	4/13	46.9	NC	2,400	20,000	**2.1**
Benzo(a)anthracene	12/13	6.1	NC	#	#	**0.8**
Benzo(a)pyrene	13/13	48.2	NC	**0.1**	**0.7**	**8**
Benzo(b)fluoranthene	12/13	38	NC	#	#	**2.4**
Dibenzo(a,h)anthracene	4/13	1.1	NC	#	#	**0.7**
Indeno(1,2,3-cd)pyrene	8/13	4.3	NC	#	#	6.6
BaPEqs	13/13	52	NC	**0.1**	**0.7**	NC
Nitroaromatic Compounds (mg/kg)						
4-Nitrotoluene	1/3	37.5	NC	640	12,000	**1.4**
Metals (mg/kg)						
Lead	13/13	840	**197**	**400**	**1,400**	*

1 Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2 Maximum detected concentration.
3 NAS Cecil Field Inorganic Background Data Set values (HLA, 1998a).
4 Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs), Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
Bold indicates exceedance of SCTL.
NA Not applicable.
NC No criterion.
= Based on F.A.C. 62-777, site concentrations of carginogenic polynuclear aromatic hydrocarbons (PAHs) are converted to benzo(a)pyrene equivalents (BaPEq) 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 1-11

SURFACE WATER ANALYTES DETECTED AT CONCENTRATIONS GREATER THAN SCREENING CRITERIA
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	Frequency of Detection(1)	Screening Concentration(2)	NAS Cecil Field IBDS Value(3)	FDEP Surface Water Criterion (Freshwater)(4)
Metals (µg/L)				
Copper	1/3	9	**7.35**	**8.7**
Lead	7/7	398	**5.35**	**1.3**

1 Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2 Maximum detected concentration.
3 NAS Cecil Field Inorganic Background Data Set values (HLA, 1998a).
4 - Florida Department of Environmental Protection surface water criteria based on freshwater classification, Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
Bold indicates exceedance of SCTL.

TABLE 1-12

PRE RISKS FOR EXPOSURE TO SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY EPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	C or N	Maximum Detected Concentration	FDEP Residential SCTL	Residential Risk Ratio(1)	UCL	FDEP Industrial SCTL	Industrial Risk Ratio(2)
BaPEqs	C	956	0.1	9,560	32	0.7	46
Antimony	N	2,440	27	90.4	334	370	0.94
Arsenic	C	451	2.1	215	44	12	3.7
TRPH	N	450	460	0.98	111	2,700	0.04
Lead	N	65,500	400	NA	990	1,400	NA

Carcinogen (C) or noncarcinogen (N).
Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for residential and industrial direct contact exposure, Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
1 Ratio of maximum detected concentration to residential SCTL.
2 Ratio of UCL to indusrial SCTL.
95% Upper confidence limit (UCL) of the mean as calculated by FL-UCL software.
NA = Not applicable. SCTLs are levels that result in a protective blood-lead concentration.
All concentrations in mg/kg.

TABLE 1-13

PRE RISKS FOR EXPOSURE TO SUBSURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	C or N	Maximum Detected Concentration	FDEP Residential SCTL	Residential Risk Ratio(1)	UCL	FDEP Industrial SCTL	Industrial Risk Ratio(2)
BaPEqs	C	46	0.1	460	5.2	0.7	7.4

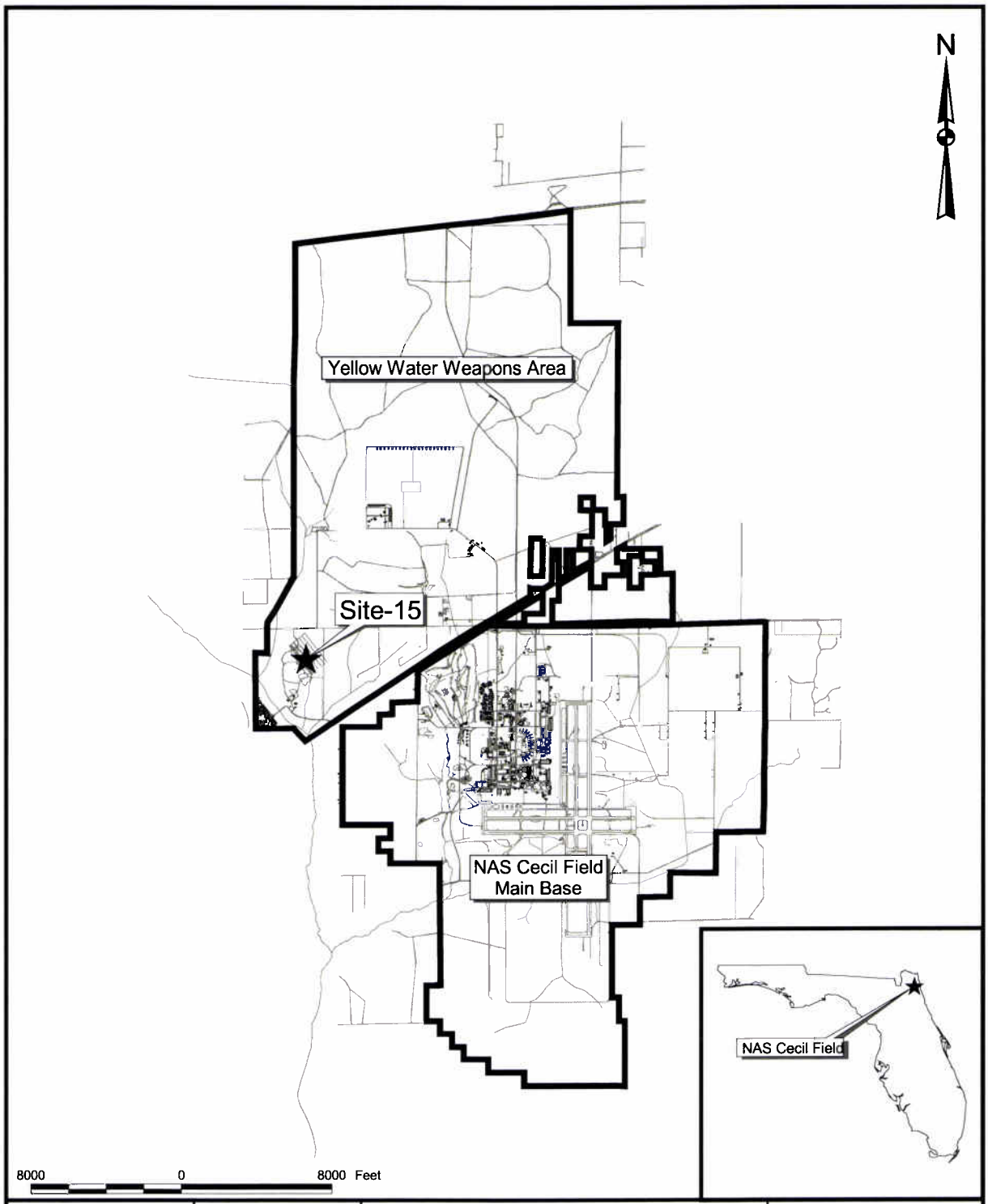
BaPEqs - Benzo(a)pyrene equivalents.
Carcinogen (C) or noncarcinogen (N).
Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for residential and industrial direct contact exposure, Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
1 Ratio of maximum detected concentration to residential SCTL.
2 Ratio of UCL to indusrial SCTL.
95% Upper confidence limit (UCL) of the mean as calculated by FL-UCL software.
All concentrations in mg/kg.

TABLE 1-14

PRE RISKS FOR EXPOSURE TO SEDIMENT
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Analyte	C or N	Maximum Detected Concentration	FDEP Residential SCTL	Residential Risk Ratio(1)	UCL	FDEP Industrial SCTL	Industrial Risk Ratio(2)
BaPEqs	C	31	0.1	310	31	0.7	44
Lead	N	840	400	NA	249	920	NA

BaPEqs - Benzo(a)pyrene equivalents.
Carcinogen (C) or noncarcinogen (N).
Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for residential and industrial direct contact exposure, Chapter 62-777, Florida Administrative Code (F.A.C.) (FDEP, 2005).
1 Ratio of maximum detected concentration to residential SCTL.
2 Ratio of UCL to indusrial SCTL.
95% Upper confidence limit (UCL) of the mean as calculated by FL-UCL software.
NA = Not applicable. SCTLs are levels that result in a protective blood-lead concentration.
All concentrations in mg/kg.



DRAWN BY MJJ	DATE 14Jan00	GENERAL LOCATION MAP OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-1 / REV 0

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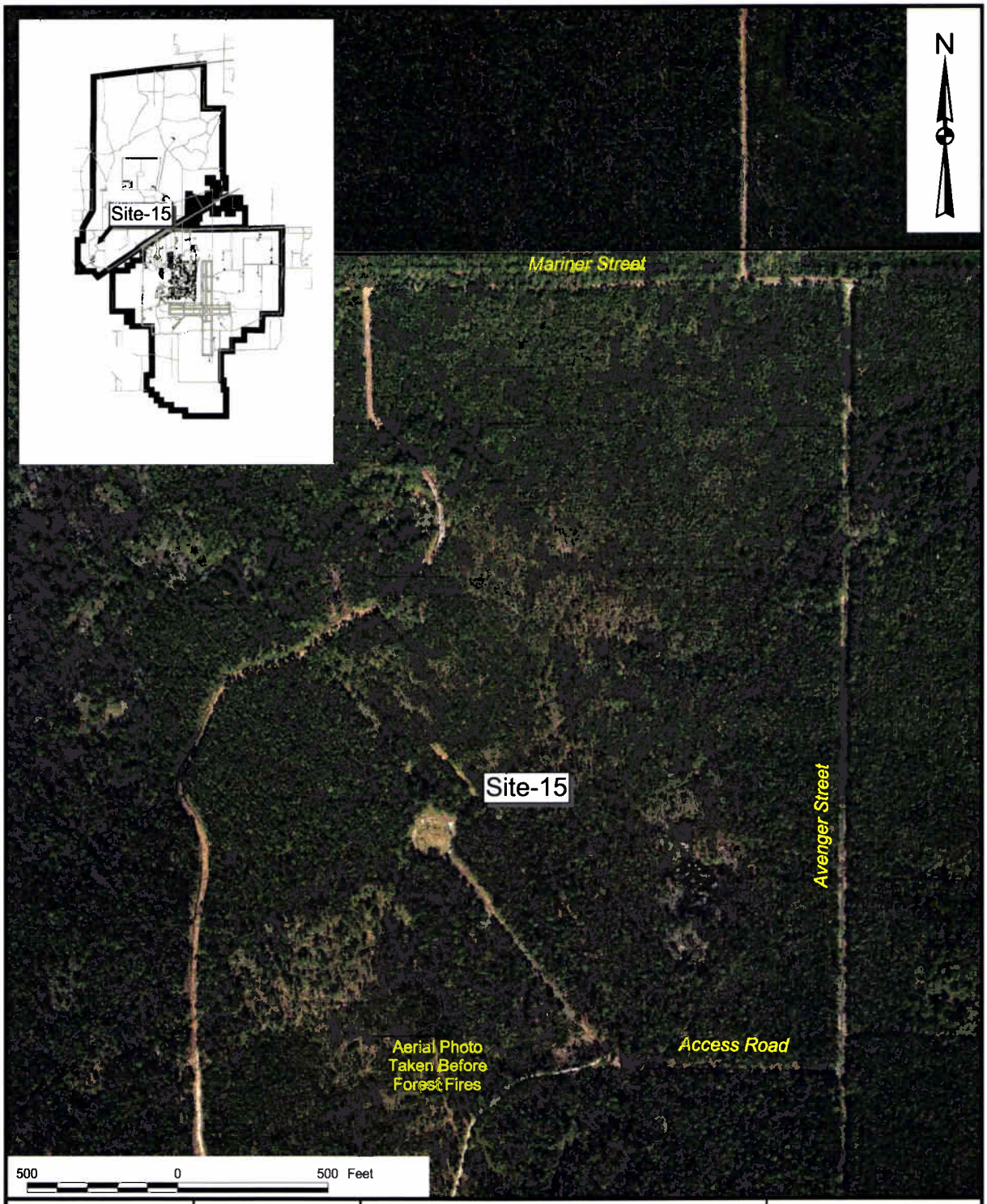

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CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-2 / REV 0

NAVFAC

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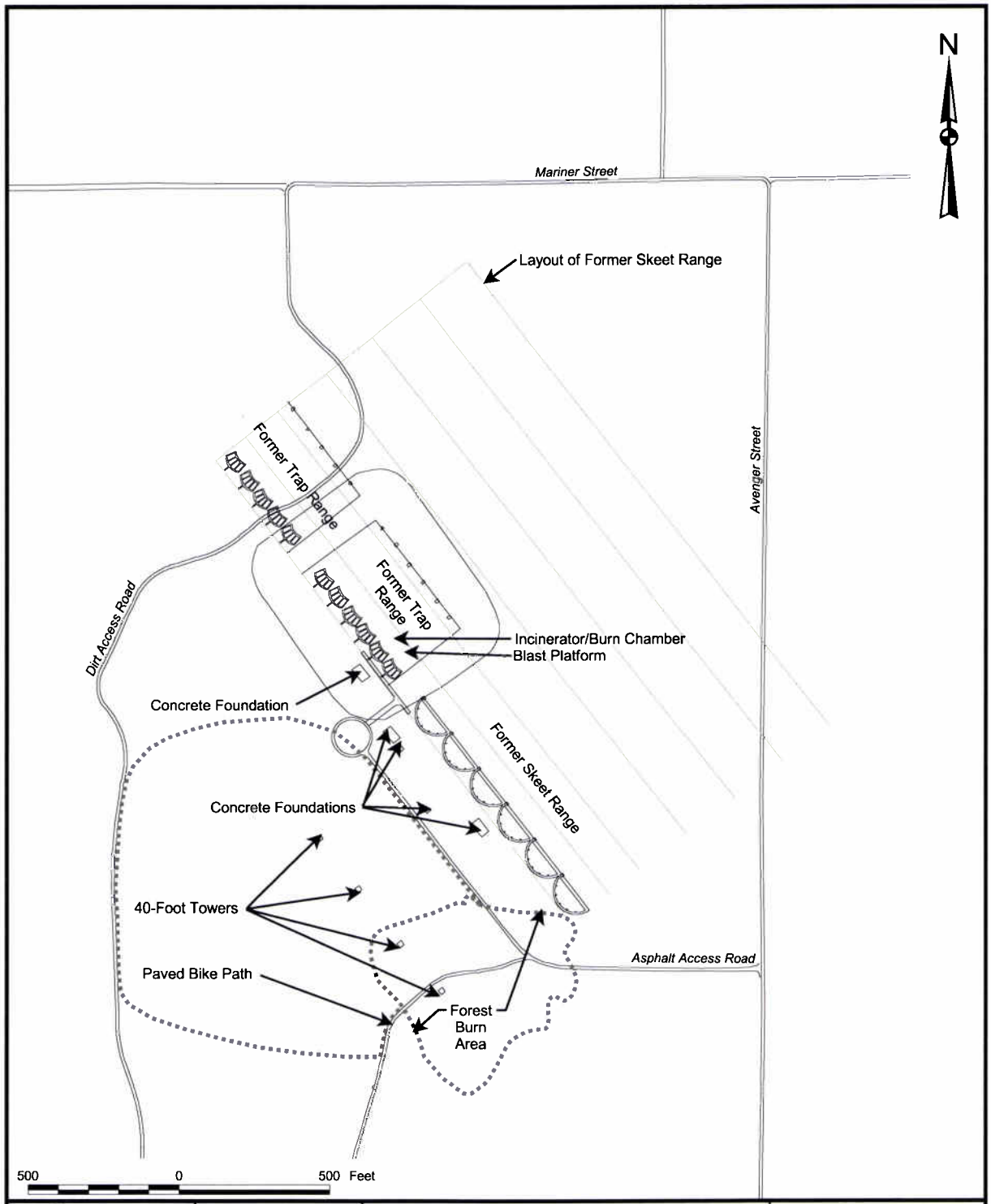

DRAWN BY MJJ	DATE 14Jan00	GENERAL ARRANGEMENT OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-3 REV 0

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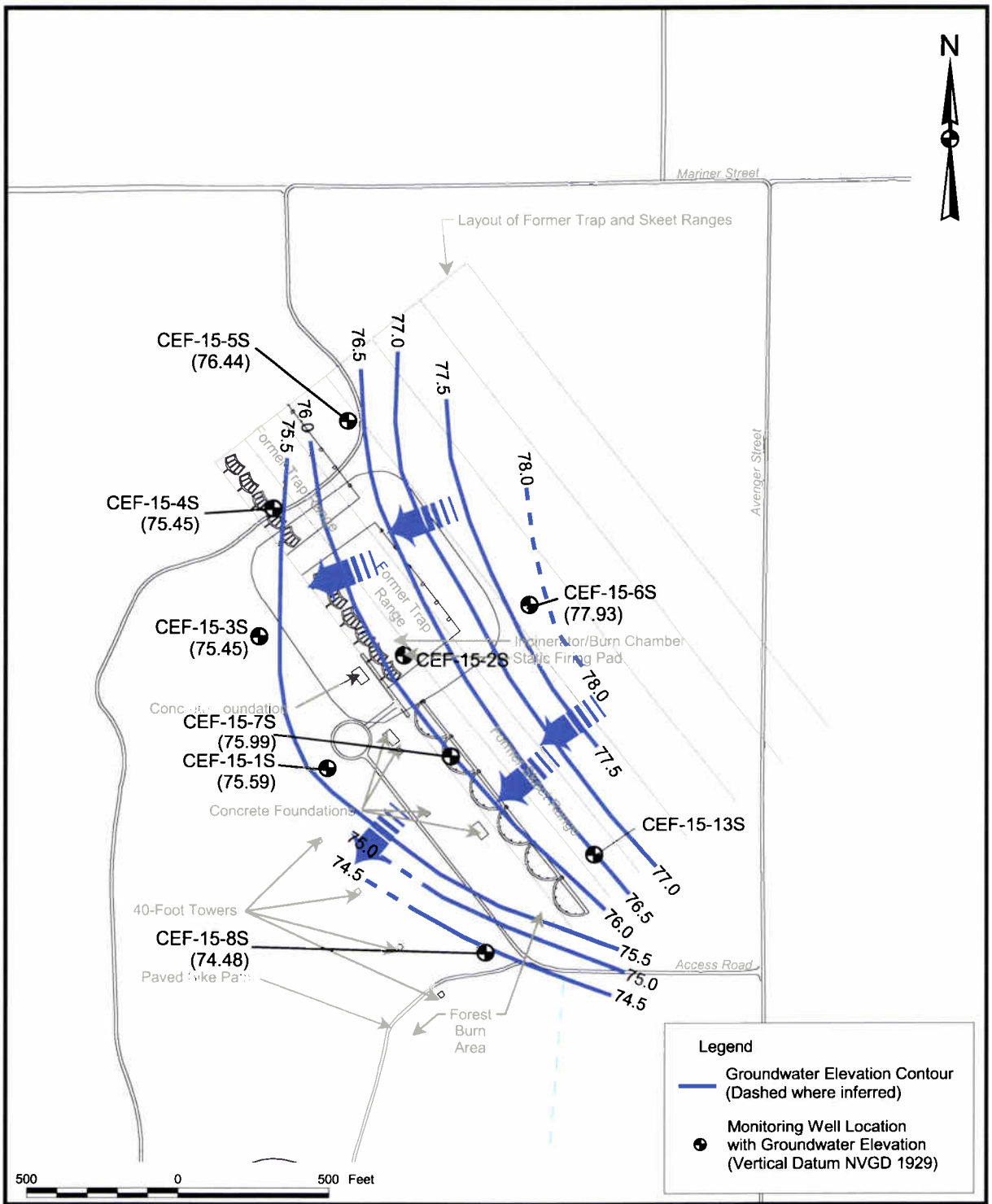

DRAWN BY	DATE			CONTRACT NUMBER
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CHECKED BY	DATE		OU 5, SITE 15	APPROVED BY / DATE
COST/SCHEDULE-AREA			FEASIBILITY STUDY REPORT	APPROVED BY / DATE
SCALE		NAVFAC	NAS CECIL FIELD	DRAWING NO. FIGURE 1-4 / REV 0
AS NOTED			JACKSONVILLE, FLORIDA	

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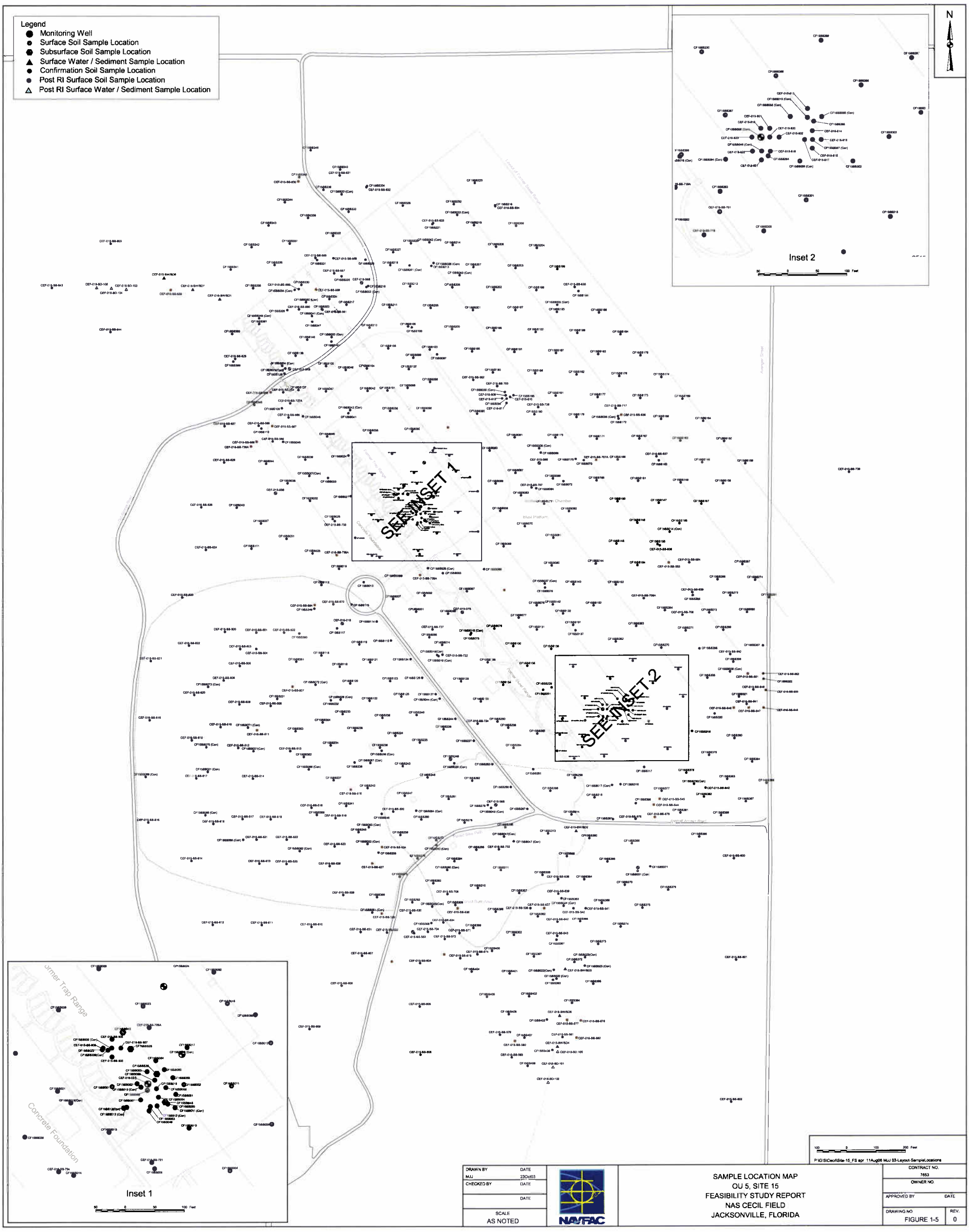
Legend
Monitoring Well
Surface Soil Sample Location
Subsurface Soil Sample Location
Surface Water / Sediment Sample Location
Confirmation Soil Sample Location
Post RI Surface Soil Sample Location
Post RI Surface Water / Sediment Sample Location
N
Inset 2
SEE INSET 1
SEE INSET 2
Inset 1
Former Trap Range
Concrete Foundation
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DRAWN BY
MJJ
DATE
23Oct03
CHECKED BY
DATE
DATE
SCALE
AS NOTED
NAVFAC
SAMPLE LOCATION MAP
OU 5, SITE 15
FEASIBILITY STUDY REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO.
7653
OWNER NO.
APPROVED BY
DATE
DRAWING NO
FIGURE 1-5
REV.
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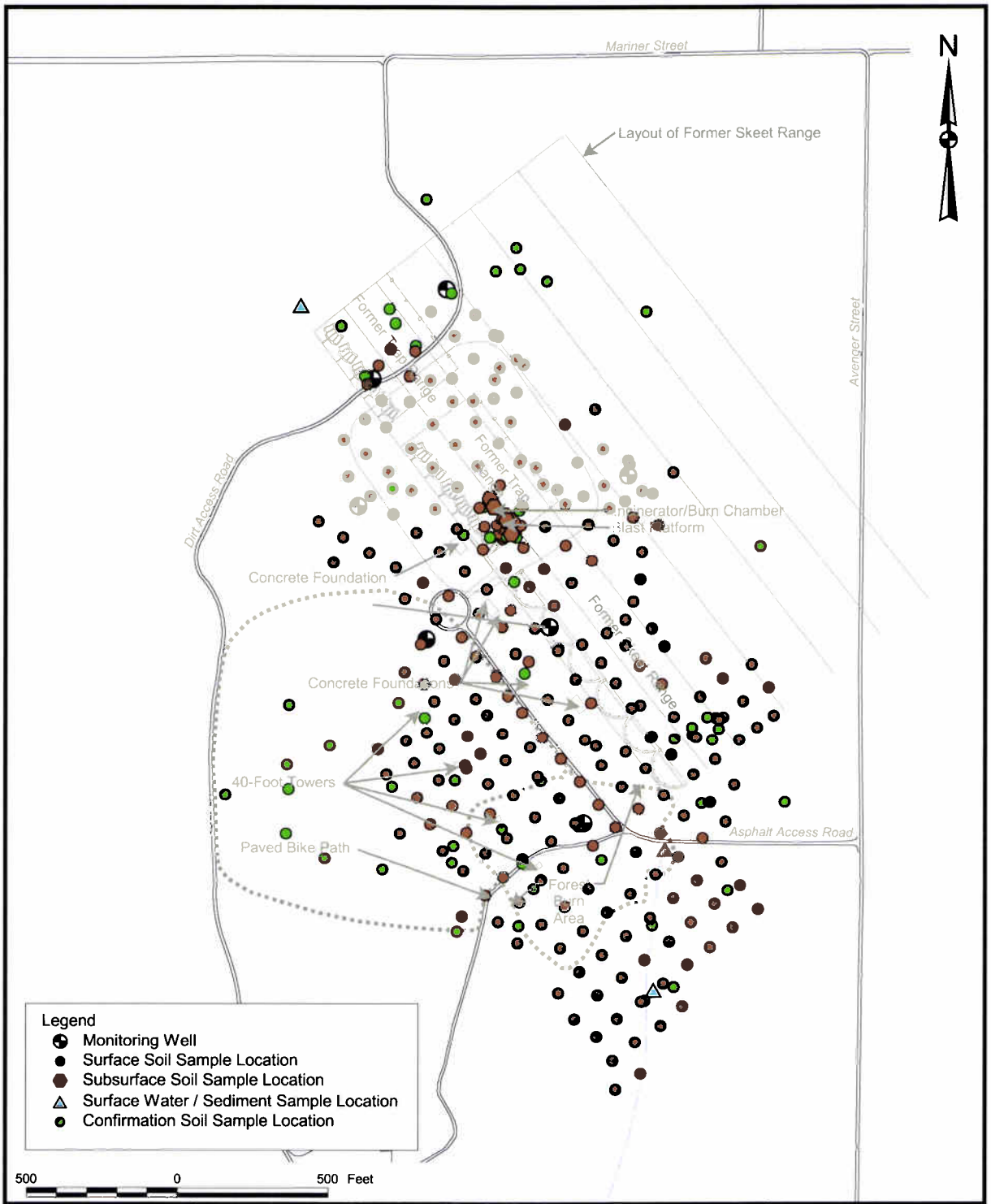

DRAWN BY MJJ	DATE 21Jan00	RI SAMPLING LOCATIONS SELECTED FOR PAH SCREENING & CONFIRMATORY SAMPLING OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-6 REV 0

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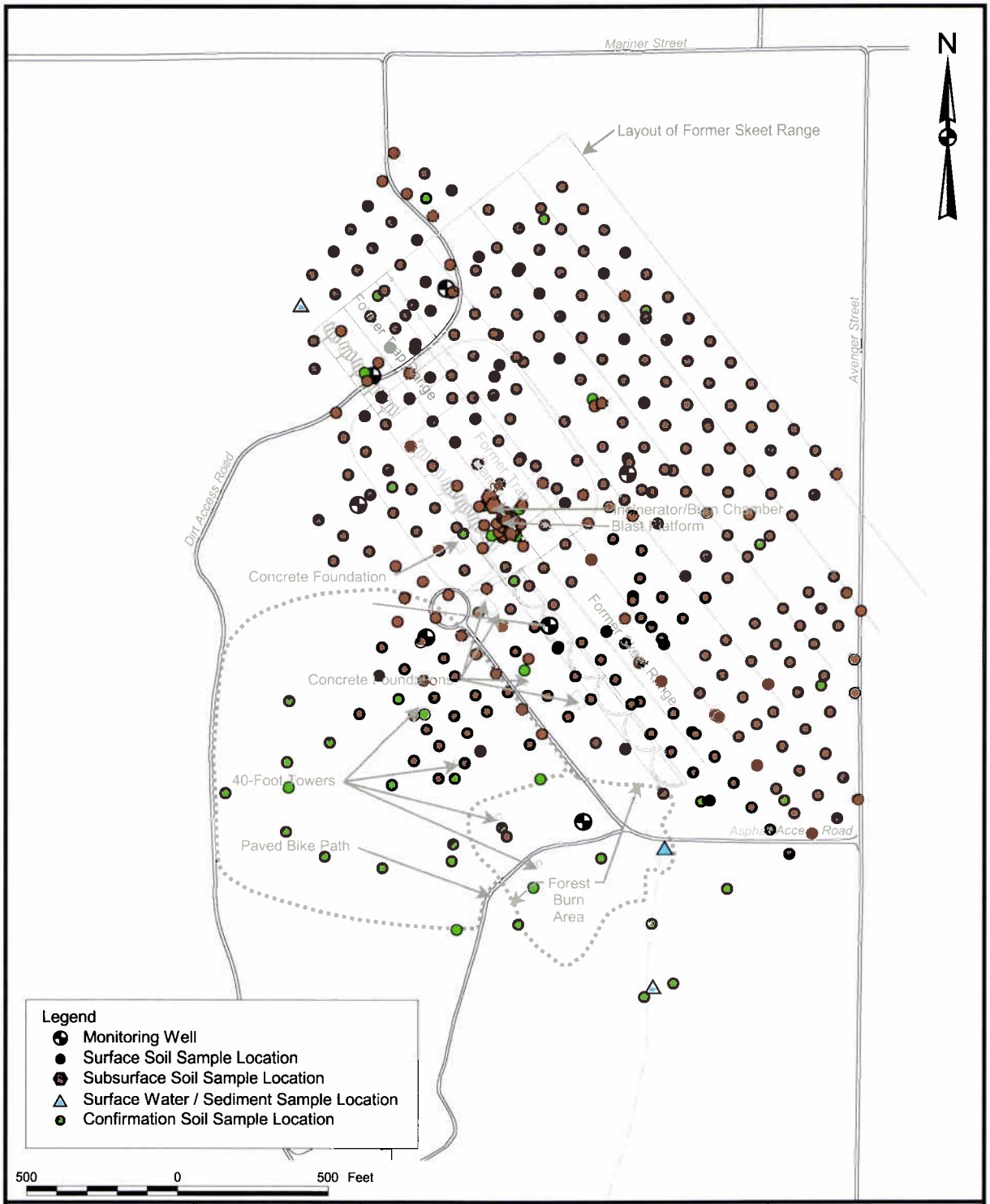

DRAWN BY MJJ	DATE 21Jan00	RI SAMPLING LOCATIONS SELECTED FOR LEAD SCREENING & CONFIRMATORY SAMPLING OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-7 REV 0

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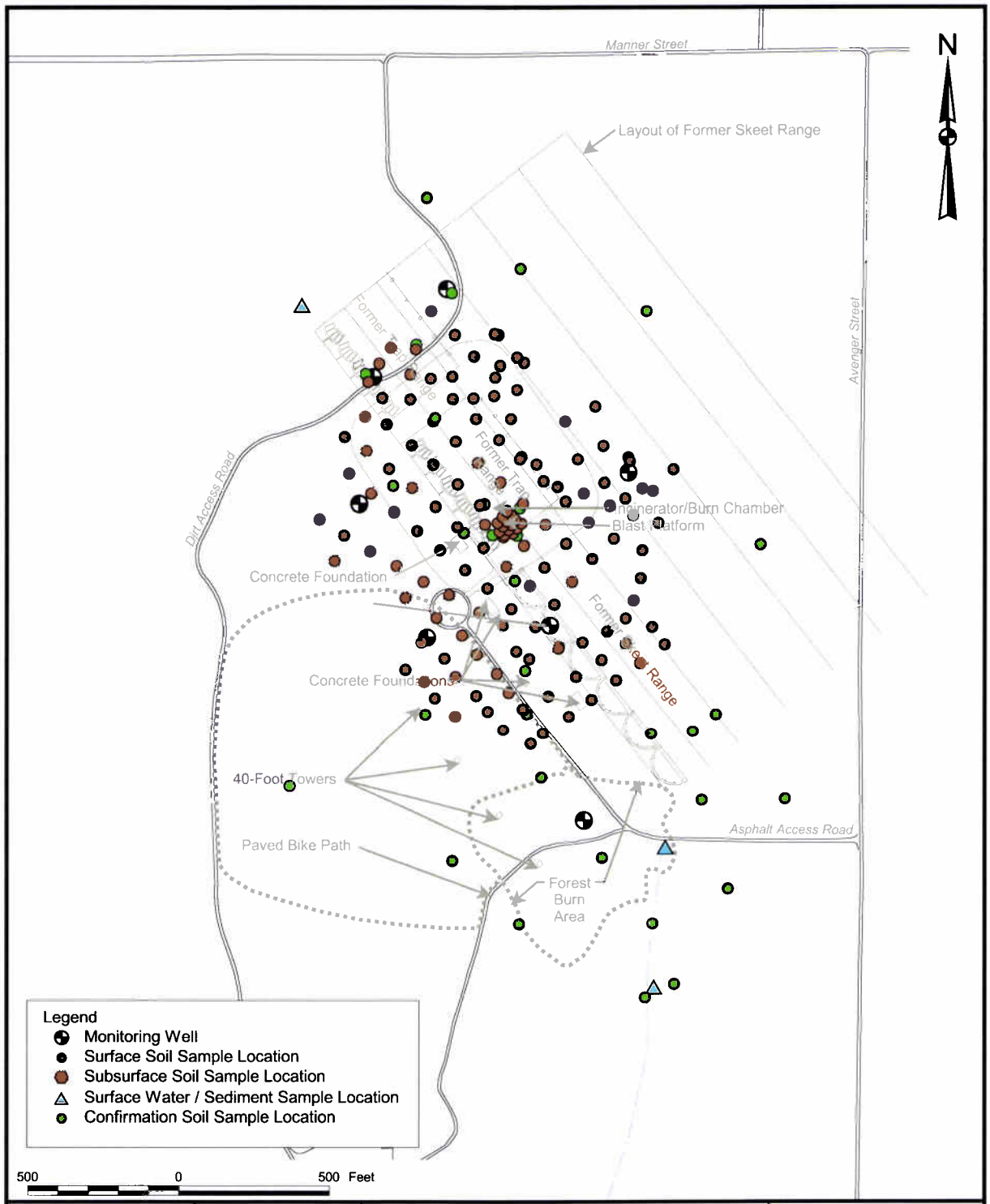

DRAWN BY MJJ	DATE 21Jan00	RI SAMPLING LOCATIONS SELECTED FOR TNT SCREENING & CONFIRMATORY SAMPLING OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-8 / REV 0

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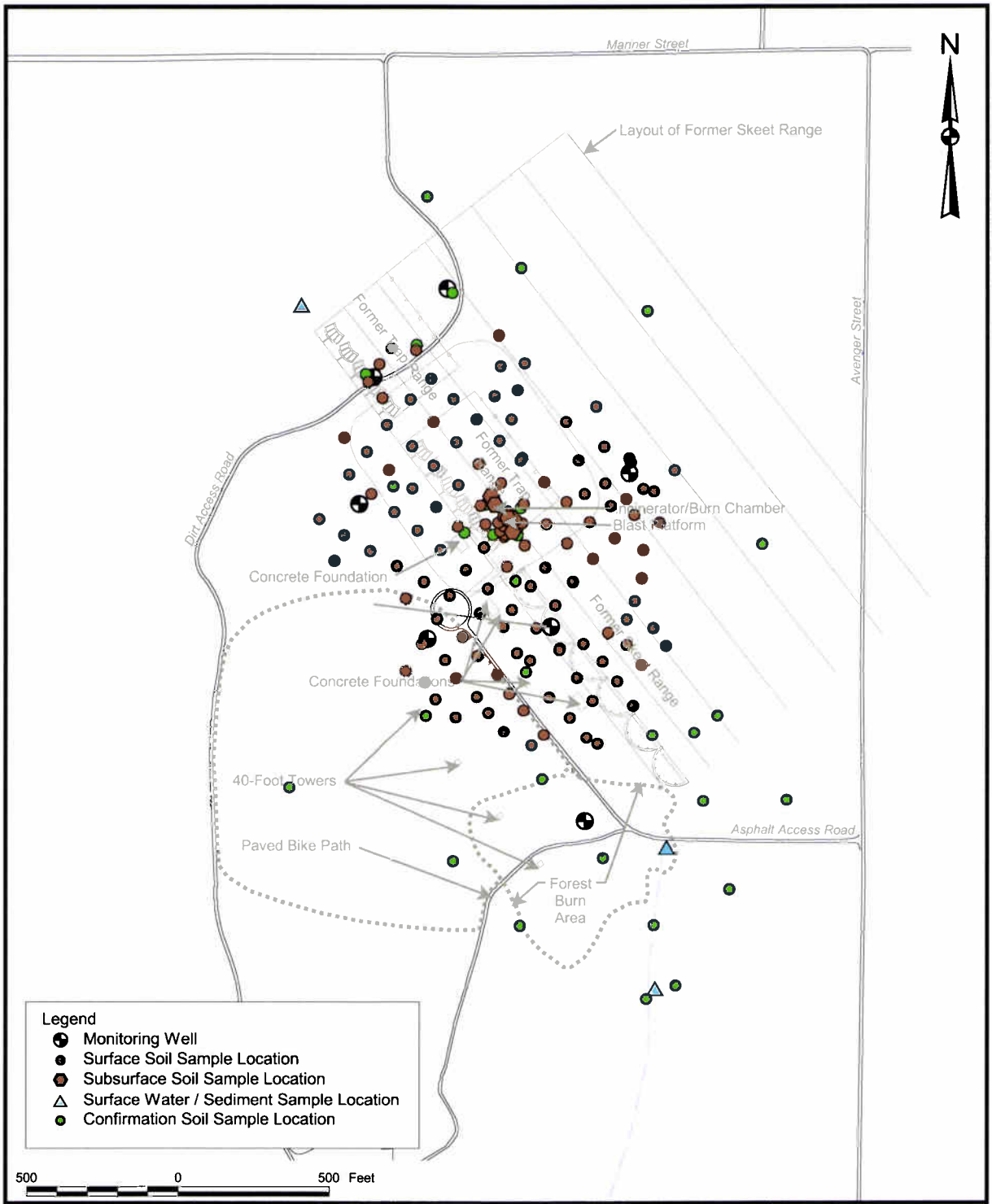

DRAWN BY MJJ	DATE 21Jan00	RI SAMPLING LOCATIONS SELECTED FOR TRPH SCREENING & CONFIRMATORY SAMPLING OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO FIGURE 1-9 / REV 0

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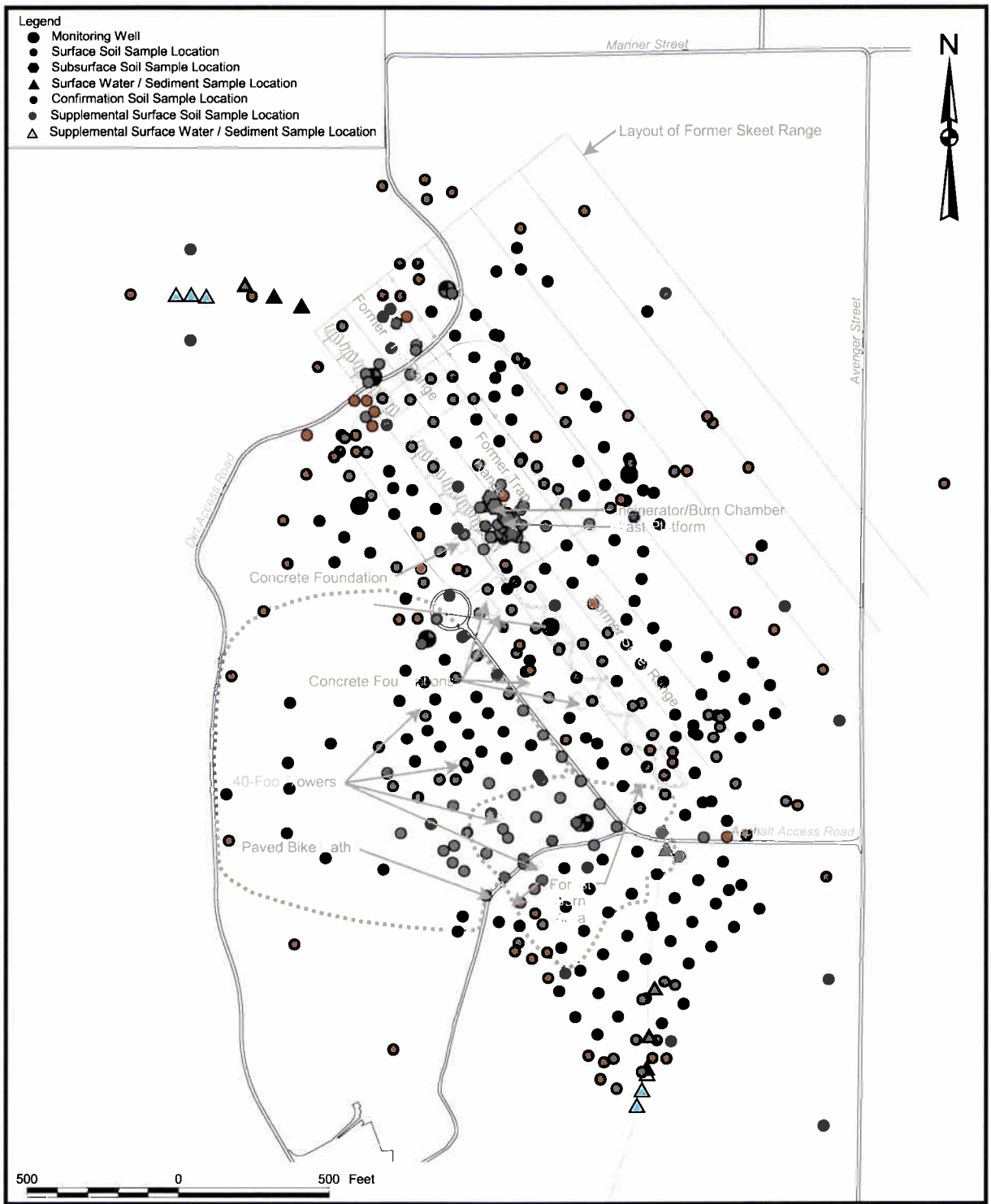

DRAWN BY MJJ	DATE 21Jan00	SUPPLEMENTAL SURFACE SOIL/SEDIMENT SAMPLING LOCATIONS SELECTED FOR PAH ANALYSIS OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-10 / REV 0

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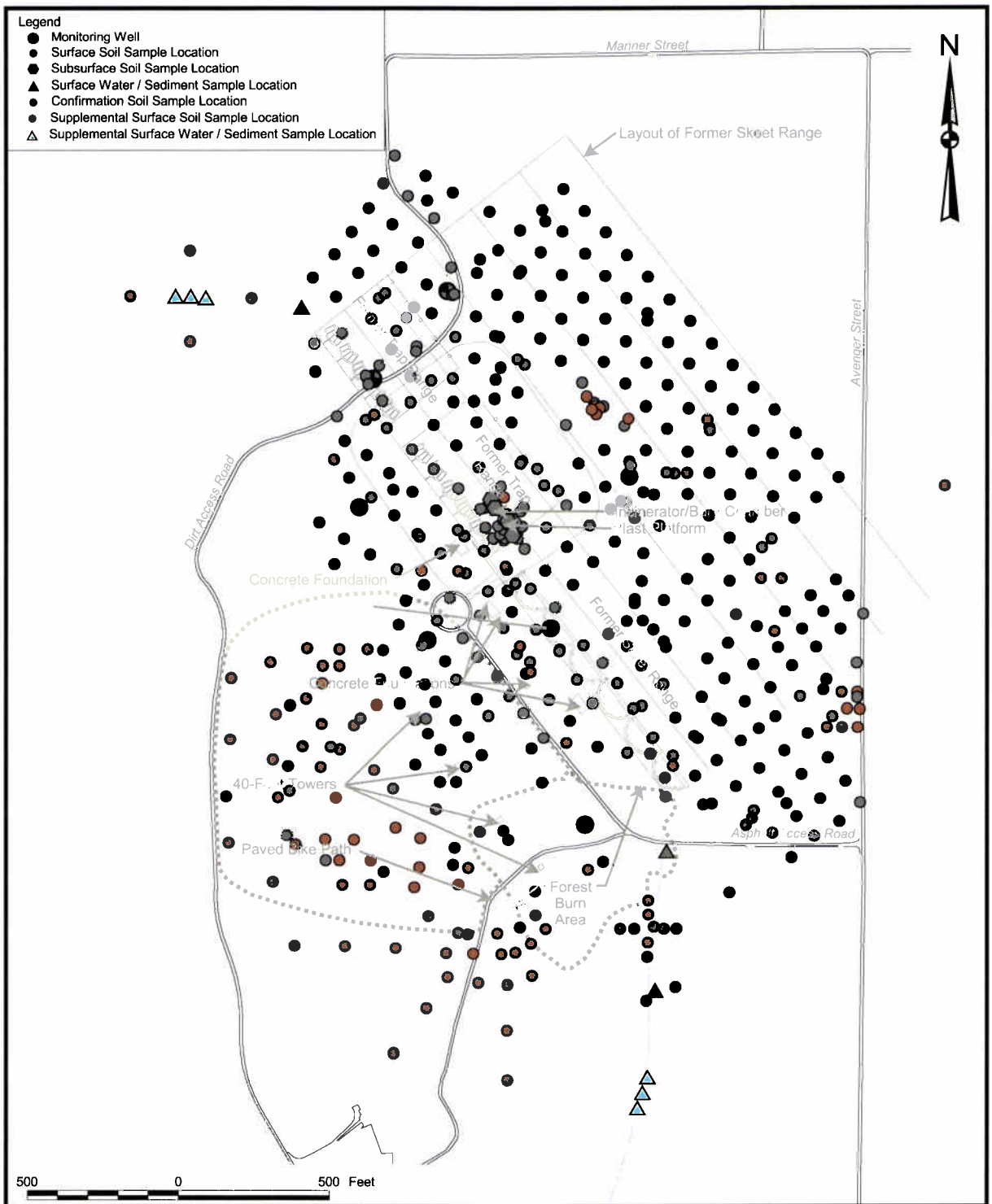

DRAWN BY MJJ	DATE 21Jan00	SUPPLEMENTAL SURFACE SOIL/SEDIMENT SAMPLING LOCATIONS SELECTED FOR LEAD ANALYSIS OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-11 / REV 0

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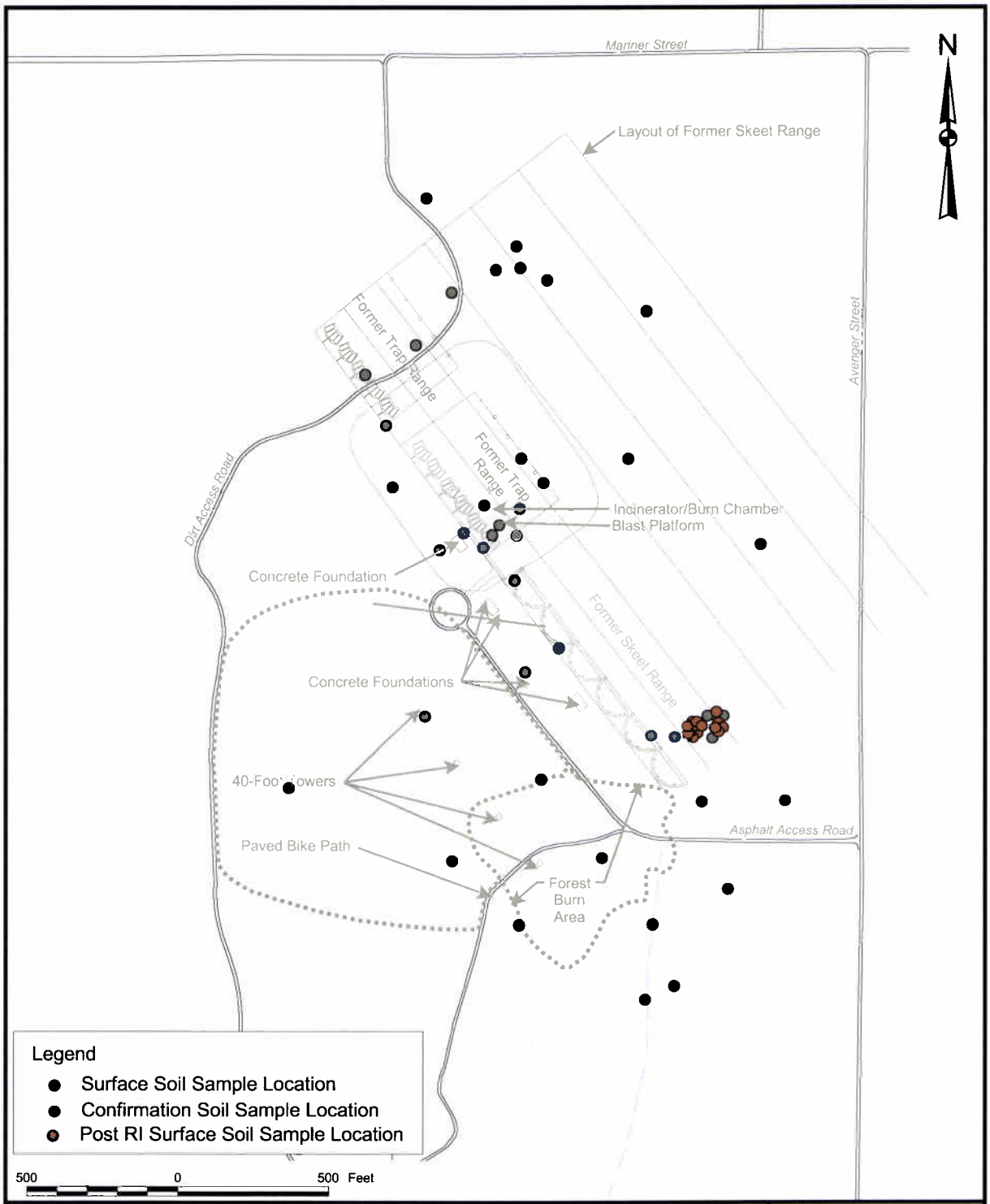
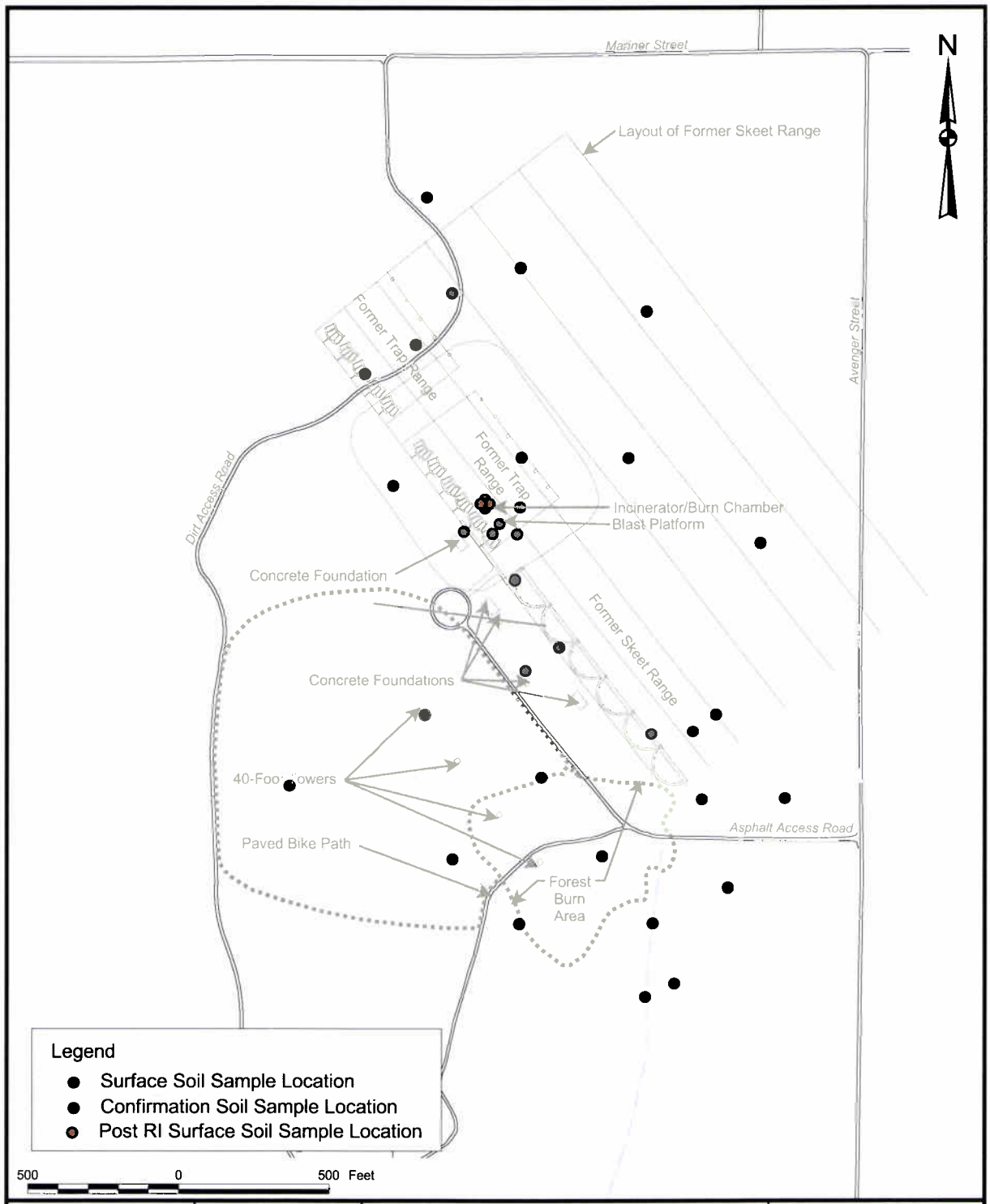


DRAWN BY MJJ	DATE 21Jan00	SUPPLEMENTAL SURFACE SOIL/SEDIMENT SAMPLING LOCATIONS SELECTED FOR ARSENIC ANALYSIS OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-12 / REV 0

P:\GIS\Cecil\Site-15_FS.apr 11Aug06 MJJ 16-Layout-PostArsenic_Samples



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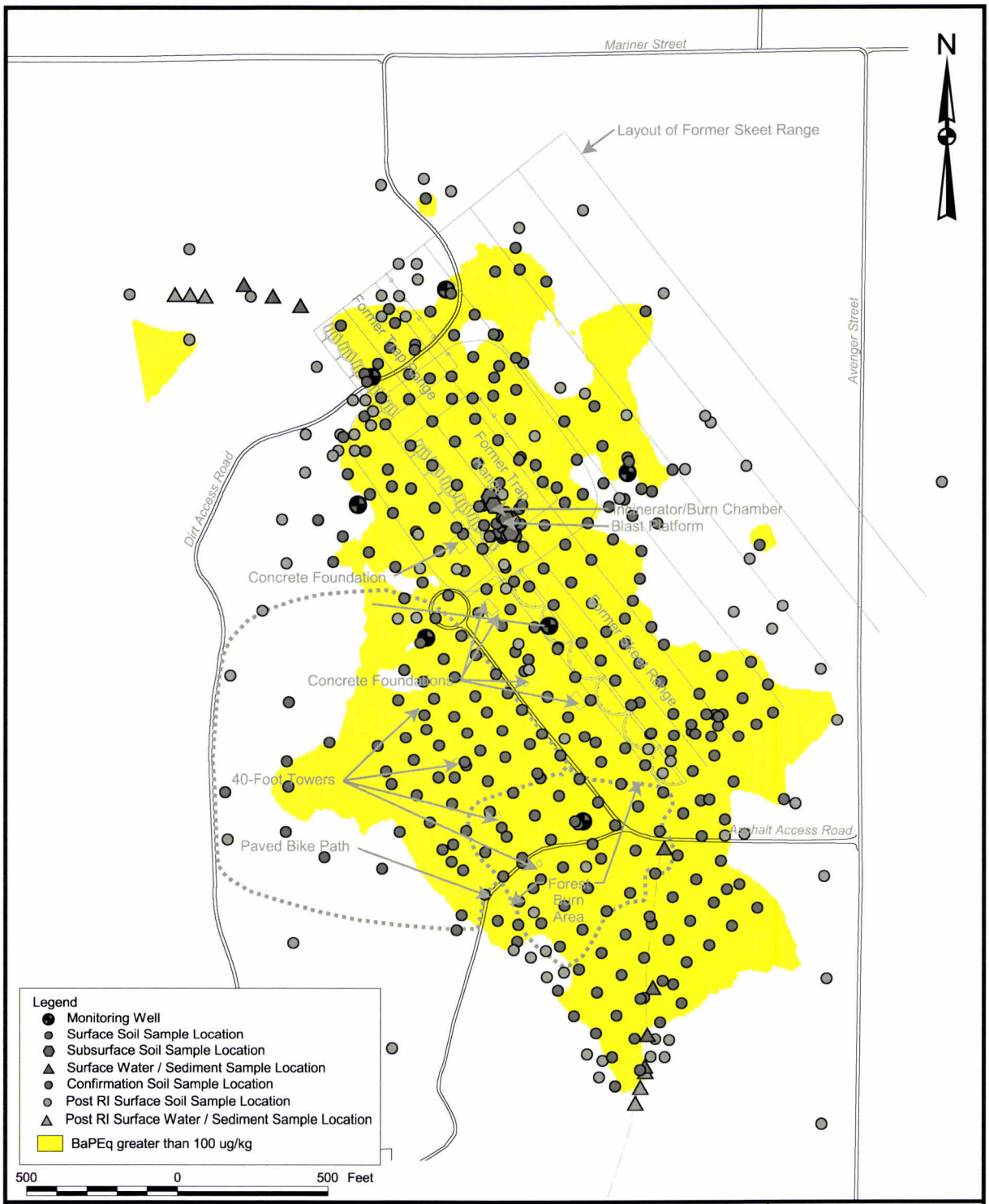
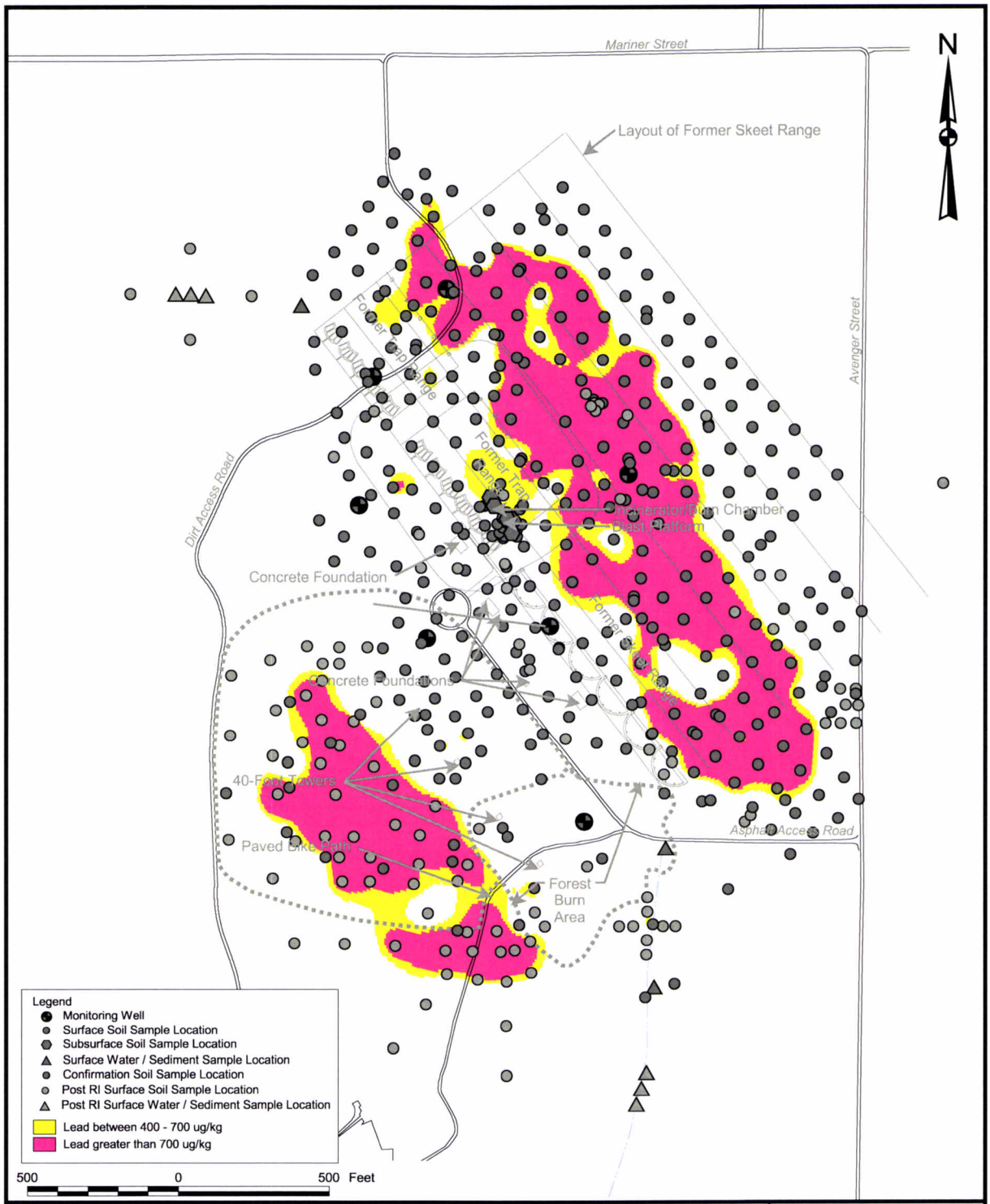
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-13 REV 0

P:\GIS\Cecil\Site-15_FS.apr 11Aug06 MJJ 17-Layout-PostTRPH_Samples



DRAWN BY MJJ DATE 21Jan00	NAVFAC	PAH CONCENTRATIONS IN SURFACE SOIL SAMPLES EXCEEDING FDEP SCTLs OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY DATE			APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-14 REV 0

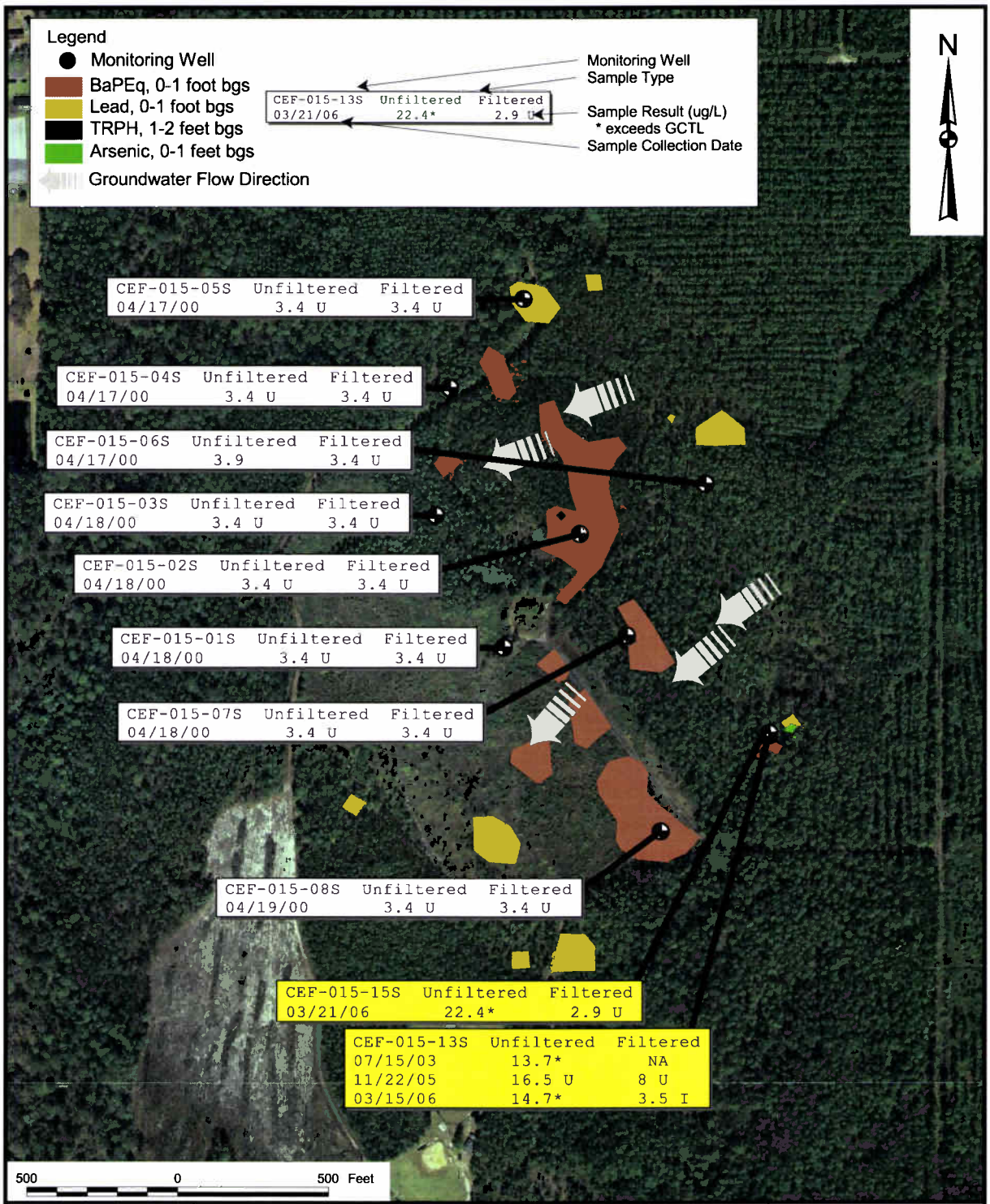
P:\GIS\Cecil\Site-15_FS.apr 11Aug06 MJJ 12-Layout-PAH Exceeding FDEP



DRAWN BY MJJ	DATE 21Jan00	LEAD CONCENTRATIONS IN SURFACE SOIL SAMPLES EXCEEDING FDEP SCTLs OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-15 / REV 0

NAVFAC

P:\GIS\Cecil\Site-15_FS.apr 11Aug06 MJJ 13-Layout-Lead Exceeding FDEP



DRAWN BY MJJ	DATE 05Jun06	GROUNDWATER IMPACTED AREA OU 5, SITE 15 FEASIBILITY STUDY REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-16 REV 0

P:\GIS\Cecil\Site-15_FS.apr 14Aug06 MJJ 21-Layout-ArsenicMap

2.0 REMEDIAL ACTION OBJECTIVES AND GENERAL RESPONSE ACTIONS

This section develops RAOs for soil and describes the derivation of site-wide cleanup goals and remedial pickup levels for contaminated soil at OU 5, Site 15 based on the site conditions presented in Section 1.0. The RAOs provide the basis for selecting appropriate remedial alternatives. General Response Actions (GRAs) that may be suitable to achieve the site-wide cleanup goals for soil are also presented in this section.

The regulatory requirements [chemical-, location-, and action-specific Applicable or Relevant and Appropriate Requirements (ARARs)] and TBC criteria that may potentially govern remedial activities at the site are also presented in this section. In addition, this section presents the COCs and the conceptual pathways through which these chemicals may affect human health, and thus derives the environmental media of concern. Finally, this section presents an estimate of the volume of contaminated soil.

2.1 REMEDIAL ACTION OBJECTIVES

The purpose of this section is to develop RAOs for Site 15 at NAS Cecil Field, Jacksonville, Florida. Development of RAOs is an important step in the FS process. RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. The RAOs specify the COCs, potential exposure routes and receptors, and acceptable contaminant levels for the site. Section 2.1.1 presents the RAOs developed for Site 15.

The development of RAOs takes into consideration ARARs and TBC criteria. Section 2.1.2 identifies the ARARs and TBC criteria, Section 2.1.3 identifies the medium of concern, and Section 2.1.4 identifies the COCs for remediation.

2.1.1 Statement of Remedial Action Objectives

Site-specific RAOs specify COCs, media of interest, exposure pathways, and cleanup goals or acceptable contaminant concentrations. This FS addresses soil contamination at Site 15. The RAOs were developed to permit consideration of a range of treatment and containment alternatives based on the future use of the site for low-intensity recreation activities (see Section 2.2.1), a green corridor connecting two state forests, and open space. To protect the public from potential current and future health risks, and to protect the environment, the following RAOs were developed for OU 5, Site 15:

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

- Reduce ecological risk associated with exposure to surface soil containing PAHs and lead at concentrations greater than site-specific ecological target levels.

2.1.2 Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria

ARARs consist of the following:

- Any standard, requirement, criterion, or limitation under federal environmental law.
- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility-siting law that is more stringent than the associated federal standard, requirement, criterion, or limitation.

TBC criteria are non-promulgated guidelines or criteria that may be useful for developing a remedial action or are necessary for determining what is protective to human health and/or the environment. Examples of TBC criteria include U.S. EPA's Drinking Water Health Advisories, Reference Doses (RfDs), and Cancer Slope Factors (CSFs).

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 a waiver must be obtained [see also 40 Code of Federal Regulations (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 (TBC guidance category).

According to 40 CFR 300.430(f)(1)(i)(A), overall protection of human health and the environment and compliance with ARARs are threshold requirements that each alternative must meet to be eligible for selection.

2.1.2.1 Definitions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR Part 300.5 provides the following definitions for ARARs:

- Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law

that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

- Relevant and appropriate requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law. While these relevant and appropriate requirements are not "applicable" to a hazardous substance, pollutant, contaminant, or remedial action, location, or other circumstance at a CERCLA site, they address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Per 40 CFR 300.430(g)(3), other advisories, criteria, or guidance are to be considered for a particular release. The TBC category consists of advisories, criteria, or guidance that were developed by U.S. EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

The U.S. EPA in various guidance documents and the NCP has divided ARARs into three categories to facilitate identification. Chemical-specific and location-specific ARARs are identified early in the process, generally during the RI, and action-specific ARARs are normally identified during the FS in the detailed analysis of alternatives. The three ARAR categories are defined as follows:

- Chemical-Specific: Health- or risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants. Examples include MCLs and Clean Water Act (CWA) Ambient Water Quality Criteria (AWQCs).

- Location-Specific: Restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of these areas regulated under various federal laws include floodplains, wetlands, and locations where endangered species or historically significant cultural resources are present.

- Action-Specific: Technology- or activity-based requirements, limitations on actions, or conditions involving special substances. Examples of action-specific ARARs include RCRA regulations for generation, characterization, and management of hazardous wastes and CWA effluent limitations and pre-treatment standards for wastewater discharges.

This section discusses chemical- and location-specific ARARs and TBC criteria. Action-specific ARARs and TBC criteria are presented in Section 2.3 along with the discussion of GRAs.

2.1.2.2 Chemical-Specific ARARs and TBC Criteria

Tables 2-1 and 2-2 present lists of federal and State of Florida chemical-specific ARARs and TBC criteria for this FS. These ARARs and TBC criteria provide some medium-specific guidance on "acceptable" or "permissible" concentrations of contaminants.

2.1.2.3 Location-Specific ARARs and TBC Criteria

Tables 2-3 and 2-4 present lists of federal and State of Florida location-specific ARARs and TBC criteria for this FS. These ARARs and TBC criteria place restrictions on concentrations of contaminants or the conduct of activities solely based on the site's particular characteristics or location.

2.1.3 Medium of Concern

Based on the discussion in Section 1.0 involving toxicity and risk assessment for both human and ecological receptors, the medium of concern at Site 15 was determined to be surface soil, less than 2 feet in depth and mostly contained to the first foot of soil.

As documented in the Technical Memorandum for No Further Groundwater Monitoring provided in Appendix A.1 and in the addendum to this Technical Memorandum that is included in Appendix A.2, groundwater was eliminated as a medium of concern at Site 15 (TtNUS, 2006a).

2.1.4 Chemicals of Concern for Remediation

COCs for Site 15 were established based on an initial screening of maximum concentrations compared to FDEP SCTLs (FDEP, 2005) as published in Chapter 62-777, Florida Administrative Code (F.A.C.) (soil leachability criteria or residential direct exposure, whichever was more restrictive), and the NAS Cecil Field site-specific IBDS values (HLA, 1998a) as outlined in Section 1.4.1 of this FS. Site-specific SCTLs were developed for the COCs to be protective of human health and ecological receptors as presented in Section 2.2. The COCs are BaPEqs, arsenic, lead, antimony, and TRPH.

2.2 CLEANUP GOALS

Cleanup goals are concentrations of COCs in environmental media that, when attained, should achieve RAOs. According to the NCP, cleanup goals are based on readily available information such as chemical-specific ARARs. Pickup levels are developed to ensure that exposure concentrations left on site are protective of human receptors (based on future recreational land use) and ecological receptors. In general, cleanup goals are established with consideration to the following:

- Protecting human receptors from adverse health effects
- Protecting the environment from detrimental impacts from site-related contamination
- Compliance with federal and state ARARs

Surface soil cleanup goals were determined for the COCs identified in Section 1.5. The cleanup goals were based on the following criteria:

- Protection of human health from direct exposure to contaminants in surface soil at levels exceeding the site-specific SCTLs.

- Protection of potential ecological receptors from direct exposure to contaminants in surface soil and sediment at levels exceeding the site-specific ecological target levels.

2.2.1 Development of Site-Specific SCTLs for Human Health

The reuse plan for NAS Cecil Field stipulates that Site 15 will be maintained as a green space with no planned development for the site. Therefore, it was agreed by the BCT that future human receptors for the site would be limited to low-intensity recreational receptors with infrequent exposure, such as hikers, bikers, horseback riders, birders, and hunters. Based on the results of previous investigations and the PRE, the main COCs are BaPEqs and lead. Additional COCs include antimony, arsenic, and TRPH. Therefore, site-specific SCTLs for these COCs that would be protective of the hypothetical recreational receptor were developed.

Based on the known future use of the site, U.S. EPA, FDEP, and the Navy agreed that the human health SCTLs should be protective of the recreational user. The exposure assumptions for the Site 15 recreational user are presented below.

Site 15 Exposure Assumptions for the Adult Recreational User	
Exposure Frequency (EF)	50 days/year
Exposure Duration (ED)	20 years
Fraction from Source (FC)	1
Soil Ingestion Rate (IR)	50 mg/day
Surface Area (SA)	3,000 cm^2
Soil Adherence Factor (AF)	0.07 mg/cm^2
Inhalation Rate (IRi)	15 m^3/day
Body Weight (BW)	35 kg

In developing site-specific SCTLs protective of the recreational user, the BCT agreed that the receptor is exposed through incidental ingestion, dermal contact, and inhalation of fugitive dust. It was assumed that

the receptor is present on site 1 day per week, 50 weeks per year (50 days per year) for 20 years. The exposure frequency and exposure duration were initially based on revised assumptions included in FDEP's exposure assumptions for recreational exposure at former cattle-dip sites (prepared by Woodward-Clyde for FDEP). Specifically, these assumptions for exposure frequency and exposure duration correspond to a "Restricted II" site, which is a site that involves infrequent site contact. The document identifies a hiking trail to be a "Restricted II" site. It was also assumed that soil ingestion for this receptor is 50 mg per day. This ingestion rate corresponds to U.S. EPA's and FDEP's default value for an adult worker. The nature of the site and the nature of the assumed activities do not constitute a need to assume a higher ingestion rate. Dermal exposure was also considered in the development of the SCTL. It was agreed that the surface area potentially exposed to soil would be 3,000 square centimeters (cm^2), which is between the FDEP adult worker surface area (2,000 cm^2) and the adult residential surface area (3,674 cm^2). It was also agreed that the soil adherence factor would be 0.07 mg per cm^2, a value referenced in U.S. EPA's Exposure Factors Handbook (U.S. EPA, 1997a) for the adult resident. The inhalation rate corresponds to the FDEP and U.S. EPA default value for the worker.

Using these assumptions in conjunction with FDEP's equation for calculating an SCTL, the Site 15 recreational SCTL for cPAHs in terms of BaPEqs is 2,250 µg/kg. Details regarding the development of this SCTL are presented in Appendix F.

The same exposure assumptions used to derive the site-specific BaPEq SCTL were used to derive the site-specific SCTL for lead. The primary difference was that the U.S. EPA's Adult Lead Model was used (1996). This model can be used to determine the soil lead concentration that would result in a fetal blood lead level of 10 milligram per deciliter (µg/dL). Based on the same exposure assumptions outlined above, the adult recreational SCTL for lead at Site 15 is 3,281 mg/kg. Details regarding the development of this site-specific SCTL are presented in Appendix F.

In the context of assessing potential risks to human health from exposure to lead in soils at Site 15, the question arose as to what constitutes an acceptable soil lead concentration limit based on acute contact by a small child. This question was considered important because it would define an effective not-to-exceed value for lead in areas where small children could ingest large quantities of soil. It is unlikely that a child would be left unattended to ingest quantities of soil greater than the intake used to assess chronic exposures. Nonetheless, an analysis was conducted to determine a not-to-exceed lead concentration in soil such that acute exposure, in the form of a soil pica episode (single dose), would not result in a blood lead concentration associated with acute lead toxicity in children. This analysis was conducted by Drs. Stephen Roberts and Bernard Gadagbui of the University of Florida, Dr. Joel Pounds of Battelle Northwest Laboratories, and Dr. Ted Simon of U.S. EPA Region 4. The analysis resulted in a not-to-exceed lead concentration of 6,500 mg/kg. The value is based on a child of 2 years, the approximate age

when a soil pica event while at play is most likely, ingesting 10 grams of soil in an episode. The basis for this determination is presented in more detail in Appendix F.

Site-specific SCTLs were developed for the other COCs (antimony, arsenic, and lead) using the same exposure assumptions in conjunction with the toxicity factors and chemical properties used in developing FDEP SCTLs. Details regarding development of these SCTLs are presented in Appendix F.

Although the reuse plan for Site 15 stipulates that the site will be maintained as a green space with no development, determining the requirements for unrestricted use of the site (e.g., residential use) was evaluated to provide a basis of comparison. To achieve unrestricted use, the entire site must be remediated such that COC concentrations within 0.25-acre exposure units are less than the Chapter 62-777, F.A.C. residential SCTLs.

The following table summarizes the site-specific recreational SCTLs developed based on protection of human health and the Chapter 62-777 FDEP residential SCTLs for the 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)	6,500 mg/kg	NA
Lead (Chronic)	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

2.2.2 Development of Site-Specific Ecological Target Levels

The detailed development of target levels also identified as remediation goals for protection of ecological receptors is described in Appendix B. The methodologies through which the ecological target levels were developed have been approved by representatives of the Navy, U.S. EPA Region 4, and FDEP.

As discussed in Appendix B, the toxicity of PAHs to upper-level receptors such as birds and mammals via the terrestrial food web is negligible at the concentrations present at Site 15. The concentration of total PAHs (the sum of individual detected PAHs) believed to be potentially toxic to soil invertebrates at Site 15 is greater than 1,121,520 µg/kg, based on a site-specific toxicity test. This was the maximum total PAH concentration tested in the study.

Risk to invertebrates from lead in soil was evident at the highest concentration tested (5,470 mg/kg). There was no indication of lead-related impacts at concentrations less than 1,120 mg/kg. There is uncertainty regarding lead toxicity to invertebrates at soil concentrations between these two values. The soil target level for lead to be protective of insectivorous birds is 1,127 mg/kg (site-wide average lead concentration). The characterization of lead-related risk to insectivorous mammals is complicated by uncertainty regarding the most appropriate soil-to-invertebrate bioaccumulation factor (BAF). Based on the regression-derived BAF from 12 invertebrate and corresponding soil samples, the soil ecological target level for lead that is protective of insectivorous mammals is 2,512 mg/kg. Based on the median BAF, the soil ecological target level for lead that is protective of insectivorous mammals is 4,716 mg/kg. Both of the insectivorous mammal screening values apply to 2-acre average lead concentrations.

2.2.3 Determining the Extent of Remediation Required to Achieve Cleanup Goals

A statistically based approach was used to determine the concentrations above which soil must be removed to achieve UCLs or average concentrations less than or equal to site-specific SCTLs for a defined exposure unit, the area to which a receptor is assumed to be exposed. For human and avian receptors, the entire site is defined as the exposure unit. For mammalian receptors, the exposure unit is a 2-acre unit, which represents the home range of the shrew.

For Site 15, there is a need to achieve exposure concentrations less than site-specific SCTLs concurrently for BaPEqs and lead. The cleanup goals for all receptors are summarized below.

Summary of Cleanup Goals			
COC	**Receptor**	**Recreational and Ecological**	**Residential and Ecological(1)**
Lead	Human (Site-wide)	3,281 mg/kg	400 mg/kg
	Acute Toxicity Human (Site-wide)	6,500 mg/kg	6,500 mg/kg
	Avian (Site-wide)	1,127 mg/kg(2)	1,149 mg/kg
	Mammalian (2-Acre)	2,512 mg/kg(2)	2,512 mg/kg
BaPEqs	Human (Site-wide)	2,250 µg/kg	100 µg/kg
Arsenic	Human (Site-wide)	36 mg/kg	2.1 mg/kg
Antimony	Human (Site-wide)	1,440 mg/kg	27 mg/kg
TRPH	Human (Site-wide)	8,900 mg/kg	400 mg/kg

1 These values apply to 0.25-acre exposure units.
2 The minimum remedial goal for these receptors based on the uncertainty of the variables.

The pre-remediation conditions identifying maximum concentrations, UCLs, and average concentrations for the identified COCs are summarized below.

Pre-Remediation Conditions			
COC	**Maximum Concentration**	**UCL**	**Average Concentration**
Lead	41,400 mg/kg	Not applicable	990 mg/kg
BaPEqs	956,000 µg/kg	13,000 µg/kg	9,400 µg/kg
Arsenic	451 mg/kg	29 mg/kg	17 mg/kg
Antimony	2,440 mg/kg	164 mg/kg	78 mg/kg
TRPH	2,380 mg/kg	273 mg/kg	96 mg/kg

The site-wide average lead concentration of 990 mg/kg is already less than its minimum site-wide goal of 1,127 mg/kg, the concentration protective of the avian receptor. Therefore, site-wide remediation for lead would not be required to be protective of avian receptors. However, to address acute toxicity to children, it was agreed that soil with lead concentrations greater than 6,500 mg/kg would be removed. Removal of soil with lead concentrations greater than 6,500 mg/kg results in a site-wide post-remedial concentration of 577 mg/kg, which is protective of human receptors under a low-intensity recreational reuse scenario and site-wide ecological receptors.

To address the mammalian ecological receptors represented by the least shrew, which has an average home range of 2 acres, Site 15 was divided into a grid of 2-acre exposure units. A statistical analysis was performed for each 2-acre exposure unit assuming removal of all soil with lead concentrations greater than 6,500 mg/kg. The average lead concentration in two 2-acre exposure units exceeded the remedial goal (2,512 mg/kg) for the least shrew. Therefore, additional removal of soil in these two 2-acre units with lead concentrations greater than 4,000 mg/kg would be required to achieve the mammalian ecological remedial goal.

In accordance with Chapter 62-780, F.A.C., soil with concentrations greater than three times the site-specific SCTLs would be removed based on acute toxicity. Based on the existing conditions and site-specific SCTLs, remediation or treatment would not be needed to address antimony contamination. Removal of soil with BaPEq and arsenic concentrations greater than three times their site-specific SCTLs is more than sufficient to result in site-wide UCLs less than site-specific SCTLs. To be protective of human and ecological receptors, the existing on-site TRPH concentrations indicate that remediation or treatment would not be needed. However, there are locations where TRPH concentrations exceed the leachability criterion of 340 mg/kg, the most restrictive FDEP SCTL for TRPH. Because the volume of soil associated with the exceedances of the leachability criterion was relatively insignificant, it was agreed that the pickup value for TRPH would be based on the leachability criterion.

The corresponding pickup values that comply with regulatory requirements and would obtain site-wide cleanup goals that allow for recreational use of the site are presented below.

Recreational Pickup Values			
COC	**Maximum Detected Concentration**	**Recreational Use Cleanup Goal**	**Recreation Use Pickup Value**
BaPEqs	956,000 µg/kg	2,250 µg/kg	6,750 µg/kg(1)
Arsenic	451 mg/kg	36 mg/kg	108 mg/kg(1)
Lead	41,400 mg/kg	3,281 mg/kg (chronic)	6,500 mg/kg(2)
TRPH	2,380 mg/kg	8,900 mg/kg	340 mg/kg(3)

1 Three times the site-specific recreational SCTL as per Chapter 62-780, F.A.C. for acute toxicity.
2 Site-specific acute toxicity SCTL.
3 Chapter 62-777, F.A.C. leachability SCTL.

The post-remedial conditions that exist after applying the recreational pickup values are presented below.

Post-Remediation Conditions		
COC	**Maximum Concentration**	**Site-Wide Concentration(1)**
Lead (site wide)	6,500 mg/kg	577(2) mg/kg
BaPEqs	6,750 µg/kg	695 µg/kg
Arsenic	34.5 mg/kg	7.3 mg/kg
Antimony	221 mg/kg	30.8 mg/kg
TRPH	114 mg/kg	39.4 mg/kg

1 Represented by the 95-percent UCL, except as noted.
2 Average concentration.

For lead, it is necessary to achieve a site-wide concentration of 1,127 mg/kg to protect the most sensitive receptor, the mockingbird, and to achieve 2-acre concentrations less than 2,512 mg/kg to protect the shrew. To be protective of an acute lead exposure, it was agreed that the maximum lead concentration remaining on site would be 6,500 mg/kg. Removal of soil with lead concentrations greater than 6,500 mg/kg results in attainment of the site-wide SCTL. Additional removal of soil with lead concentrations greater than 4,000 mg/kg was required in two 2-acre units to attain the mammalian ecological SCTL.

For cPAHs, it is necessary to achieve a site-wide BaPEq concentration of 2,250 µg/kg to protect the low-intensity recreational receptor. For arsenic, it is necessary to achieve a site-wide concentration of 36 mg/kg. Removal or treatment of soils with concentrations greater than three times their site-specific SCTLs results in post-remediation site-wide UCL concentrations less than these site-wide SCTLs.

2.3 GENERAL RESPONSE ACTIONS AND ACTION-SPECIFIC ARARS

GRAs are broadly defined remedial approaches that may be used (by themselves or in combination with one or more of the others) to attain RAOs. Action-specific ARARs and TBC criteria are those regulations, criteria, and guidances that must be complied with or taken into consideration during remedial activities on site.

2.3.1 General Response Actions

GRAs describe categories of actions that could be implemented to satisfy or address a component of an RAO for the site. Remedial action alternatives are then composed using GRAs individually or in combination to meet the RAOs. The remedial action alternatives, composed of GRAs, will be capable of achieving the RAOs for contaminated soil at Site 15.

The following GRAs were considered for surface soil:

- No Action
- Limited Action: Land Use Controls (LUCs)
- Containment
- Removal
- In-Situ Treatment
- Ex-Situ Treatment
- Disposal

2.3.2 Action-Specific ARARs

Action-specific ARARs and TBC criteria are technology- or activity-based regulatory requirements or guidance that would control or restrict remedial action. Tables 2-5 and 2-6 present a list of federal and State of Florida action-specific ARARs and TBCs for this FS.

2.4 ESTIMATED VOLUMES OF CONTAMINATED SOIL

Preliminary surface areas and volumes of soil that would need to be remediated to allow for the planned future low-intensity recreational use of Site 15 were estimated. Based on the Site 15 soil database provided in Appendix E and on the findings of the Geostatistical Assessment Report provided in Appendix D (Newfields, 2004), it is estimated that a total volume of approximately 11,850 yd^3 of contaminated soil from 22 areas with a combined surface of approximately 7.2 acres contains concentrations of COCs

greater than recreational pickup values. These areas are illustrated on Figure 2-1 and summarized as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 6,750 µg/kg – nine areas totaling 235,900 square feet (ft^2), or 5.42 acres, from 0 to 1 foot bgs.

- Lead-contaminated soil with concentrations greater than 6,500 mg/kg – nine areas totaling 75,300 ft^2, or 1.73 acres, from 0 to1 foot bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg – one 500 ft^2 area (0.01 acre) 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, or 0.04 acre, from ground surface to the water table (assume to be 2 feet bgs). At the time of sample collection in these arsenic-contaminated areas, the water table was within 1 foot of the ground surface, limiting unsaturated soil sample collection to this depth. Because the water table has decreased, overexcavation to a depth of 2 feet bgs will be conducted in these areas.

Preliminary surface areas and volumes of soil that would need to be remediated to allow for potential future unrestricted use of Site 15 were also estimated. Based on a comparison of the Site 15 soil database to the pickup values for hypothetical future residential use, it was estimated that a total volume of approximately 118,000 yd^3 of contaminated soil over a surface area of approximately 73 acres of would need to be remediated, as illustrated on Figure 2-2 and summarized as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 100 µg/kg – 1,772,800 ft^2, or 40.7 acres, from 0 to 1 foot bgs.

- Lead-contaminated soil with concentrations greater than 400 mg/kg – 632,460 ft^2, or 14.5 acres, from 0 to 1 foot bgs.

- PAH- and lead-contaminated soil with BaPEq concentrations greater than 100 µg/kg and lead concentrations greater than 400 mg/kg – 789,650 ft^2, or 18.1 acres, from 0 to 1 foot bgs.

- Arsenic-contaminated soil with concentrations greater than 2.04 mg/kg – included within the other areas from 0 to 2 feet bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg – included within the PAH-contaminated area noted above from a depth of 1 to 2 feet bgs.

The Geostatistical Assessment Report (Appendix D) stated that significant soil sampling was conducted at Site 15 and that the delineation of lead and BaPEqs was accurate and complete, and therefore confirmation sampling is not warranted. Additional discussions regarding this topic were held (as identified in BCT Meeting Minute No. 2208), and it was agreed by the BCT (Decision No. 687) that the areas requiring remediation for BaPEqs only would not require confirmation sampling; however, the areas being remediated for lead would require limited confirmation sampling. Six areas have been identified as exceeding the lead pickup level for recreational use and therefore would require confirmation sampling. A confirmation sampling plan will be developed as part of the remedial design. The confirmation sampling will be conducted prior to the implementation of the remedial action.

TABLE 2-1

FEDERAL CHEMICAL-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Cancer Slope Factors (CSFs)	NA	To Be Considered	CSFs are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	CSFs would be considered for development of human health protection PRGs for soil at this site.
Reference Doses (RFDs)	NA	To Be Considered	RFDs are guidance values used to evaluate the potential non-carcinogenic hazard caused by exposure to contaminants.	RFDs would be considered for development of human health protection PRGs for soil at this site.

NA – Not applicable.

TABLE 2-2

STATE CHEMICAL-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Contaminant Cleanup Target Levels Rule	Chapter 62-777, Florida Administrative Code (F.A.C.)	Relevant and Appropriate	This document provides guidance for soil, groundwater, and surface water cleanup levels that can be developed on a site-by-site basis.	These guidelines would be used in determining cleanup goals.
Approach to the Assessment of Sediment Quality in Florida Coastal Waters, 1995		To Be Considered	This document recommends effects-based sediment quality assessments such as identifying nonpoint source management, designing wetlands restoration projects, and monitoring trends in environmental contamination.	These guidelines would be used when evaluating the potential biological harm posed by contaminated sediments in Florida coastal waters.

TABLE 2-3

FEDERAL LOCATION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Endangered Species Act Regulations	50 Code of Federal Regulations(CFR) Parts 81, 225, 402	Potentially Applicable	This act requires federal agencies to take action to avoid jeopardizing the continued existence of federally listed endangered or threatened species.	If a site investigation or remediation could potentially affect an endangered species or their habitat, these regulations would apply.
Historic Sites Act Regulations	36 CFR Part 62	Potentially Applicable	Requires federal agencies to consider to existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	The existence of Natural Landmarks would be identified prior to remedial activities on site including remedial investigations
Clean Water Act (CWA) Regulations, Guidelines for Specification of Disposal Sites for Dredged or Filled Materials	40 CFR Part 230	Potentially Applicable	These regulations apply to all existing, proposed, or potential disposal sites for discharges of dredged or fill material into U.S. waters, including wetlands.	If a remediation involves the discharge of dredged or fill material into a wetland, it must be demonstrated that such a discharge will not have an unacceptable effect on the wetland.
Fish and Wildlife Coordination Act Regulations	33 CFR Subsection 320.3	Potentially Applicable	Requires that the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and related state agencies be consulted prior to structural modification of any body of water, including wetlands. If modifications must be conducted, the regulation requires that adequate protection be provided for fish and wildlife resources.	If a remedial alternative involves the alteration of a stream or wetland, these agencies would be consulted.

TABLE 2-3

FEDERAL LOCATION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
National Environmental Policy Act (NEPA) Regulations, Wetlands, Floodplains, etc.	40 CFR Subsection 6.302 [a]	Potentially Applicable	These regulations contain the procedures for complying with Executive Order 11990 on wetlands protection. Appendix A states that no remedial alternative adversely affect a wetland if another practicable alternative is available. If no alternative is available, impacts from implementing the chosen alternative must be mitigated.	If remedial action affects a wetland, these regulations would apply. Approximately 7,000 square feet of wetlands would be affected under the recreational scenario, and all the wetland identified would be affected under the unrestricted reuse scenario.
National Environmental Policy Act (NEPA) Regulations, Floodplain Management, Executive Order 11988	40 CFR Part 6, Appendix A	Potentially Applicable	Appendix A describes the policy for carrying out the Executive Order regarding floodplains. If no practicable alternative exists to performing cleanup in a floodplain, potential harm must be mitigated and actions taken to preserve the beneficial value of the floodplain.	If removal actions take place in a floodplain, alternatives would be considered that would reduce the risk of flood loss and restore and preserve the floodplain.
Fish and Wildlife Conservation Act	40 CFR Section 6.302	Potentially Applicable	Requires action to be taken to protect fish and wildlife from projects affecting streams or rivers.	United States Fish and Wildlife Service (USFWS) officials would be consulted on how to minimize impacts of any remedial activities on any wildlife. The presence of gopher tortoises will be taken into account for possible relocation if remedial activities may adversely impact their habitat.

TABLE 2-4

STATE LOCATION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Delineation of the Landward Extent of Wetlands and Surface Waters	Chapter 62-340, Florida Administrative Code (F.A.C.)	Potentially Applicable	This rule's intent is to provide a unified statewide methodology for the delineation of the extent of wetlands and surface waters	To be used to determine the extent of wetlands.
Environmental Resource Permit Procedures	Chapter 62-343, F.A.C.	Potentially Applicable	This rule provides the procedural requirements for processing environmental resource permits and for obtaining formal determinations of the landward extent of wetlands and surface waters.	This rule will be followed if any discharge to surface is required.

TABLE 2-5

FEDERAL ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
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 261	Potentially Applicable	Defines the listed and characteristic hazardous wastes subject to RCRA. Appendix II contains the Toxicity Characteristic Leaching Procedure.	These regulations would apply when determining whether or not a solid waste is hazardous, either by being listed or by exhibiting a hazardous characteristic, as described in the regulations.
Clean Air Act (CAA) Regulations, National Ambient Air Quality Standards (NAAQSs)	40 CFR Part 50	Potentially Applicable	Establishes primary (health-based) and secondary (welfare-based) air quality standards for carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides emitted from a major source of air emissions. The NAAQS form the basis for all regulations promulgated under the CAA. However, the NAAQS themselves are non-enforceable and are not ARARs themselves.	Site remediation activities must comply with NAAQSs. The principal application of these standards is during remedial activities resulting in exposures through dust and vapors. In general, emissions from CERCLA activities are not expected to qualify as a major source, and are therefore, not expected to be applicable requirements. However, the requirements may be determined to be relevant and appropriate for non-major sources with significantly similar emissions.
RCRA Regulations, Land Disposal Restrictions (LDRs)	40 CFR Part 268	Potentially Applicable	This regulation prohibits the land disposal of untreated hazardous wastes and provides criteria for the treatment of hazardous waste prior to land disposal.	Remedial actions that involve excavating, treating, and redepositing hazardous soil would comply with LDRs. However, consolidation of contaminated soil within Site 15 for the purposes of reducing the size of the contaminated area would not constitute land disposal, per Area of Contamination policy letter (U.S. EPA, March 1996).

TABLE 2-5

FEDERAL ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Guidance on Demonstrating compliance With the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standard	EPA530-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 can be used to help determine requirements for compliance with the LDR alternative treatment standards that may apply to soil generated during site remediation.
Clean Water Act, National Pollution Discharge Elimination System (NPDES)	40 CFR Parts 122 through 125, and 131	Potentially Relevant and Appropriate	NPDES permits are required for any discharges to navigable waters. If remedial activities include such a discharge, the NPDES standards would be ARARs.	Any alternative which would discharge into any navigable water would require compliance with these regulations including treatment, if necessary.
Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR Part 61	Potentially Applicable	NESHAPs are a set of emissions standards for specific chemicals from specific production activities.	Emissions of hazardous air pollutants would be minimized by fugitive dust control and off gas treatment from a thermal desorption facility remedy.
Air/Superfund National Technical Guidance	U.S. EPA Guidance: EPA/450/1-89/001-EPA/450/1-89/004	To Be Considered	This guidance describes methodologies for predicting risks due to air release at a Superfund site.	These guidance documents would be considered when risks due to air releases from fugitive dust and thermal desorption are being evaluated.

TABLE 2-5

FEDERAL ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
CAA Regulations, New Source Performance Standards (NSPSs)	40 CFR Part 60	Potentially Relevant and Appropriate	This rule establishes NSPSs for specified sources that are similar to a source that has established NSPSs (such as air stripping technologies). The NSPSs limit the emissions of a number of different pollutants, including the six criteria pollutants list (for which NAAQSs are established) as well fluorides, sulfuric acid mist, and total reduced sulfur including hydrogen sulfide (H_2S).	This rule may be a relevant and appropriate requirement for a new source that is similar to a source that has established NSPSs (such as thermal desorption). If it is determined that the remedy would create potential air impacts, the response action or the equipment for the response action may qualify as a new source; therefore, these requirements would be met.
CWA Regulations, National Pretreatment Standards	40 CFR Part 403	Potentially Relevant and Appropriate	Sets pretreatment standards through the National Categorical Standards of the General Pretreatment Regulations for the introduction of pollutants from non-domestic sources into Publicly Owned Treatment Works (POTWs) in order to control pollutants that pass through, cause interference, or are otherwise incompatible with treatment processes at a POTW.	If wastewater from an alternative is discharged to a POTW or the FOTW, the discharge must meet local limits imposed by the POTW. A discharge from a CERCLA site must meet the POTW's pretreatment standards in the effluent of the POTW. Discharge to a POTW is considered an off-site activity and is, therefore subject to both the substantive requirements of this rule.
RCRA Regulations, General Facility Standards	40 CFR Subpart B, 264.10-264.18	Potentially Relevant and Appropriate	Sets the general facility requirements including general waste analysis, security measures, inspections, and training requirements. Section 264.18 establishes that a facility located in a 100-year floodplain must be designed, constructed, and maintained to prevent washout of any hazardous wastes by a 100-year flood.	If the remedial action involves construction of an on-site treatment facility, the substantive requirements of this rule would be applicable requirements. A permitted treatment facility must be selected for off-site treatment.

TABLE 2-5

FEDERAL ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
RCRA Regulations, Miscellaneous Units	40 CFR Part 264, Subpart X	Potentially Relevant and Appropriate	These standards are applicable to miscellaneous units not previously defined under existing RCRA regulations. Subpart X outlines performance requirements that miscellaneous units be designed, constructed, operated, and maintained to prevent releases to the subsurface, groundwater, and wetland that may have adverse effects on human health and the environment.	The design of proposed treatment alternatives, not specifically regulated under other subparts of RCRA, must prevent the release of hazardous constituents and future impacts on the environment. This subpart would apply to on-site construction of any treatment facility that is not previously defined under the RCRA regulation.
RCRA Regulations, Standards for Owners and Operators of Hazardous Waste TSDFs.	40 CFR Part 264	Potentially Relevant and Appropriate	Establishes minimum national standards defining the acceptable management of hazardous wastes for owners and operators of facilities that treat, store, or dispose of hazardous wastes.	If remedial actions involving management of RCRA wastes at an off-site TSDF or if RCRA wastes are managed on-site, the requirements of this rule would be followed.
RCRA Regulations, Use and Management of Containers	40 CFR Part 264, Subpart I	Potentially Relevant and Appropriate	Sets standards for the storage of containers of hazardous waste.	This requirement would apply if a remedial alternative involves the storage of a hazardous waste (i.e. contaminated soil) in containers, prior to treatment or disposal.
Migratory Bird Treaty Act	16 USC 703-711	Potentially Applicable	Protects migratory birds and their nests.	Proposed action shall not kill migratory birds or destroy their nests and eggs.

References:
U.S. EPA, March 1996. Policy letter "Area of Contamination" from Michael Shapiro, Director, Office of Solid Waste, EPA Washing ton, D.C., to Norman H. Nosenchuck, Director of Division of Solid & Hazardous Materials, New York State Department of Environmental Conservation.

TABLE 2-6

STATE ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Florida Hazardous Waste Rules – October 1993	FAC Chapter 62-730	Potentially Applicable	Adopts by reference sections of the federal hazardous waste regulations and establishes minor additions to these regulations concerning the generation, storage, treatment, transportation and disposal of hazardous wastes.	These regulations would apply if waste onsite was deemed hazardous and needed to be stored, transported, or disposed of properly.
Florida Wetland Application Regulations – November 1989	FAC Chapter 62-611	Potentially Applicable	Sets requirements for discharge of domestic wastewater to wetland. This rule mainly addresses the discharge of domestic wastewater to wetlands. Discharge limits are established for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), nitrogen, and phosphorus.	This rule would be considered for remedial alternatives that would result in discharges to wetlands where these limits may be approached.
Florida Dredge and Fill Activities	FAC Chapter 62-312	Potentially Applicable	This rule establishes requirements for dredging, filling, excavating, or placing material in or over the waters of the state, including wetlands.	The requirements of these rules would be considered when developing and implementing remedial activities that involve waters of the state.
Florida Solid Waste Management Facilities	FAC Chapter 62-701	Potentially Applicable	Sets the facility standards for construction, operation, and closure of SWMUs.	These requirements would apply if on-site waste was deemed a nonhazardous solid waste and needed to be stored, transported, or disposed of properly.

TABLE 2-6

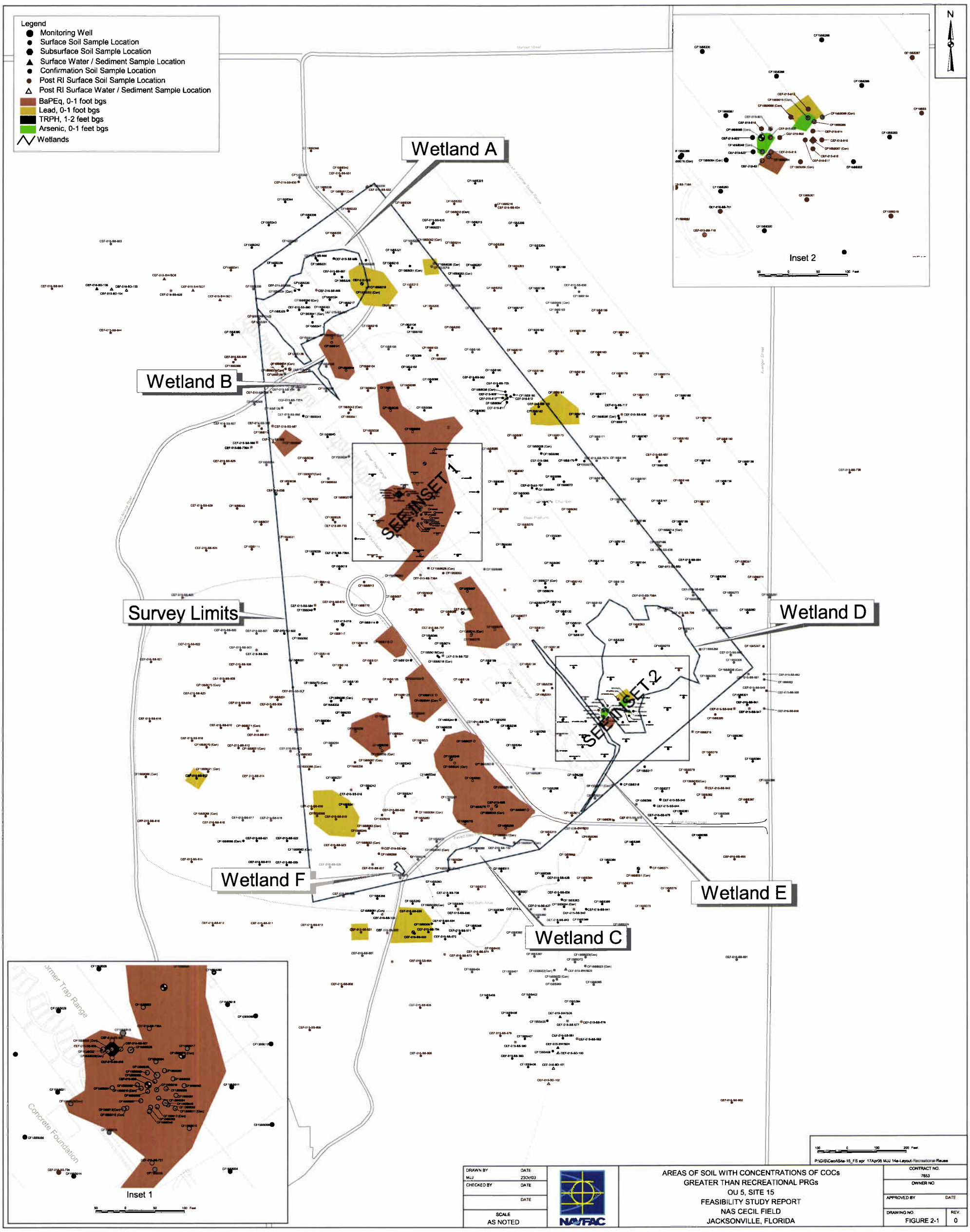
STATE ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Florida Air Pollution Rules – October 1992	Chapter 62-2, Florida Administrative Code (F.A.C.)	Potentially Relevant and Appropriate	Establishes permitting requirements for owners or operators of any source that emits any air pollutant. This rule also establishes ambient air quality standards for sulfur dioxide, carbon monoxide, lead, and ozone.	Although this rule is directly applicable to industrial polluters, these requirements are relevant and appropriate for a remedial action that could result in release of regulated contaminants to the atmosphere, such as may occur during excavation.
Florida Regulation of Stormwater Discharge – May 1993	Chapter 62-25, F.A.C.	Potentially Relevant and Appropriate	Establishes requirements for discharges of untreated stormwater to ensure protection of the surface water of the state.	Remedial actions would consider the impact of the discharge of untreated stormwater from the site.
Florida Ambient Air Quality Standards – December 1994	Chapter 62-272, F.A.C.	Potentially Applicable	Establishes ambient air quality standards necessary to protect human health and public welfare. It also establishes maximum allowable increases in ambient concentrations for subject pollutants to prevent significant deterioration of air quality in areas where ambient air quality standards are being met. Approved air quality monitoring methods are also specified.	These ambient air quality standards would be met for remedial actions involving the possible release exposure of contaminants to the atmosphere.

TABLE 2-6

STATE ACTION-SPECIFIC ARARs
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Requirement	Citation	Status	Synopsis	Evaluation/Action to be Taken
Air Pollution Episodes – September 1994	Chapter 62-273, F.A.C.	Potentially Relevant and Appropriate	This rule classifies an air episode as an air alert, warning or emergency and establishes criteria for determining the level of the air episode. It also establishes response requirements for each level.	These regulations would be adhered to if remedial actions involve air emissions.
Florida Rules on Hazardous Waste Warning Signs – July 1991	Chapter 62-736, F.A.C.	Applicable	Requires warning signs at NPL and FDEP identified hazardous waste sites to inform the public of the presence of potentially harmful conditions.	This requirement will be met.


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, 0-1 feet bgs
Wetlands
N
Wetland A
Wetland B
Wetland C
Wetland D
Wetland E
Wetland F
Survey Limits
SEE INSET 1
SEE INSET 2
Inset 1
Inset 2
Former Trap Range
Concrete Foundation
Avenger Street
Airport Access Road
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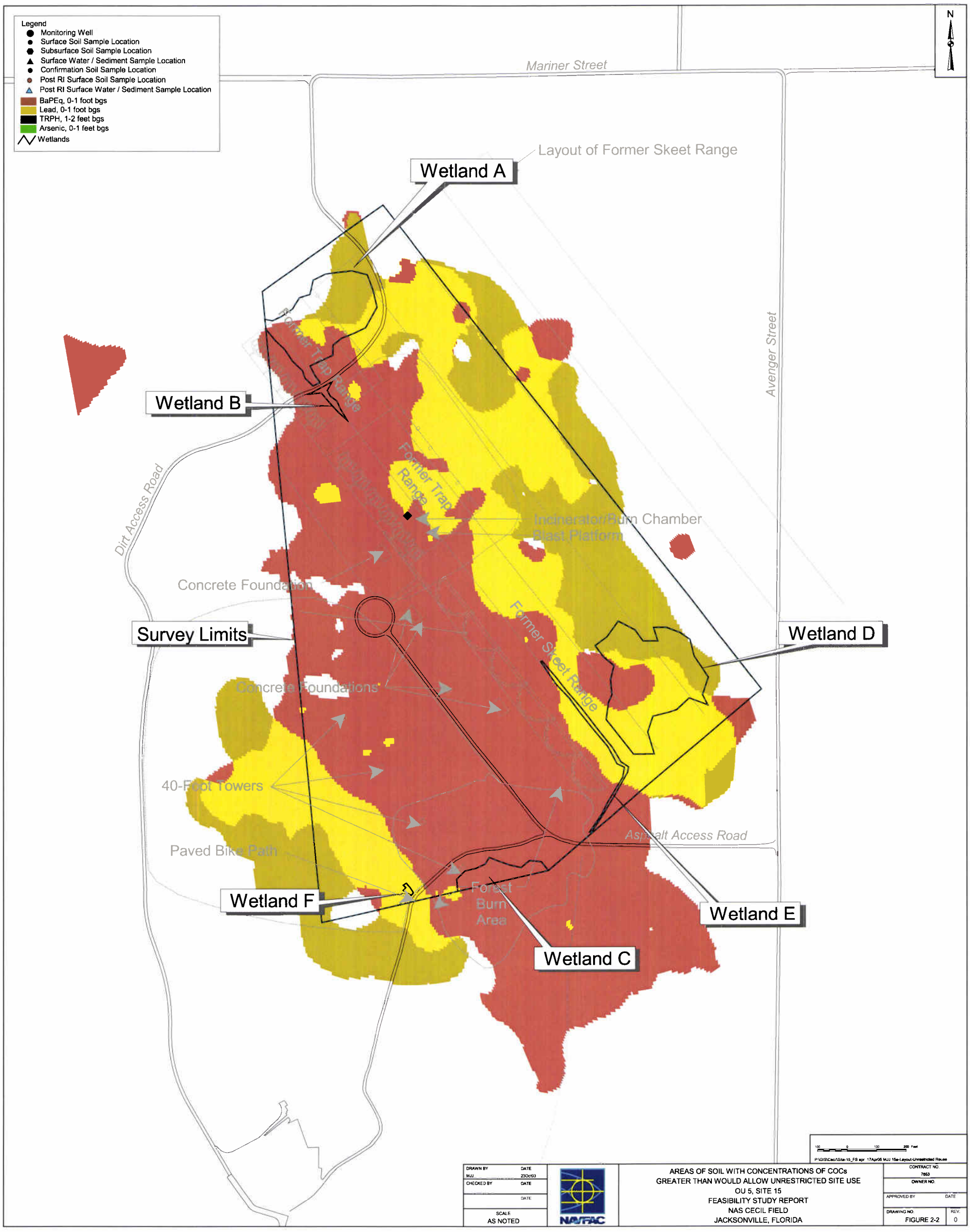
DRAWN BY MJJ DATE 23Oct03
CHECKED BY DATE
DATE
SCALE AS NOTED
NAVFAC
AREAS OF SOIL WITH CONCENTRATIONS OF COCs
GREATER THAN RECREATIONAL PRGs
OU 5, SITE 15
FEASIBILITY STUDY REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 7653
OWNER NO.
APPROVED BY DATE
DRAWING NO. FIGURE 2-1
REV. 0


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, 0-1 feet bgs
Wetlands
N
Mariner Street
Layout of Former Skeet Range
Wetland A
Wetland B
Wetland C
Wetland D
Wetland E
Wetland F
Avenger Street
Dirt Access Road
Former Trap Range
Former Trap Range
Incinerator/Burn Chamber
Blast Platform
Concrete Foundation
Survey Limits
Former Skeet Range
Concrete Foundations
40-Foot Towers
Asphalt Access Road
Paved Bike Path
Forest Burn Area
100 0 100 200 Feet
P:\GIS\Cecl\Site-15_FS apr 17Apr06 MJJ 15a-Layout-Unrestricted Reuse
DRAWN BY MJJ
DATE 23Oct03
CHECKED BY
DATE
DATE
SCALE AS NOTED
NAVFAC
AREAS OF SOIL WITH CONCENTRATIONS OF COCs
GREATER THAN WOULD ALLOW UNRESTRICTED SITE USE
OU 5, SITE 15
FEASIBILITY STUDY REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 7653
OWNER NO.
APPROVED BY
DATE
DRAWING NO. FIGURE 2-2
REV. 0

3.0 SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

This section identifies, screens, and evaluates the potential technologies and process options that may be applicable to develop the remedial alternatives for OU 5, Site 15 at NAS Cecil Field. The primary objective of this phase of the FS is to develop an appropriate range of remedial technologies and process options that will be used for developing the remedial alternatives.

The basis for technology identification and screening began in Section 2.0 with a series of discussions that included the following:

- Development of RAOs
- Identification of ARARs
- Identification of COCs
- Development of cleanup goals
- Identification of GRAs
- Identification of volumes and areas of medium of concern

Technology screening evaluation is performed in this section with the completion of the following analytical steps:

- Identification and preliminary screening of remedial technologies and process options.
- Detailed screening of remedial technologies and process options that pass the preliminary screening step.
- Evaluation and selection of representative process options.

In this section, a variety of technologies and process options are identified under each GRA (discussed in Section 2.3.1) and screened. The selection of technologies and process options for initial screening is based on the Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA (U.S. EPA, 1988). The screening is first conducted at a preliminary level to focus on relevant technologies and process options, then the screening is conducted at a more detailed level based on certain evaluation criteria. Finally, process options are selected to represent the technologies that have passed the detailed evaluation and screening.

The evaluation criteria for detailed screening of technologies and process options that have been retained after the preliminary screening are effectiveness, implementability, and cost. The following are descriptions of these evaluation criteria:

- Effectiveness
  - Protection of human health and environment; reduction in toxicity, mobility, or volume; and permanence of the solution.
  - Ability of the technology to address the estimated areas or volumes of contaminated medium.
  - Ability of the technology to meet the cleanup goals identified in the RAOs.
  - Technical reliability (innovative versus proven) with respect to contaminants and site conditions.

- Implementability
  - Overall technical feasibility at the site.
  - Availability of vendors, mobile units, storage and disposal services, etc.
  - Administrative feasibility.
  - Special long-term operation and maintenance (O&M) requirements.

- Cost (Qualitative)
  - Capital cost.
  - O&M costs.

Technologies and process options identified for the remediation of soil at Site 15 are discussed in the following sections.

3.1 PRELIMINARY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

This section identifies and screens technologies and process options for soil at a preliminary stage based on implementation with respect to site conditions and COPCs. Table 3-1 summarizes the preliminary screening of technologies and process options applicable to soil. This table presents the GRAs, identifies the technologies and process options, and provides a brief description of each process option followed by screening comments. The technologies and process options that passed the initial screening step were retained for detailed screening in Section 3.2 and are summarized in Table 3-2.

3.2 DETAILED SCREENING OF TREATMENT TECHNOLOGIES AND PROCESS OPTIONS

This section identifies and develops the representative process options, through a detailed screening procedure, that will be used in the formulation of remedial alternatives to accomplish the RAOs and meet the cleanup goals identified in Section 2.

3.2.1 No Action

No Action consists of maintaining status quo at the site. As required under CERCLA regulations, the No Action alternative is carried through the FS to provide a baseline for comparison of alternatives and their effectiveness in mitigating risks posed by site contaminants.

Effectiveness

No action would not be effective in meeting the soil RAOs. No action would not actively reduce the toxicity, mobility, or volume of contaminants in the soil. There would be no reduction in risk through exposure control or treatment. Lead contamination would remain and, although the PAH contamination may degrade through natural processes over time, this would not be verified.

Implementability

There would be no implementability concerns because no action would be implemented.

Cost

There would be no costs associated with the No Action alternative.

Conclusion

No action is retained because of NCP requirements, although it would not be effective.

3.2.2 Limited Action

This GRA consists of LUCs to limit or restrict site use.

3.2.2.1 Institutional Controls

LUCs would be developed to prevent the site from being used in the future for any purposes other than as a low-intensity recreational area. Physical restrictions to the site may include signage, fencing, physical barriers, and site security.

LUC performance objectives and restrictions for Site 15 would be as follows:

- Prohibit residential, industrial, commercial, agricultural (specifically growing crops for human consumption), 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, athletic fields, etc. Prohibited medium-intensity recreational activities include, but are not limited to, picnic grounds, camping, etc. Allowable low-intensity recreational activities include hiking, biking, horseback riding, hunting, etc.

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

- 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.

Annual inspections of the site would be conducted to confirm compliance with LUC objectives, and an annual compliance certificate would be prepared and provided to U.S. EPA and FDEP. Prior to any property conveyance, U.S. EPA and FDEP would be notified.

The LUCs would be implemented through a LUC Remedial Design (RD) that would be prepared as a component of the overall RD. In addition to the U.S. EPA and FDEP, copies of the LUC RD would be sent to the City of Jacksonville Parks and Recreation Department, City of Jacksonville Environmental Resource Management Department, City of Jacksonville Planning and Development Department, City of Jacksonville Development Management Group, Jacksonville Electric Authority, and St. Johns River Water Management District. The LUCs would be maintained for as long as they are required to prevent unacceptable exposure to contaminated soil and/or to preserve the integrity of the selected remedy.

Effectiveness

LUCs would not reduce the toxicity, mobility, or volume of COCs in soil. Lead contamination would remain and PAH contamination may degrade through natural processes over time. Prohibiting future residential development of the site would effectively prevent the occurrence of unacceptable risks to human receptors from direct exposure to contaminated soil. However, LUCs would not protect ecological receptors.

Implementability

LUCs would be readily implementable. The implementability of these controls would be more of a concern if the site is transferred to private owners. Provisions would be incorporated in property transfer

documents to insure the continued implementation of institutional controls. Resources are readily available for the preparation of a LUC RD.

Cost

Costs of LUCs would be low.

Conclusion

LUCs are retained in combination with other process options for the development of remedial alternatives.

3.2.3 Containment

The technology considered under this GRA is soil cover.

3.2.3.1 Soil Cover

A soil cover would prevent human receptor contact with Site 15 surface soil and minimize migration and transport of COCs due to erosion. The soil cover would also prevent exposure of ecological receptors to COCs in surface soil. Due to the dense tree and plant growth at Site 15, clearing and grubbing of the area would be required to establish an appropriate cover.

Effectiveness

A soil cover would be effective in preventing potential receptors from direct contact with the contaminated soil. A soil cover would not reduce the toxicity or volume of contaminants in the soil. Lead contamination would remain and PAH contamination may degrade through natural processes over time. Long-term maintenance and monitoring would ensure that the cover remains effective in minimizing the exposure of receptors to COCs. Any exposure to on-site workers during cover installation or monitoring could be easily controlled by complying with the site-specific health and safety plan.

Implementability

Installation of a soil cover at Site 15 would be implementable. Materials and services required to implement this technology are readily available. Clearing of the area to remove trees and vegetation would be required to construct a cover. Removal of the pine needle layer (i.e., duff) would not be required for construction of the soil cover.

This technology is well proven and established in the construction/remediation industry. During installation of the cover, site-specific health and safety procedures and OSHA regulations would have to be complied with to ensure that the exposure of the workers to COCs is minimized. Following installation of the cover, impacted wetlands would have to be restored.

Cost

Capital costs for a soil cover would be low. O&M costs would also be low.

Conclusion

A soil cover is retained to be used in combination with other process options for the development of soil remedial alternatives.

3.2.4 Removal

The technology considered under this GRA is excavation.

3.2.4.1 Excavation

A variety of equipment such as front-end loaders, backhoes, and grade-alls could be used to perform the excavation. The type of equipment selected must take into consideration several factors such as the type of material to be removed, the load-bearing capacity of the ground surrounding the removal area, the depth and areal extent of removal, the required rate of removal, and the elevation of the groundwater table. Excavation is the technology of choice for the removal of well-consolidated material such as soil from well-defined areas of ground with significant load-bearing capacity (i.e., greater than 1,500 pounds per ft^2).

The logistics of excavation must take into account the available space for operating the equipment, loading and unloading of the excavated material, location of the site, etc. After excavation is completed, the location would be filled and graded with clean fill material or treated soils.

Effectiveness

Excavation is a well-proven and effective method of removing contaminated material from a site. Properly designed excavation would remove soil with concentrations of COCs greater than the pickup values, and the remaining soil would not pose an unacceptable risk to human health or the environment.

Implementability

Excavation of contaminated soil at Site 15 would be implementable. Excavation equipment is readily available from multiple vendors. This technology is well proven and established in the construction/remediation industry. During excavation, site-specific health and safety procedures and OSHA regulations would have to be complied with to ensure that the exposure of workers to COCs is minimized.

Because the excavation depth at this site would be limited to a depth of 1 to 2 feet bgs, no shoring would be necessary. Existing structures, tanks, concrete pads, etc. located at the site would have to be removed prior to excavation. Because they are no longer in use, there would be no need to replace them at the completion of the excavation. Following excavation, impacted wetlands would have to be restored.

Cost

Cost of excavation at OU 5, Site 15 on a unit volume basis would be low because of the shallow depth and presence of sandy soils.

Conclusion

Excavation is retained in combination with other process options for the development of remedial alternatives.

3.2.5 Ex-Situ Treatment

The technologies considered under this GRA include soil washing/chemical extraction, chemical fixation/solidification, size reduction, screening, and on-site thermal desorption.

3.2.5.1 Physical/Chemical

3.2.5.1.1 Soil Washing-Chemical Extraction

Soil washing uses physical processes such as high-pressure water, screening, attrition scrubbing, froth flotation, electromagnetic separation, mechanical separation, hydrogravimetric separation (including hydrocyclones, mineral jigs, and spiral classifiers), and multigravity separation. Such physical separation processes achieve waste minimization through a volume reduction process by separating out a size fraction of the soil containing little or no contamination (such as coarse-grained soils and large-sized material) from the more highly contaminated, finer-grained material such as clays and silts.

Chemical extraction uses water or other solvents to extract or desorb COCs from the soil and dissolve them into the liquid phase. Chemical extraction often requires preliminary treatment using physical separation to reduce the volume of material to be treated.

Effectiveness

The effectiveness of soil washing is highly waste specific and is typically well suited for the removal of SVOCs/PAHs and metals such as lead. A thorough physical and chemical characterization of the waste and treatability testing are essential to determine the most suitable and efficient means of separating the COCs from clean soil. When different classes of contaminants are present, such as metals and PAHs, a series of extraction operations using different solvents, pH adjustment. etc., may be required.

A combination of physical separation and various chemical extraction techniques might be used to remove the COCs from Site 15 soil. Nontoxic organic solvents may be used for the removal of PAHs, and acids may be used to remove arsenic and lead. The extraction process would yield clean soil that would require water rinsing to remove the residual extractant. By-products from the process would consist of spent solvent streams containing the wastes requiring further treatment/disposal and recovery/recycle of the extractants.

Implementability

Soil washing/chemical extraction could be implemented at Site 15. However, a full-scale soil washing/chemical extraction system would be very complex, consisting of physical separation operations and chemical extraction processes. Physical separation would consist of several operations depending on the type of debris, sizes, densities of materials, etc. A sieve analysis of the soil would be required for the design of the treatment system. Chemical extraction would require treatability studies to determine the specific type and composition of solvent to be used. Typically, waste streams produced from chemical extraction are more contaminated and greater in volume than waste streams from other processes. To treat the extracted liquid, an extensive wastewater treatment facility would be required to separate the reagents from the treated soils and then to treat the residuals. The wastewater facility would be required to have organic treatment and neutralization processes in addition to dewatering processes. Unless efficient recovery/recycling of the extractant is achievable, there would be significant implementability concerns for further treatment/disposal of the waste streams. Due to potentially high concentrations of lead, the substantive requirements of a RCRA hazardous waste (Subtitle C) treatment, storage, and disposal facility (TSDF) would have to be met by an on-site soil washing/chemical extraction system.

Cost

Capital and O&M costs for soil washing/chemical extraction would be moderate to high. Additional costs for disposal of residues could also be moderate to high.

Conclusion

Soil washing/chemical extraction is retained in combination with other process options for the development of soil remedial alternatives.

3.2.5.1.2 Chemical Fixation/Solidification/Stabilization

Chemical fixation/solidification and solidification/stabilization mixes chemical agents with contaminated soil to immobilize organic and inorganic contaminants. Contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (chemical fixation). Binding and hardening material ties up the free water in the soil matrix. Potential chemical agents include Portland cement, cement kiln dust (CKD) lime, thermoplastic binders (i.e., asphalt), sorbents such as granular activated carbon (GAC), clays, zeolites, and anhydrous sodium silicate, or Maectite® reagents. The top 1 to 2 feet of contaminated soil that does not meet TCLP regulatory limits and/or non-hazardous disposal requirements would be excavated and mixed then treated on site or off-site to enable disposal or reuse. In the case of asphalt emulsion-based encapsulation (Encapco Technologies, LLC), the treated soil is typically used as structural fill or road base material. The Encapco technology uses proprietary emulsions of asphalt or tall oil pitch that encapsulate soil particles and form an integral, stable product that is chemically and physically bonded. Upon curing, the product retains its adhesive, durability, and water-resistant properties and can be compacted to form structurally stable road base, or can be used as fill material, erosion control layer, etc. The chemical composition of the asphalt-based emulsion is very similar to the asphalt used for paving roads or parking lots and therefore the technology, although innovative, is gaining acceptance. The more common method of contaminant stabilization of soil involves mixing with Portland cement and other additives.

Effectiveness

Chemical fixation/solidification is typically quite effective for the immobilization of inorganic chemicals. Therefore, it would be effective for immobilizing the lead in Site 15 contaminated soil. However, traditional chemical fixation/stabilization processes have only limited effectiveness for the immobilization of SVOCs in contaminated soil. The major advantage to this process is that excavated soil at Site 15, which would typically be classified as hazardous as a result of TCLP lead concentrations, would be rendered non-hazardous because the chemical solidification/stabilization process would prevent lead from leaching from the solidified soil matrix. Therefore, disposal at a hazardous (RCRA Subtitle C) TSDF would not be

necessary. Although most traditional chemical fixation/solidification processes result in a significant increase in volume, more innovative processes such as the Maectite® chemical fixation process could reduce the total volume of soil through the formation of tight geochemically stable synthetic mineral crystals that form within the waste matrix, which also offers the added advantage of being able to immobilize organic contaminants in addition to inorganics (especially lead), as demonstrated by various TCLP test results.

Implementability

Chemical fixation/solidification is implementable. This technology is well demonstrated, can be applied to the most common site and waste types, requires conventional materials handling equipment, and is available competitively from a number of vendors. Most reagents and additives are also widely available and relatively inexpensive industrial commodities. The Encapco technology is an innovative technology based on a patent. The emulsion is prepared by a proprietary process at a sole-source facility. Although reuse of the treated Encapco product on site would be incompatible with revegetation, its use as an off-site road base material may be suitable, especially if the untreated soil was originally non-hazardous. However, the reuse of the treated Encapco product (even if the soil was originally non-hazardous) would require the identification of a suitable off-site user with adequate need for a large volume of road base, and negotiation of Best Management Practices (BMPs) for the use of the material according to Industrial Byproducts requirements of the FDEP (Personal Communication, Jim Levine, LFR Levine Fricke). If the soil was originally hazardous based on exceeding TCLP standards for lead, an additional requirement would be for the treated product to meet the lead Universal Treatment Standard (UTS) of 0.75 mg/L so that it could be used off site as a recycled product or alternative Land Disposal Restriction (LDR) treatment standards if being disposed in an appropriate landfill.

Treatability studies would be required to determine or verify such design parameters as pretreatment needs, volume of stabilized soil generated, types and amounts of stabilizing agents, water-to-stabilizer mixing ratios, mixing times, treatment processes involved, and anticipated effectiveness for COC stabilization in the soil matrix. Chemical fixation/solidification has been used at many sites including Superfund sites. The Encapco technology is relatively new to the remediation industry. It is claimed that the treatability studies can be easily performed by following mixing/curing instructions with a free sample of Encapco supplied emulsion (Personal Communication with Bill Jones, Encapco Technologies, LLC, October 10, 2003). Field-scale implementation does not require any specialized equipment that are atypical of the paving industry, i.e., excavator, vibrating screen, pug mill, etc. The emulsion is supplied in a tanker with a metering pump that will directly feed the emulsion into the pug mill. Solidification/stabilization with Portland cement and other additives is commonly used and easily implemented.

Cost

Costs for chemical fixation/solidification/stabilization processes vary widely according to materials or reagents used, their availability, project size, and chemical nature of contaminants.

Conclusion

Chemical fixation/stabilization at an off-site RCRA Subtitle C TSDF and on-site solidification/stabilization are retained for consideration for the treatment of lead-contaminated soil. Ex-situ treatment using the Encapco technology is eliminated because there are currently no end users identified. Also, on-site reuse of the treated product would be incompatible with revegetation of the site.

3.2.5.1.3 Size Reduction

Size reduction would consist of grinding or shredding contaminated debris such as tree stumps so that they would meet the particle size requirements for disposal or subsequent treatment processes. This size reduction would be accomplished by processing the oversized contaminated debris in specialized mechanical equipment such as grinders and shredders.

Effectiveness

Size reduction would not of itself be effective for contaminant removal. However, it would be effective for reducing particle size, which is often required as a pre-treatment to optimize the effectiveness of other treatment processes such as thermal desorption, chemical fixation/stabilization, or soil washing. This could be performed on site following excavation or at an off-site facility.

During operation, risk to site workers operating the size-reduction equipment could be adequately minimized through the use of dust suppression controls, wearing of appropriate personal protective equipment (PPE), and compliance with OSHA regulations and site-specific health and safety procedures.

Implementability

Size reduction would be readily implementable as a pretreatment step. The equipment and labor to operate this equipment would be readily available.

Cost

Capital and O&M costs for size reduction would be low.

Conclusion

Size reduction is retained in combination with other process options for the development of soil remedial alternatives.

3.2.5.1.4 Screening

Screening would consist of separating the excavated material based on particle size. This technology is typically used as a pre-treatment step. Rotary screens (trammels), tumbler screens, vibrating bar screens (grizzlies), etc are some of the configurations and types of mechanical devices available for dry screening applications.

Effectiveness

Screening would be effective for the separation of oversized material that is typically either much less contaminated or non-contaminated. Screening would also be effective and is often required as a pre-treatment to optimize the effectiveness of other treatment processes such as thermal desorption or soil washing. This would reduce the volume of material to be processed through the downstream treatment technology. Screening would best be performed on site, immediately following excavation.

During operation, risk to site workers operating the screening equipment could be adequately minimized through the use of dust suppression controls, wearing of appropriate PPE, and compliance with OSHA regulations and site-specific health and safety procedures.

Implementability

On-site screening would be readily implementable. The equipment and labor to operate this equipment would be readily available.

Cost

Capital and O&M costs for screening would be low.

Conclusion

On-site screening is retained in combination with other process options for the development of soil remedial alternatives.

3.2.5.2 Thermal Treatment

3.2.5.2.1 On-Site Thermal Desorption

Thermal desorption technology uses direct or indirect heating to thermally desorb or volatilize organic contaminants. The temperatures used are contaminant and matrix specific, with a range of approximately 200 to 1,200 degrees Fahrenheit (°F) [95 to 650 degrees Celsius (°C)]. Typically, wastes are processed through an externally fired pug mill or rotary drum system equipped with heat-transfer surfaces that are heated by circulating hot oil. An induced airflow conveys the desorbed organic chemicals through a secondary treatment system such as a baghouse/scrubber for particulates removal and a vapor-phase GAC adsorption unit, a catalytic oxidation unit, or an afterburner. It should be noted, however, that use of an afterburner for secondary treatment has typically resulted in the thermal desorption unit being considered as an incinerator by regulatory agencies. The off-gas is then discharged through a stack.

Effectiveness

The effectiveness of thermal desorption is highly contaminant and matrix specific. Therefore a full characterization of the waste to be treated would be required, and treatability testing would have to be performed to verify the level of effectiveness and to determine the optimum operating temperature and detention time. Thermal desorption effectiveness is very sensitive to particle size; therefore, pre-treatment with size separation and crushing/grinding/shredding would likely be required.

Thermal desorption would likely be very effective for the removal of PAHs from contaminated soil at Site 15, although operating temperatures may be close to the higher end of the typical range. Thermal desorption would require additional treatment of the volatilized contaminants that would be accomplished through treatment of off-gases by such processes as condensation, vapor-phase GAC adsorption, or catalytic oxidation. However, this technology would not be very effective for the removal of lead contamination, although some degree of lead sublimation might be achieved.

Implementability

On-site treatment of contaminated Site 15 soil with thermal desorption would be implementable. Qualified contractors are readily available to provide the necessary services. Pre-treatment of the excavated material for size separation and/or reduction would most likely be required and could be accomplished on site. Exhaust gas from the thermal desorption unit would have to be treated to remove the volatilized PAHs and fine, particulate dust, thereby generating potentially hazardous waste for off-site treatment/disposal. Treated soil would need to be amended prior to reuse at Site 15 so that revegetation could occur.

Cost

Costs of on-site thermal desorption at Site 15 would be high. The high water content of site soil would make the cost of thermal desorption even higher.

Conclusion

On-site thermal desorption is eliminated because its effectiveness would essentially be limited to the removal of PAHs, and the volumes of soil that also need treatment for lead are significant. Therefore, other technologies would be needed for treatment of soil contaminated with lead, thereby adding additional expense to the cost of thermal desorption, which is expected to be high.

3.2.6 Disposal

The technology considered under this GRA is off-site landfilling.

3.2.6.1 Off-Site Landfilling

Off-site landfilling would consist of transporting excavated soil for burial at an off-site TSDF. Excavated soil characterized as RCRA non-hazardous waste could be disposed in a RCRA Subtitle D solid waste landfill. Excavated soil characterized as RCRA hazardous waste would have to be disposed in a RCRA Subtitle C hazardous waste landfill.

Effectiveness

Off-site landfilling does not permanently or irreversibly reduce contaminant concentrations. However, although the CERCLA preference for treatment relegates landfilling to a less preferable option, this technology can be an effective disposal option for contaminated soil. Off-site landfills are only permitted to operate if they meet certain requirements of design and operation governing foundation, liner, leak detection, leachate collection and treatment, daily cover, post-closure inspections and monitoring, etc., which ensure the effectiveness of these facilities. The requirements of a RCRA hazardous (Subtitle C) landfill are typically more stringent than those of a RCRA non-hazardous (Subtitle D) solid waste landfill.

Implementability

Off-site landfilling would be easily implementable. Facilities and services are available. Disposal at a RCRA Subtitle D landfill may require certain pre-treatment, mainly the removal of free liquids but, because soil would only be excavated to a depth of 1 to 2 feet, no associated water should be present and this requirement should be easy to meet. In addition, a waste profile would have to be prepared indicating

contaminant concentrations and their leachability. Disposal of any soil containing lead with TCLP levels exceeding hazardous criteria would require pre-treatment to meet land disposal restrictions prior to landfilling. If treatment achieves UTS levels, disposal of the treated soil in a RCRA Subtitle D landfill (i.e., non-hazardous) would be permissible. If not, the treated soil would need to disposed in a RCRA Subtitle C (i.e., hazardous) landfill.

Cost

Cost of off-site landfilling would be low to moderate depending on volume.

Conclusion

Off-site landfilling is retained in combination with other process options for the development of remedial alternatives.

3.3 SELECTION OF REPRESENTATIVE PROCESS OPTIONS

The following GRAs, technologies, and process options, under the GRAs as noted, were retained for the development of soil remedial alternatives:

- No Action.
- Limited Action: LUCs.
- Containment: Soil Cover.
- Removal: Excavation.
- Ex-Situ Treatment: On-Site Screening, Size Reduction, On-Site Soil Washing/Chemical Extraction, On-Site Solidification/Stabilization, and Off-Site Chemical Fixation/Solidification.
- Disposal: On-Site Beneficial Reuse, Off-Site RCRA Non- Hazardous (Subtitle D) Landfill, and Off-Site RCRA Hazardous (Subtitle C) Landfill.

The next step is to select representative process options from each technology to assemble an adequate variety of alternatives and evaluate the alternatives in sufficient detail to aid in the final selection process. All process options listed in Table 3-2 were retained for the formulation of alternatives because the processes are sufficiently varied in their functions.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
No Action	None	Not Applicable	No activities conducted at the site to address contamination. Biodegradation of PAHs may occur through natural attenuation processes, which will not be verified.	Required by law. Retain for baseline comparison to other technologies.
Limited Action	Land Use Controls (LUCs)	Engineered Controls: Physical Barriers/ Security Guards	Fencing, markers, warning signs, and monitoring to restrict site access.	Eliminate. Prevents human exposure to contaminants, but does not reduce exposure to ecological receptors.
		Administrative Controls: Deed or Site Use Restrictions	Administrative action using property deeds or other land use prohibitions to restrict future site activities. Five-year reviews would be conducted to evaluate if additional remedial actions would be required.	Retain. May be used in conjunction with certain remedial alternatives to control future development and/or to maintain design integrity of containment systems.
	Monitoring	Sampling and Analysis	Sampling and analysis of groundwater, to evaluate if additional remedial actions would be warranted.	Addressed in Table 3-2.
Containment	Cover/Barrier	Soil Cover/Multi-Media Cap	Use of semipermeable or impermeable barriers to minimize direct exposure to contaminants and potential migration to groundwater.	Retain soil cover to reduce exposure by human and animal receptors to site contaminants. A multi-media cap is not required because potential migration of soil COCs to groundwater is not a concern at Site 15.
	Erosion control	Rip-Rap Cover/Vegetation	Use of gravel/cobbles or dense plant growth to minimize migration of wastes/contaminated soils.	Eliminate. Site 15 is relatively flat and erosion is not a concern. However, revegetation is retained to allow future site use as a green space.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
Removal	Excavation	Mechanical	Means for removal of contaminated soils by backhoe, bulldozer, loader, etc.	Retain for removal of contaminated soil and dry sediments.
In-Situ Treatment	Thermal	Vitrification	Use of high-temperature melting to fuse inorganic contaminants into a glass matrix within vadose zone or the use of moderate temperature heating to volatilize contaminants and remove them from the vadose zone.	Eliminate because of implementability concerns associated with the shallow groundwater table and high moisture content of the soil. Typically used for highly contaminated or radioactive materials.
		Radiofrequency Heating	Use of radio-frequency energy to heat soil and cause volatilization of contaminants	Eliminate. Limited thickness and shallow depth of contaminated soil renders this technology difficult to implement with limited, commercially available equipment(1). Not applicable for treatment of arsenic and lead.
		Electrical Heating	Use of an electrical blanket or electrical heating elements within slotted pipes to volatilize contaminants	Eliminate. The shallow depth to groundwater renders this technology difficult to implement(2). Not applicable for treatment of arsenic and lead.
	Physical/ Chemical	Soil Flushing/ Chemical Extraction	Use of water/solvents to remove contaminants from the vadose zone by flushing and collecting the contaminated wastewater in the saturated zone followed by above ground pump and treat.	Eliminate. The result of this technology would be the migration of COCs from the soil to the groundwater. Therefore, the implementation of this technology could contaminate “clean” groundwater.
		Dynamic Underground Stripping	Steam injection at the periphery of the contaminated area resulting in the vaporization of volatile compounds bound to soil and the movement of contaminants to a centrally located extraction well.	Eliminate. Difficult to implement due to the shallow groundwater table. No applicable for treatment of arsenic and lead.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
In-Situ Treatment (Continued)	Physical/ Chemical (Continued)	Soil Vapor Extraction	Use of vacuum and possibly air sparging to volatilize contaminants.	Eliminate. This technology is better suited to volatile organic contaminants than the polynuclear aromatic hydrocarbons (PAHs) at Site 15. In addition, it is not applicable to arsenic and lead.
		Chemical Fixation/ Solidification	Mixing of chemical agents in the vadose zone to chemically bind, solidify, and reduce contaminant mobility.	Eliminate. Mobility of soil COCs is not a concern at this site. Moreover the treated material would not be suitable for revegetation.
		Electrokinetic Separation	Use of electrodes with the application of direct current-based electrical fields that can induce the migration of metallic contaminants from soil towards electrodes or to induce electrochemical reactions to destroy selected organic contaminants.	Eliminate. Shallow depth to groundwater would minimize the available resistivity required for application of this technology(3).
	Biological	Biodegradation	Nutrients and amendments are added to surface soil to promote biodegradation of PAHs.	Eliminate. Would be difficult to achieve cleanup levels for PAHs. Not effective for lead contamination.
		Phytoremediation	Use of selected plants cultivated in contaminated soil to lead to uptake of metallic contaminants or enhancement of biodegradation of organic contaminants by indigenous microorganisms in the root zone.	Eliminate. This innovative technology has limited demonstrated effectiveness for areas with high levels of organic contaminants(4). Has potential in reducing lower level organic contamination left in place, however not applicable to achieve identified cleanup goals.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
Ex-Situ Treatment	Physical/ Chemical	Soil Washing/ Chemical Extraction	Use of solubilization and chemical (oxidation/reduction/neutralization) processes to remove contaminants from the solid phase and convert them into more concentrated forms or less toxic forms in liquid phase.	Retain. May be used in conjunction with other remedial technologies to treat both PAHs and lead. Predominantly fine-medium grained sand particles with lenses of silt and clay make this technology potentially effective.
		Chemical Fixation/ Solidification	Mixing of chemical agents to bind, solidify, and reduce contaminant mobility.	Retain. May be used in conjunction with other remedial technologies to render excavated lead contaminated soil non-hazardous for off-site disposal.
	Biological	On-Site Landfarming	Tilling of contaminated soils and wastes in layers of surface soil within a treatment bed to aerate and biodegrade organic contaminants.	Eliminate. Limited effectiveness for PAH contamination and not effective for arsenic and lead.
	Thermal	Off-Site Incineration	Use of high temperatures to pyrolize or oxidize organic contaminants into less toxic gases.	Eliminate. Although effective for destruction of PAHs, it would be ineffective for lead and arsenic contamination.
		Off-Site Thermal Desorption	Use moderate temperatures to volatilize contaminants and remove them from the solid phase into the gaseous phase.	Retain. May be used to treat PAH contamination. Off-gas treatment may be required to treat soils where metals are also present. This technology is more cost effective than incineration for removal of organic contaminants and should be evaluated further.

TABLE 3-1

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS FOR SURFACE SOIL
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option	Description	Screening Comment
Ex-Situ Treatment (continued)	Solids Processing	Size Reduction	Crushing/grinding/shredding of wastes as a preliminary process to aid in downstream treatment.	Eliminate crushing because it would apply to rock that would typically not be further treated. Retain grinding and shredding as pretreatment step for vegetative material (tree stumps) prior to other processes.
		Screening	Removal/segregation of material based on size as a preliminary process to aid in downstream treatment.	Retain to remove oversized material that is typically not contaminated and as a pretreatment step for other processes.
Disposal	Off-Site	Hazardous/ Non-Hazardous Waste Landfilling	Disposal of excavated wastes and treatment residuals in a permitted RCRA C or RCRA D facility.	Retain landfilling to be used in conjunction with other remedial technologies.
	On-Site	Consolidation	Excavation and relocation of contaminated soil to minimize space and closure requirements.	Eliminate. Would trigger on-site issues that are unacceptable to regulatory agencies.
		Beneficial Reuse	Reuse of treated soil as fill material.	Retain as a possible process option to be used in conjunction with other technologies.

Sources:
1. Personal communication between J.P. Kumar, TtNUS, and XDD, Inc., Stratham, NH, (Bruce Cliff, Co-owner, 603-788-1888) October 14, 2003.
2. Personal communication between J.P. Kumar, TtNUS, and Terra Therm, Inc., Fitchburg, MA, (Hiroshi Fujita, Project Coordinator, 978-343-0300), October 13, 2003.
3. Personal communication between J.P. Kumar, TtNUS, and Onion Equipment Company, Naples, Florida, (Barry Zvibleman, developer of Electro Klean ™ technology, 239-566-7007), October 10, 2003.
4. Personal communication between J.P. Kumar, TtNUS, and EPA, Cincinnati, OH, (Steve Rock, Research Scientist, 513-569-7149), October, 15, 2003.

TABLE 3-2

TECHNOLOGIES AND PROCESS OPTIONS RETAINED FOR DETAILED SCREENING
SITE 15 AMENDED FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

General Response Action	Remedial Technology	Process Option
No Action	None	Not Applicable
Limited Action	Land Use Controls (LUCs)	Administrative Controls: Deeds and Site Use Restrictions
Containment	Cover/Barrier	Soil/Multi-Media Cap
Removal	Excavation	Mechanical
Ex-Situ Treatment	Physical/Chemical	Soil Washing/Chemical Extraction
		Chemical Fixation/Solidification
	Thermal	Off-Site Thermal Desorption
	Solids Processing	Screening
Disposal	Off-Site	Hazardous/Non-Hazardous Waste Landfill
	On-Site	Beneficial Reuse
	Monitoring	Sampling and Analysis

4.0 DEVELOPMENT AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section discusses the development of the remedial alternatives developed from the process options retained in Section 3.0 and provides a description of the conceptual design for each alternative. This section also presents an evaluation of each remedial alternative with respect to the criteria of the NCP of 40 CFR Part 300, as revised in 1990. The criteria, and the relative importance of these criteria, are also discussed in this section.

4.1 DEVELOPMENT OF ALTERNATIVES

The technologies and process options retained after detailed screening in Section 3.0 were assembled into alternatives. The GRAs, remedial technologies, and process options retained are as follows:

- No Action.
- Limited Action: LUCs.
- Containment: Soil Cover.
- Removal: Excavation.
- Ex-Situ Treatment: On-Site Screening, Grinding/Shredding, On-Site Soil Washing/Chemical Extraction, On-Site Solidification/Stabilization, and Off-Site Chemical Fixation/Solidification.
- Disposal: On-Site Beneficial Reuse, Off-Site RCRA Non- Hazardous (Subtitle D) Landfill, and Off-Site RCRA Hazardous (Subtitle C) Landfill.

The following remedial alternatives have been assembled and developed based on the rationale discussed below:

1. No Action:

   This alternative is required by the guidance document as a baseline for comparison to other alternatives.

2. Soil Cover to Meet Recreational RAOs and LUCs:

This alternative would place a soil cover over the areas of Site 15 where concentrations of COCs in soil are greater than the recreational use pickup values defined in Section 2.0. A total of 22 areas with an overall surface of approximately 7.2 acres would be capped with a 2-foot-thick soil cover. Because the cover would need to be maintained to prevent exposure to contaminated soil remaining on site, LUCs would have to be established and enforced. These LUCs would include establishing an inspection and maintenance schedule for the cover and preventing residential, commercial/industrial, and medium- and high-intensity recreational land use.

Providing a cover over areas of soil with concentrations of COCs greater than residential criteria would essentially require capping of the entire 73-acre site. Such an alternative was not developed and evaluated because, compared to the partial capping presented under Alternative 2, it would not improve site usability and would substantially adversely impact site wetlands. LUCs would still be required to protect the soil cover from future development, and site use would therefore remain restricted.

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

This alternative would remove soil from areas of Site 15 where concentrations of COCs are greater than the recreational use pickup values. A total of approximately 11,850 yd^3 of contaminated soil would be excavated from 22 areas totaling approximately 7.2 acres that are considered for capping under Alternative 2. Most of the excavated soil (approximately 8,090 yd^3) would be disposed off site at a permitted RCRA non-hazardous (Subtitle D) TSDF, and the remainder (soil excavated from lead-contaminated areas that failed TCLP analysis, approximately 3,760 yd^3) would be disposed at an off-site permitted RCRA hazardous (Subtitle C) TSDF. The excavated areas would then be backfilled with 11,850 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Because the soil remaining on site would continue to contain concentrations of COCs that would not be protective of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors, the same type of LUCs would have to be established and enforced as in Alternative 2. These LUCs would prevent land use other than low-intensity recreational activities.

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

As with Alternative 3A, Alternative 3B would remove soil from areas of Site 15 where concentrations of COCs are greater than the recreational use pickup values. A total of

approximately 11,850 yd^3 of contaminated soil would be excavated from 22 areas totaling approximately 7.2 acres that would be excavated 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 10,470 yd^3 of treated soil would be reused to backfill the excavated areas. The soil washing process would concentrate the COCs removed from the treated soil in a wet (65 percent moisture by weight) filter cake residue, and approximately 790 yd^3 (or 1,600 tons) of this wet filter cake residue would be disposed at an off-site permitted RCRA Subtitle C TSDF. The backfilling of the excavated areas would be completed with 1,380 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Alternative 3B would incorporate the same LUCs as Alternative 3A to prevent unacceptable risks from exposure of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors to contaminated soil remaining on site. These LUCs would prevent land use other than low-intensity recreational activities.

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

As with Alternative 3A, Alternative 3C would remove soil from areas of Site 15 where concentrations of COCs are greater than the recreational use pickup values. A total of approximately 11,600 yd^3 of contaminated soil would be excavated from 22 areas totaling approximately 7.2 acres that would be excavated under Alternative 3A. TCLP testing would be conducted for soil from lead-contaminated areas, and the results would be used to determine if soil could be transported off site for disposal at a non-hazardous landfill or would be subjected to on-site solidification/stabilization. Soil from areas with initial TCLP lead concentrations less than 5 mg/L (estimated volume of approximately 8,090 yd^3) would be disposed off site at a permitted RCRA non-hazardous (Subtitle D) landfill. Soil from areas with TCLP concentrations greater than or equal to the toxicity characteristic value of 5 mg/L (estimated volume of approximately 3,760 yd^3) would be subjected to on-site solidification/stabilization. After treatment, soil would be retested, and if the TCLP concentration decreased to less than 5 mg/L and the alternative LDR treatment standards were met, the soil would be transported and disposed at a non-hazardous (Subtitle D) landfill. If restesting results were greater than or equal to 5 mg/L and the alternative treatment standards were not met, the soil would be transported, treated, and disposed at an off-site permitted RCRA hazardous (Subtitle C) TSDF (estimated volume of approximately 750 yd^3). It is assumed that no treated soil that meets the alternative LDR treatment standards would have a TCLP lead concentration less than 5 mg/L. The excavated areas would then be backfilled with 11,850 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands

would be restored. Alternative 3C would incorporate the same LUCs as Alternative 3A to prevent unacceptable risks from exposure of hypothetical future high- and medium-intensity recreational, commercial/industrial, and residential human receptors to contaminated soil remaining on site. These LUCs would prevent land use other than low-intensity recreational activities.

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

This alternative would remove contaminated soil to the extent necessary to allow for unrestricted use of the site. This would essentially require excavation of all of the site surface soil because the area identified as exceeding the residential SCTLs encompasses the entire site. 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 remaining 10,000 $yd^{3,}$ which is assumed would fail TCLP testing, would be disposed at an off-site permitted RCRA Subtitle C TSDF. The excavated areas would then be backfilled with 118,000 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. Because the soil remaining on site would no longer contain concentrations of COCs that could be harmful to hypothetical future residential receptors, LUCs would not be required.

4B. Excavation to Allow Unrestricted Site Use and On-Site Treatment and Reuse:

As with Alternative 4A, Alternative 4B would remove contaminated soil to the extent necessary to allow unrestricted use of the site; 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 approximately 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 (or 15,900 tons) of wet filter cake residue from the soil washing process would be disposed at an off-site permitted RCRA Subtitle C TSDF. The backfilling of the excavated areas would be completed with 14,000 yd^3 of clean imported fill material, the site would be revegetated, and impacted wetlands would be restored. As for Alternative S-4A, no LUCs would be required.

4.2 DESCRIPTION AND DETAILED ANALYSIS OF ALTERNATIVES

This section presents a description of the conceptual design of each alternative, followed by the detailed analysis using the nine criteria of the NCP under 40 CFR Part 300. The evaluation criteria are discussed below.

4.2.1 Evaluation Criteria

In accordance with the NCP (40 CFR 300.430), the following nine criteria are used for the evaluation of remedial alternatives:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

Overall Protection of Human Health and the Environment

Alternatives must be assessed for adequate protection of human health and environment, in the short and the long term, from unacceptable risks posed by hazardous substances or contaminants present at the site by eliminating, reducing, or controlling exposure to levels exceeding remediation goals. Overall protection draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Compliance with ARARs

Alternatives must be assessed to determine whether they attain ARARs under federal environmental laws and state environmental or facility siting laws. 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 a waiver must be obtained [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 (TBC guidance category).

Long-Term Effectiveness and Permanence

Alternatives must be assessed for the long-term effectiveness and permanence they offer, along with a degree of certainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include the following:

Magnitude of Residual Risk

This refers to risk posed by untreated waste or treatment residuals at the conclusion of remedial activities. The characteristics of residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

Adequacy and Reliability of Controls

Controls such as containment systems and LUCs that are necessary to manage treatment residuals and untreated waste must be shown to be reliable. These include the uncertainties associated with land disposal for providing long-term protection from residuals, the assessment for the potential need to replace technical components of the alternative such as a cap, a slurry wall, or a treatment system, and the potential exposure pathways and risks posed should the remedial action need replacement.

Reduction of Toxicity, Mobility, or Volume through Treatment

The degree to which the alternative employs recycling or treatment that reduces the toxicity, mobility, or volume shall be assessed, including how treatment is used to address the principal threats posed by the site. Factors that shall be considered, as appropriate, include the following:

- The treatment or recycling processes the alternative employs and the materials that they will treat.
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled.
- The degree of expected reduction in toxicity, mobility, or volume of waste due to treatment or recycling and the specification of which reduction(s) is occurring.
- The degree to which the treatment is irreversible.

- The type and quantity of residuals that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents.

- The degree to which treatment reduces the inherent hazards posed by principal threats at the site.

Short-Term Effectiveness

The short-term impacts of the alternative shall be assessed considering the following:

- Short-term risks that might be posed to the community during implementation.

- Potential impacts to workers during remedial action and the effectiveness and reliability of protective measures.

- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigation measures during implementation.

- Time until protection is achieved.

Implementability

The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors, as appropriate:

- Technical feasibility including technical difficulties and unknowns associated with the construction and operation of a technology, reliability of the technology, ease of undertaking additional remedial actions, and ability to monitor the effectiveness of the remedy.

- Administrative feasibility including activities needed to coordinate with other offices and agencies, and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions).

- Availability of services and materials including the availability of adequate off-site treatment capacity, storage capacity, and disposal capacity and services, the availability of necessary equipment and specialists, and provisions to ensure necessary additional resources, the availability of services and materials, and availability of prospective technologies.

Cost

Capital costs shall include both direct and indirect costs. Annual O&M costs shall be provided. A net present worth (NPW) value of the capital and O&M costs shall also be provided. Typically, the cost estimate accuracy range is plus 50 percent to minus 30 percent.

State Acceptance

The State's concerns must be assessed to include the following:

- The State's position and key concerns related to the preferred alternative and other alternatives.
- State comments on ARARs or the proposed use of waivers.

These concerns cannot be evaluated at this time in the FS because the State has not reviewed and commented on the FS. These concerns will be discussed, to the extent possible, in the Proposed Plan to be issued for public comment.

Community Acceptance

This assessment consists of responses of the community to the Proposed Plan. This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment can only be done after comments on the Proposed Plan are received from the public.

4.2.1.1 Relative Importance of Criteria

Among the nine criteria, the threshold criteria are considered to be the following:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs (excluding those that may be waived)

The threshold criteria must be satisfied for an alternative to be eligible for selection.

Among the remaining criteria, the following five are considered to be the primary balancing criteria:

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume
- Short-Term Effectiveness

- Implementability
- Cost

The balancing criteria are used to weigh the relative merits of alternatives.

The remaining two of the nine criteria, State Acceptance and Community Acceptance, are considered to be modifying criteria that must be considered during remedy selection. These last two criteria can be evaluated after the State of Florida has reviewed this FS and after the Proposed Plan has been discussed in a public meeting, if requested, and opened to public comment. Therefore, this document addresses only seven of the nine criteria.

4.2.2 Selection of Remedy

The selection of a remedy is a two-step process. The first step consists of identification of a preferred alternative and presentation of the alternative in a Proposed Plan submitted to the community for review and comment. The preferred alternative must meet the following criteria:

- Protection of human health and the environment.
- Compliance with ARARs unless a waiver is justified.
- Cost effectiveness in protecting human health and environment and in complying with ARARs.
- Utilization of permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

The second step consists of the review of comments received for the Proposed Plan and consultation with the State of Florida to determine whether or not the preferred alternative continues to be the most appropriate remedial action for the site.

4.2.3 Alternative 1: No Action

4.2.3.1 Description of Alternative 1

This alternative is a "walk-away" alternative that is required under CERCLA to establish a basis for comparison with other alternatives. Under this alternative, the property would be released for unrestricted use.

4.2.3.2 Detailed Analysis of Alternative 1

Overall Protection of Human Health and Environment

Alternative 1 would not be protective of human health and the environment. Concentrations of PAHs, arsenic, and lead would remain in surface soil at levels that exceed the established site-specific SCTLs for human health. Concentrations of PAHs and lead would remain in surface soil at levels that exceed the site-specific ecological target levels for ecological receptors. Therefore, two of the three RAOs for Site 15 would not be achieved.

Compliance with ARARs

There are no applicable ARARs; however, Alternative 1 would not achieve human health site-specific SCTLs derived using the guidance provided in Chapter 62-777, F.A.C.

Long-Term Effectiveness and Permanence

Alternative 1 would not be effective in the long term because soil COCs would remain on site and pose potential human health and ecological hazards. Although concentrations of soil COCs might gradually decrease to acceptable levels over a long period of time as a result of natural processes, this would not be monitored to verify its occurrence.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 1 does not employ any treatment. There would most likely be some reduction in toxicity (i.e., concentrations) of COCs over time due to natural attenuation, but this process would not be monitored.

Short-Term Effectiveness

There are no relevant issues under Alternative 1 because no action would occur.

Implementability

There are no implementability concerns for Alternative 1 because no action would be implemented.

Cost

There are no costs associated with Alternative 1.

4.2.4 Alternative 2: Soil Cover to Meet Recreational RAOs and LUCs

4.2.4.1 Description of Alternative 2

Alternative 2 is illustrated on Figure 4-1 and would consist of two major components: (1) soil cover to meet recreational RAOs and (2) LUCs.

Component 1: Soil Cover to Meet Recreational RAOs

Figure 4-2 shows the areas of the site that would be capped with a soil cover to meet the recreational RAOs. A total of 22 areas of contaminated soil with a combined surface of approximately 7.2 acres would be capped with a 2-foot-thick cover. The following are the areas of contamination that would be addressed:

- PAH-contaminated soil with BaPEq concentrations greater than 6,750 µg/kg – nine areas totaling 235,900 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 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, or 0.04 acre, from ground surface to the water table (assume to be 2 feet bgs). At the time of sample collection in these arsenic-contaminated areas, the water table was within 1 foot of the ground surface, limiting unsaturated soil sample collection to this depth. Because the water table has decreased, overexcavation to a depth of 2 feet bgs will be conducted.

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

As part of site preparation, temporary haul routes would be constructed to allow equipment to access the areas to be capped, and these areas would be cleared. Larger trees would be harvested and their stumps cut flush or ground flush with the existing grade. Small trees and underbrush would be cleared using a bulldozer or similar equipment and mulched. For the purpose of this FS, it was estimated that

approximately 880 larger trees covering an total area of 4.3 acres would have to be removed and that a total area of 2.8 acres of small trees and underbrush would have to be cleared.

The soil cover would consist of 30 inches of select fill material to permit settling of the material while maintaining a 2-foot protective barrier to the impacted soils. Approximately 29,000 yd^3 of clean soil would be imported from a suitable borrow location outside of NAS Cecil Field to construct the soil cover. As part of soil cover construction, a detection netting or fabric would be placed on the surfaces to be covered to provide a reference point to monitor cover thickness. During construction activities, erosion control procedures such as hay bales, silt fences, or sediment traps would be implemented.

It is anticipated that a total of approximately 0.18 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, would need to be restored. Following cover construction, the capped areas would be re-vegetated as appropriate and the impacted wetland areas would be restored.

Component 2: LUCs

LUCs would be developed to prevent the site from being used in the future for any purposes other than as a low-intensity recreational area. Physical restrictions to the site may include signage, fencing, physical barriers, and site security. LUC performance objectives and restrictions for Site 15 would be as follows:

- Prohibit residential, industrial, commercial, agricultural (specifically growing crops for human consumption), 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, athletic fields, etc. Prohibited medium-intensity recreational activities include, but are not limited to, picnic grounds, camping, etc. Allowable low-intensity recreational activities include hiking, biking, horseback riding, hunting, etc.

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

- 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.

Annual inspections of the site would be conducted to confirm compliance with LUC objectives, and an annual compliance certificate would be prepared and provided to U.S. EPA and FDEP. Prior to any property conveyance, U.S. EPA and FDEP would be notified.

The LUCs would be implemented through a LUC RD that would be prepared as a component of the overall RD. In addition to the U.S. EPA and FDEP, copies of the LUC RD would be sent to the City of Jacksonville Parks and Recreation Department, City of Jacksonville Environmental Resource Management Department, City of Jacksonville Planning and Development Department, City of Jacksonville Development Management Group, Jacksonville Electric Authority, and St. Johns River Water Management District. The LUCs would be maintained for as long as they are required to prevent unacceptable exposure to contaminated soil and/or to preserve the integrity of the selected remedy.

The LUC RD would also include procedures for regular inspections of the soil cover and maintenance and repair of the cover as required. LUCs would be 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 alternative would therefore require a survey of the site, annual visual inspections, and five-year review report preparation.

4.2.4.2 Detailed Analysis of Alternative 2

Overall Protection of Human Health and Environment

Alternative 2 would be protective of human health and the environment. A soil cover barrier over the area of contamination exceeding pickup values for a recreational receptor would ensure that the most likely future potential site users would be protected from exposure to unacceptable levels of PAHs, TRPH, arsenic, and lead. The use of LUCs would prevent potential residential, commercial/industrial, and high- and medium-intensity recreational receptors from being exposed to unacceptable levels of residual PAHs, TRPH, arsenic, and lead that would remain under the covered areas and other areas outside the cover. The site would be suitable for revegetation and future use as a natural and recreational corridor with low-intensity recreational activities. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 2 would not comply with chemical-specific ARARs, but exposure to soil with contaminant concentrations greater than chemical-specific ARARs would be prevented by the soil cover and LUCs. The following location-specific and action-specific ARARs would be complied with in substance:

- RCRA regulations detailing Identification and Listing of Hazardous Wastes and Land Disposal Restrictions.
- National Environmental Policy Act (NEPA) regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs.

Long-Term Effectiveness and Permanence

Alternative 2 would be effective in the long term because the soil cover would provide a barrier that would prevent recreational and ecological receptors from unacceptable exposure to COCs in soil. The detection grid installed to identify the separation between native soil and cap material would deter burrowing animals such as the gopher tortoise from burrowing into capped areas.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 2 would not reduce the toxicity, mobility or volume through treatment. However, the soil COCs present at the site are not currently migrating to groundwater and are not expected to do so in the future because of their relative low mobility.

Short-Term Effectiveness

Alternative 2 would be effective in the short term. Dust suppression and control measures would be implemented to minimize the emission of contaminated soil particulates during on-site remedial activities. Erosion control measures would minimize the potential migration of COCs into nearby streams. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 1 year, after which it would be protective assuming LUCs have been implemented.

Implementability

Alternative 2 is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Off-site borrow locations for clean soil can be identified. Establishment of LUCs would require negotiation and agreement on the specifics

of the procedures between the Navy, U.S. EPA, FDEP, and potential future site owners who might be affected by deed restrictions.

Cost

Estimated costs for Alternative 2 are as follows:

- Capital: $1,373,000
- 30-Year NPW of O&M: $247,000
- 30-Year NPW: $1,620,000

The above figures have been rounded to the nearest $1,000 to reflect the preliminary nature of the estimates. A more detailed breakdown of these cost estimates is provided in Appendix G.

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

4.2.5.1 Description of Alternative 3A

Alternative 3A is illustrated on Figure 4-3 and would consist of three major components: (1) excavation to meet recreational RAOs, (2) off-site treatment and disposal, and (3) LUCs.

Component 1: Excavation to Meet Recreational RAOs

The same 22 areas of contaminated soil with a combined surface of approximately 7.2 acres that were designated for capping under Alternative 2 (as illustrated on Figure 4-2) would be excavated under Alternative 3A as described below:

- PAH-contaminated soil with BaPEq concentrations greater than 6,750 µg/kg – nine areas totaling 235,900 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 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, or 0.04 acre, from ground surface to the water table (assume to be 2 feet bgs). At the time of sample collection in these arsenic-contaminated areas, the water table was within 1 foot of the ground surface, limiting unsaturated soil sample collection to this depth. Because the water table has decreased, overexcavation to a depth of 2 feet bgs will be conducted.

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

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

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

The Geostatistical Assessment Report (Appendix D) stated that significant soil sampling was conducted at Site 15 and that the delineation of lead and BaPEqs was accurate and complete, and therefore confirmation sampling is not warranted. Additional discussions regarding this topic were held (as identified in BCT Meeting Minute No. 2208), and it was agreed by the BCT (Decision No. 687) that the areas requiring remediation for BaPEqs only would not require confirmation sampling; however, the areas being remediated for lead would require limited confirmation sampling. Nine areas have been identified as exceeding the lead pickup level for recreational use and therefore would require confirmation sampling. A confirmation sampling plan will be developed as part of the remedial design, and confirmation sampling will be conducted prior to the implementation of the remedial action.

Following excavation, the excavated areas would be backfilled with clean material, graded to original contours and revegetated.

It is also anticipated that 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, would need to be restored.

Component 2: Off-Site Treatment and Disposal

The following are the assumed dispositions of the excavated soil:

- Approximately 8,090 yd^3 would be identified as RCRA non-hazardous and would be transported to the RCRA Subtitle D facility located near Folkston, Georgia, 35 miles northeast of Jacksonville, for direct landfilling.

- Approximately 750 yd^3 that failed TCLP testing would be identified as RCRA hazardous and would 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 would need to be verified based on sampling and analysis of stockpiled soil, followed by profiling as necessary for each facility.

Component 3: LUCs

The LUC RD prepared and implemented as part of this component would be very similar to that prepared and implemented as part of Component 2 of Alternative 2. The only significant difference is that there would be no need for inspection, maintenance, and repair of a soil cover system.

4.2.5.2 Detailed Analysis of Alternative 3A

Overall Protection of Human Health and Environment

Alternative 3A would be protective of human health and the environment. The removal of contamination exceeding the established pickup values for a recreational receptor would ensure that future potential users of the site would be protected from exposure to unacceptable levels of PAHs, arsenic, and lead. The use of LUCs would prevent potential residential, commercial/industrial, and high- and medium-intensity recreational receptors from being exposed to unacceptable levels of residual PAHs, arsenic, and lead that would remain in the unexcavated areas. The site would be suitable for revegetation and future use as a natural and recreational corridor with low-intensity recreational activities. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 3A would comply with chemical-specific ARARs. The following location-specific and action-specific ARARs would be complied with in substance:

- RCRA regulations detailing Identification and Listing of Hazardous Wastes and Land Disposal Restrictions.
- NEPA regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs.

Long-Term Effectiveness and Permanence

Alternative 3A would be effective in the long term because the COCs would be removed from the site and disposed in a suitable landfill outside the facility, resulting in residual levels that would not longer pose an unacceptable risk to recreational and ecological receptors.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 3A would permanently and irreversibly reduce the mobility of the most contaminated portion of the soil containing lead exhibiting leachability at levels exceeding TCLP criteria. Approximately 3,760 yd^3 of soil (to be verified at the time of remedial design) would be treated by chemical fixation and solidification at an off-site RCRA Subtitle C TSDF such that leachable lead levels would no longer exceed TCLP criteria. The treated soil would be deposited in a secure landfill, thereby rendering it unlikely to be exposed to reversible chemical reactions. In that regard, the overall remedy would employ irreversible components. The remaining excavated soil would be deposited in a non-hazardous waste landfill where its exposure to the environment would be adequately controlled.

Short-Term Effectiveness

Alternative 3A would be effective in the short term. Dust suppression and control measures would be implemented to minimize the emission of contaminated soil particulates during on-site remedial activities. Erosion control measures would minimize the migration of COCs into nearby streams. Transportation of contaminated soil to an off-site TSDF would be conducted in suitable containers and by reputable transporters. In the unlikely event of a traffic accident releasing contaminated soil to the environment, transported soil would not pose an immediately hazard to the community because of the non-volatile nature and relatively low solubility of the COCs present in the soil. However, should such an event occur, measures to prevent washing away of the soil by storm events would be warranted. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of

gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 1 year, after which it would be protective assuming LUCs have been implemented.

Implementability

Alternative 3A is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Suitable TSDFs are available for treatment and/or direct disposal of the excavated soil and have been identified at nearby locations. Establishment of LUCs would require negotiation and agreement on the specifics of the procedures between the Navy, U.S. EPA, FDEP, and potential future site owners who might be affected by deed restrictions.

Cost

Estimated costs for Alternative 3A are as follows:

- Capital: $3,872,000
- 30-Year NPW of O&M: $35,000
- 30-Year NPW: $3,907,000

A more detailed breakdown of these cost estimates is provided in Appendix G.

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

4.2.6.1 Description of Alternative 3B

Alternative 3B is illustrated on Figure 4-4 and would consist of three major components: (1) excavation to meet recreational RAOs, (2) on-site soil washing and reuse, and (3) LUCs.

Component 1: Excavation to Meet Recreational RAOs

This component would be identical to Component 1 of Alternative 3A.

Component 2: On-Site Soil Washing and Reuse

The excavated material would be treated on site with soil washing to meet the recreational pickup values. Soil washing would use a combination of physical separation and solvent extraction processes to remove

COCs from the larger-sized particles and concentrate them in a relatively small volume of treatment residue made of the smallest-sized particles. This treatment residue most often takes the form of a moist cake generated by the filtration process used to recover and recycle the majority of the extracting solvent. The treated soil would be suitable for on-site reuse to backfill the majority of the excavated areas, and the filter cake treatment residue would require off-site disposal at a RCRA Subtitle C TSDF. The treated soil would be evaluated for pH and nutrient content to assure suitability for reuse and adjusted as needed as part of this process prior to use as backfill.

Typically, soil washing operations concentrate the removed contaminants within 5 to 10 percent of the original volume of processed soil. Subject to confirmation by a treatability study and for the purpose of this FS, it was assumed that on-site washing of contaminated Site 15 soil would concentrate the removed COCs within 7 percent of the original volume of soil treated.

Approximately 11,850 yd^3 of excavated contaminated soil would be screened on site, and an estimated 600 yd^3, or approximately 5 percent, of oversized material would be separated and landfilled at the RCRA Subtitle D facility located near Folkston, Georgia. The oversized material would also be ground and/or shredded either on site or off site as required prior to landfilling. The screened soil would be treated on site, yielding or approximately 10,200 yd^3 of clean treated soil. Assuming that the soil being processed has a dry basis density of 1.5 tons per yd^3 and that the moist filter cake residue has a typical solids content of 35 percent by weight, it is estimated that approximately 790 yd^3 (or 1,600 tons) of this filter cake would have to be transported to the RCRA Subtitle C TSDF located in Emelle, Alabama for further treatment followed by landfilling. The quantity of filter cake residue to be disposed would have to be more precisely estimated through a treatability study and would need to be verified based on sampling and analysis of the filter cake, followed by profiling.

Following on-site reuse of the treated soil, approximately 1,380 yd^3 of additional clean fill material would be imported to complete the backfilling of the excavated areas. The site would then be graded to original contours and revegetated. It is also anticipated that 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, would need to be restored.

Component 3: LUCs

This component would be identical to Component 3 of Alternative 3A.

4.2.6.2 Detailed Analysis of Alternative 3B

Overall Protection of Human Health and Environment

Alternative 3B would be protective of human health and the environment. The treatment of contamination exceeding the pickup values for a recreational receptor would ensure that future potential site users would be protected from exposure to unacceptable levels of PAHs, arsenic, and lead. The use of LUCs would prevent potential residential, commercial/industrial, and high- and medium-intensity recreational receptors from being exposed to unacceptable levels of residual PAHs, arsenic, and lead that would remain in the untreated areas. The site would be suitable for revegetation and future use as a natural and recreational corridor with low-intensity recreational activities. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 3B would comply with applicable chemical-specific ARARs. The following location-specific and action-specific ARARs would be complied with in substance:

- RCRA regulations detailing Identification and Listing of Hazardous Wastes, Land Disposal Restrictions, and Standards for Owners and Operators of Hazardous Waste TSDFs.
- NEPA regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs.

Long-Term Effectiveness and Permanence

Alternative 3B would be effective in the long term because the COCs to would be treated, and treatment residues would be removed from the site and deposited in a suitable landfill outside the facility, resulting in residual levels that would not longer pose an unacceptable risk to recreational and ecological receptors.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 3B would permanently remove from the site the COCs contained in approximately 11,850 yd^3 of contaminated soil. PAH concentrations would be reduced from an average BaPEq concentration of approximately 91,000 µg/kg by a minimum of 93 percent to meet the recreational pickup value of

6,750 µg/kg. Average concentrations of lead already meet the acute lead level of 6,500 mg/kg, and on-site treatment would further reduce these concentrations so that the 3,760 yd^3 of highly contaminated soil that currently exhibits leachability levels exceeding TCLP criteria would meet the 0.75 mg/L lead UTS for on-site reuse. The reduction in lead concentration that would be required to meet the UTS would be estimated as part of treatability studies during which TCLP concentrations of lead in the more highly contaminated soil would be determined. Lead removed from the highly contaminated soil would be included within the filter cake residue from the soil washing process and treated by chemical fixation and solidification at an off-site RCRA Subtitle C TSDF such that leachable lead levels would no longer exceed TCLP criteria. This filter cake residue (,790 yd^3 or 1,600 tons, to be verified by treatability studies) would then be deposited in a secure landfill, thereby rendering it unlikely to be exposed to reversible chemical reactions. In that regard, this alternative is nearly 100 percent irreversible.

Short-Term Effectiveness

Alternative 3B would be effective in the short term. Dust suppression control measures would be implemented to minimize the emission of contaminated soil particulates during on-site remedial activities. Erosion control measures would minimize the migration of COCs into nearby streams. Transportation of the screening and soil washing residues to an off-site TSDF would be conducted in suitable containers and by reputable transporters. In the unlikely event of a traffic accident releasing contaminated material to the environment, transported soil would not pose an immediately hazard to the community because of the non-volatile nature and relatively low solubility of the COCs present at the site. However, should such an event occur, measures to prevent washing away of the material by storm events would be warranted. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 1 year, after which it would be protective assuming LUCs have been implemented.

Implementability

Alternative 3B is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Soil washing is offered by relatively few vendors; however, at least two have been identified with an established track record in treating contaminated media containing similar constituents and with the ability to easily achieve the removal efficiencies expected in this alternative. However, treatability studies are recommended to allow better estimates of the efficiency and cost. Suitable TSDFs are available for the ultimate disposal of on-site screening and treatment residues and have been identified at nearby locations. Establishment of LUCs would require negotiation and agreement on the specifics of the procedures between the Navy, U.S. EPA, FDEP, and potential future site owners who might be affected by deed restrictions.

Cost

Estimated costs for Alternative 3B are as follows:

- Capital: $4,415,000
- 30-Year NPW of O&M: $35,000
- 30-Year NPW: $4,450,000

A more detailed breakdown of these cost estimates is provided in Appendix G.

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

4.2.7.1 Description of Alternative 3C

Alternative 3C is illustrated on Figure 4-5 and would consist of four major components: (1) excavation to meet recreational RAOs, (2) on-site solidification/stabilization, (3) off-site treatment and disposal, and (4) LUCs.

Component 1: Excavation to Meet Recreational RAOs

This component would be identical to Component 1 of Alternative 3A.

Component 2: On-Site Solidification/Stabilization

Soil with TCLP lead concentrations less than the toxicity characteristic level of 5 mg/L would be excavated and transported off site for disposal at a non-hazardous landfill (see Component 3). Soil from grids with TCLP lead concentrations greater than or equal to 5 mg/L would 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 required treatment would be thoroughly mixed with a 10 or 15 percent Portland cement and water mixture. A treatability study would be required 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 consisting of five discrete locations from 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 would 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 would 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 would have a TCLP lead concentration less than 5 mg/L. It is also assumed that approximately 3,010 yd^3 of treated soil and 677 tons of treatment media would be disposed as non-hazardous and 750 yd^3 of treated soil and 168 tons of treatment media would be disposed as hazardous. The total amount of excavated soil disposed as non-hazardous (pre- and post-treatment) would be 12,140 yd^3.

Following excavation, the excavated areas would be backfilled with clean material, graded to original contours and revegetated. It is also anticipated that 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, would need to be restored.

Component 3: Off-Site Treatment and Disposal

The following are the assumed dispositions of the excavated soil:

- A total of approximately 10,870 yd^3 of pre- and post-treatment soil would be identified as RCRA non-hazardous and would be transported to the RCRA Subtitle D facility located near Folkston, Georgia, 35 miles northeast of Jacksonville, for direct landfilling.

- Approximately 730 yd^3 that failed post-treatment TCLP testing would be identified as RCRA hazardous and would 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 would need to be verified based on sampling and analysis of stockpiled soil, followed by profiling as necessary for each facility.

Component 4: LUCs

This component would be identical to Component 3 of Alternative 3A.

4.2.7.2 Detailed Analysis of Alternative 3C

Overall Protection of Human Health and Environment

Alternative 3C would be protective of human health and the environment. The removal of contamination exceeding the pickup values for a recreational receptor would ensure that future potential site users

would be protected from exposure to unacceptable levels of PAHs, arsenic, and lead. The use of LUCs would prevent potential residential, commercial/industrial, and high- and medium-intensity recreational receptors from being exposed to unacceptable levels of residual PAHs, arsenic, and lead that would remain in the untreated areas. The site would be suitable for revegetation and future use as a natural and recreational corridor with low-intensity recreational activities. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 3C would comply with applicable chemical-specific ARARs. The following location-specific and action-specific ARARs would be complied with in substance:

- RCRA regulations detailing Identification and Listing of Hazardous Wastes, Land Disposal Restrictions, and Standards for Owners and Operators of Hazardous Waste TSDFs.
- NEPA regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs.

Long-Term Effectiveness and Permanence

Alternative 3C would be effective in the long term because the COCs to would be removed from the site and deposited in suitable landfills outside the facility, resulting in residual levels that would not longer pose an unacceptable risk to recreational and ecological receptors.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 3C would also permanently remove from the site the COCs contained in approximately 11,850 yd^3 of contaminated soil. PAH concentrations would be reduced from an average BaPEq concentration of approximately 91,000 µg/kg to meet the recreational pickup value of 6,750 µg/kg. Average concentrations of lead already meet the acute lead level of 6,500 mg/kg, and excavation and off-site disposal of soil would result in a post-excavation site-wide lead concentration less than the current value of 990 mg/kg. Alternative 3C would permanently and irreversibly reduce the mobility of lead in the most contaminated soil (with lead exhibiting leachability at levels exceeding the TCLP criteria). Approximately 3,760 yd^3 of soil would be solidified/stabilized on site, and approximately 750 yd^3 of soil would be treated by chemical fixation and solidification at an off-site RCRA Subtitle C TSDF such that

leachable lead levels would no longer exceed TCLP criteria. Volumes of soil to be treated would be verified during the remedial design.

Short-Term Effectiveness

Alternative 3C would be effective in the short term. Dust suppression control measures would be implemented to minimize the emission of contaminated soil particulates during on-site remedial activities. Erosion control measures would minimize the migration of COCs into nearby streams. Transportation of excavated soil to off-site TSDFs would be conducted in suitable containers and by reputable transporters. In the unlikely event of a traffic accident releasing contaminated material to the environment, transported soil would not pose an immediately hazard to the community because of the non-volatile nature and relatively low solubility of the COCs present at the site. However, should such an event occur, measures to prevent washing away of the material by storm events would be warranted. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 1 year, after which it would be protective assuming LUCs have been implemented.

Implementability

Alternative 3C is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Solidification/stabilization is a well-established technology used to treat waste materials to reduce contaminant solubility and mobility. However, a treatability study is recommended to allow better estimates of the efficiency and cost of the treatment process. Suitable TSDFs are available for the ultimate disposal of excavated soil (treated and untreated) and have been identified at nearby locations. Establishment of LUCs would require negotiation and agreement on the specifics of the procedures between the Navy, U.S. EPA, FDEP, and potential future site owners who might be affected by deed restrictions.

Cost

Estimated costs for Alternative 3C are as follows:

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

A more detailed breakdown of these cost estimates is provided in Appendix G.

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

4.2.8.1 Description of Alternative 4A

Alternative 4A is illustrated on Figure 4-6 and would consist of two major components: (1) excavation to allow unrestricted site use and (2) off-site treatment and disposal.

Component 1: Excavation to Allow Unrestricted Site Use

This component would be similar to Component 1 of Alternatives 3A and 3B, except that it would involve excavation of a much larger area, essentially encompassing the entire site. A total of approximately 118,000 yd^3 of contaminated soil over a surface area of approximately 73 acres of would be excavated, as illustrated on Figure 4-7 and summarized as follows:

- PAH-contaminated soil with BaPEq concentrations greater than 100 µg/kg – 1,772,803 ft^2 or 40.7 acres from 0 to 1 foot bgs.

- Lead-contaminated soil with concentrations greater than 400 mg/kg – 632,460 ft^2 or 14.5 acres from 0 to 1 foot bgs.

- PAH- and lead-contaminated soil with BaPEq concentrations greater than 100 µg/kg and lead concentrations greater than 400 mg/kg – 789,651 ft^2 or 18.1 acres from 0 to 1 foot bgs.

- TRPH-contaminated soil with concentrations greater than 340 mg/kg – included within the PAH-contaminated area noted above from a depth of 1 to 2 ft bgs.

- Arsenic-contaminated soil with concentrations greater than 36 mg/kg – three areas totaling 1,600 ft^2, or 0.04 acre, from ground surface to the water table (assume to be 2 feet bgs). At the time of sample collection in these arsenic-contaminated areas, the water table was within 1 foot of the ground surface, limiting unsaturated soil sample collection to this depth. Because the water table has decreased, overexcavation to a depth of 2 feet bgs will be conducted.

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

As part of site preparation, temporary haul routes would be constructed to allow equipment to access the areas to be excavated, and these areas would be cleared. Larger trees would be harvested and their stumps either cut or ground flush with the existing grade. Small trees and underbrush would be cleared using a bulldozer or similar equipment and mulched. For the purpose of this FS, it was estimated that approximately 10,500 larger trees covering an total area of 52.4 acres would have to be removed and that a total area of approximately 73 acres of small trees and underbrush would have to be cleared.

Excavation of the duff overlying the surface of the soil and excavation of soil to a depth of up to 2 feet bgs would be conducted using a bulldozer, front-end loader, or similar equipment. A total volume of approximately 118,000 yd^3 of contaminated soil would be excavated.

The Geostatistical Assessment Report (Appendix D) stated that significant soil sampling was conducted at Site 15 and that the delineation of lead and BaPEqs was accurate and complete, and therefore confirmation sampling is not warranted. Additional discussions regarding this topic were held (as identified in BCT Meeting Minute No. 2208), and it was agreed by the BCT (Decision No. 687) that the areas requiring remediation for BaPEqs only would not require confirmation sampling; however, the areas being remediated for lead would require limited confirmation sampling. Six areas have been identified as exceeding the lead pickup level for recreational use and therefore would require confirmation sampling. A confirmation sampling plan will be developed as part of the remedial design, and confirmation sampling will be conducted prior to the implementation of the remedial action.

Following excavation, the excavated areas would be backfilled with clean material, graded to original contours, and revegetated. It is also anticipated that all six of the wetlands identified at Site 15 (Wetlands A to F) during the Wetlands Delineation Study (TtNUS, 2003b) and totaling a surface area of approximately 4.3 acres would need to be restored.

Component 2: Off-Site Treatment and Disposal

The following are the assumed dispositions for the excavated soil:

- Approximately 108,000 yd^3 would be identified as RCRA non-hazardous and would be transported to the RCRA Subtitle D facility located near Folkston, Georgia, for direct landfilling.

- Approximately 10,000 yd^3 that failed TCLP testing would be identified as RCRA hazardous and would 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 would need to be verified based on sampling and analysis of stockpiled soil, followed by profiling as necessary for each facility.

4.2.8.2 Detailed Analysis of Alternative 4A

Overall Protection of Human Health and Environment

Alternative 4A would be protective of human health and the environment. The removal of contamination exceeding the pickup value for a hypothetical future residential receptor would ensure that unrestricted use of the site would be protective. Protection of ecological receptors would also be achieved. The site would be suitable for revegetation and future unrestricted use. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 4A would comply with chemical-specific ARARs. The following location-specific and action-specific ARARs would be complied with in substance:

- RCRA regulations detailing Identification and Listing of Hazardous Wastes and Land Disposal Restrictions.
- NEPA regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs

Long-Term Effectiveness and Permanence

Alternative 4A would be effective in the long term because the COCs would be removed from the site and deposited in a suitable landfill outside the facility, resulting in residual levels that would not longer pose an unacceptable risk to residential and ecological receptors.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 4A would permanently and irreversibly reduce the mobility of the most contaminated portion of the soil containing lead exhibiting leachability at levels exceeding TCLP criteria. Approximately 10,000 yd^3 or soil (to be verified at the time of remedial design) would be treated by chemical fixation and solidification at an off-site RCRA Subtitle C TSDF such that leachable lead levels would no longer exceed TCLP criteria. The treated soil would be deposited in a secure landfill, thereby rendering it unlikely to be

exposed to reversible chemical reactions. In that regard, this alternative employs irreversible components. The remaining excavated soil would be deposited in a non-hazardous waste landfill where its exposure to the environment would be adequately controlled.

Short-Term Effectiveness

Alternative 4A would be effective in the short term. Dust suppression and control measures would be implemented to minimize the emission of contaminated soil particulates during onsite remedial activities. Erosion control measures would minimize the migration of COCs into nearby streams. Transportation of contaminated soil to an off-site TSDF would be conducted in suitable containers and by reputable transporters. In the unlikely event of a traffic accident releasing contaminated soil to the environment, transported soil would not pose an immediately hazard to the community because of the non-volatile nature and relatively low solubility of the COCs present in the soil. However, should such an event occur, measures to prevent washing away of the soil by storm events would be warranted. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 2 years.

Implementability

Alternative 4A is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Suitable TSDFs are available for treatment and/or direct disposal of the excavated soil and have been identified at nearby locations.

Cost

Estimated costs for Alternative 4A are as follows:

- Capital: $20,100,000
- O&M: $0
- NPW: $20,100,000

A more detailed breakdown of these cost estimates is provided in Appendix G.

4.2.9 Alternative 4B: Excavation to Allow Unrestricted Site Use and On-Site Treatment and Reuse

4.2.9.1 Description of Alternative 4B

Remedial Alternative 4B is illustrated on Figure 4-8 and would consist of two major components: (1) excavation to allow unrestricted site use and (2) on-site treatment and reuse.

Component 1: Excavation to Allow Unrestricted Site Use

This component would be identical to Component 1 of Alternative 4A.

Component 2: On-Site Treatment and Reuse

This component would be similar to Component 2 of Alternative 3B, except for the significantly larger volume of contaminated soil involved and for the fact that the on-site soil washing system would have to produce a treated soil that meets residential rather than recreational cleanup goals.

Approximately 118,000 yd^3 of excavated contaminated soil would be screened on site, and approximately 6,000 yd^3 of oversized material would be separated and landfilled at the RCRA Subtitle D facility located near Folkston, Georgia. The oversized material would also be ground and/or shredded either on site or off-site as required prior to landfilling. The screened soil would be treated on site, yielding approximately 102,000 yd^3 of clean treated soil. Assuming that the soil being processed has a dry basis density of 1.5 tons per yd^3 and that the moist filter cake residue has a typical solids content of 35 percent by weight, it is estimated that approximately 7,870 yd^3 (or 15,900 tons) of this filter cake would have to be transported to the RCRA Subtitle C TSDF located in Emelle, Alabama, for further treatment followed by landfilling. The quantity of filter cake residue to be disposed would have to be more precisely estimated through a treatability study and would need to be verified based on sampling and analysis of the filter cake, followed by profiling.

Following on-site reuse of the treated soil, approximately 14,000 yd^3 of additional clean fill material would be imported to complete the backfilling of the excavated areas. The site would then be graded to original contours and revegetated. As for Alternative 4A, it is also anticipated that all six of the wetlands identified at Site 15 (Wetlands A to F) during the Wetlands Delineation Study (TtNUS, 2003b), totaling a surface area of approximately 4.5 acres, would need to be restored.

4.2.9.2 Detailed Analysis of Alternative 4B

Overall Protection of Human Health and Environment

Alternative 4B would be protective of human health and the environment. The treatment of contamination exceeding the pickup values for a residential receptor would ensure that unrestricted site use would be protective. The site would be suitable for revegetation and future unrestricted use. All of the RAOs for Site 15 would be met.

Compliance with ARARs

Alternative 4B would comply with applicable chemical-specific ARARs. The following location-specific and action specific ARARs would be complied with in substance:

- RCRA regulations describing Identification and Listing of Hazardous Wastes, Land Disposal Restrictions, and Standards for Owners and Operators of Hazardous Waste TSDFs.
- NEPA regulations on wetlands, floodplains, etc.
- Fish and Wildlife Coordination Act regulations.
- Endangered Species Act regulations.
- Florida Air Pollution Rules.
- Florida Regulation of Stormwater Discharge.
- Florida Rules on Hazardous Waste Warning Signs.

Long-Term Effectiveness and Permanence

Alternative 4B would be effective in the long term because the COCs would be treated and treatment residues would be removed from the site and deposited in a suitable landfill outside the facility, resulting in residual levels that would not longer pose an unacceptable risk to residential or ecological receptors.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 4B would permanently remove from the site the COCs contained in approximately 118,000 yd^3 of contaminated soil. Concentrations of BaPEqs would be reduced from an average of approximately 15,000 µg/kg by over 99 percent to meet the residential cleanup goal of 100 µg/kg. Average concentrations of lead would be reduced from an average of 1,300 mg/kg to 400 mg/kg. Minor quantities of arsenic and antimony would also be treated in the process. On-site treatment would reduce lead concentrations so that the 10,000 yd^3 of highly contaminated soil that currently exhibits leachability levels exceeding the TCLP criteria would meet 0.75 mg/L lead UTS for on-site reuse. The reduction in lead concentration that would be required to meet the UTS would be estimated as part of treatability studies

during which TCLP concentrations of lead in the more highly contaminated soil would be determined. Lead removed from the highly contaminated soil would be included within the filter cake residue from the soil washing process and treated by chemical fixation and solidification at an off-site RCRA Subtitle C TSDF such that leachable lead levels would no longer exceed TCLP criteria. This filter cake residue (7,870 yd^3 or 15,900 tons, to be verified by treatability studies) would then be deposited in a secure landfill, thereby rendering it unlikely to be exposed to reversible chemical reactions. In that regard, this alternative is nearly 100 percent irreversible.

Short-Term Effectiveness

Alternative 4B would be effective in the short term. Dust suppression and control measures would be implemented to minimize the emission of contaminated soil particulates during on-site remedial activities. Erosion control measures would minimize the migration of COCs into nearby streams. Transportation of screening and soil washing residues to an off-site TSDF would be conducted in suitable containers and by reputable transporters. In the unlikely event of a traffic accident releasing contaminated material to the environment, transported soil would not pose an immediately hazard to the community because of the non-volatile nature and relatively low solubility of the COCs present at the site. However, should such an event occur, measures to prevent washing away of the material by storm events would be warranted. Workers on site would be adequately protected if suitable health and safety procedures are followed. Relocation of gopher tortoise habitats would reduce adverse impacts to the site ecological system during excavation. The time frame for implementation of this alternative is estimated to be approximately 3 years.

Implementability

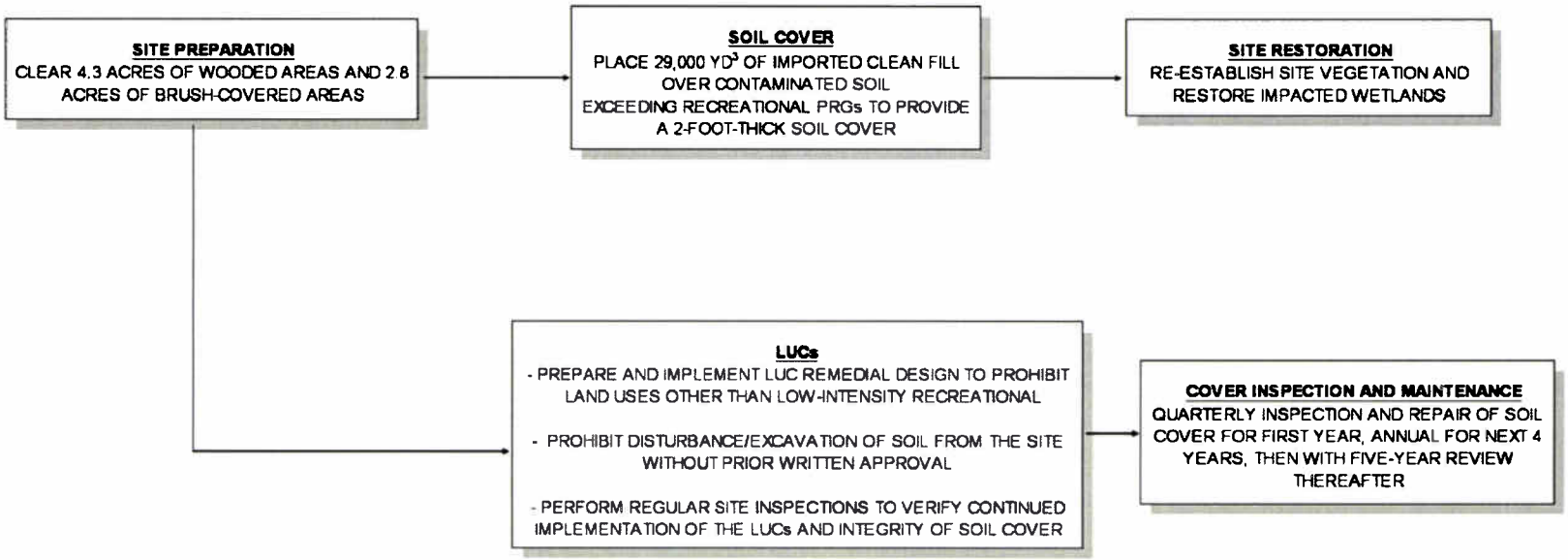
Alternative 4B is implementable. Excavation equipment considered under this alternative is typical in the construction industry and readily available from several local sources. Soil washing is offered by relatively few vendors; however, at least two have been identified with an established track record in treating contaminated media containing similar constituents and with the ability to achieve the removal efficiencies expected in this alternative. However, treatability studies are strongly recommended to allow better estimates of the efficiency and cost associated with the need for multiple passes to meet the high treatment efficiency. Suitable TSDFs are available for the disposal of the screening and soil washing residues and have been identified at nearby locations.

Cost

Estimated costs for Alternative 4B are as follows:

- Capital: $27,114,000
- O&M: $0
- NPW: $27,114,000

A more detailed breakdown of these cost estimates is provided in Appendix G.



LUCs = LAND USE CONTROLS.
YD^3 = CUBIC YARDS

DRAWN BY MJJ	DATE 04Apr06	ALTERNATIVE 2: SOIL COVER TO MEET RECREATIONAL RAOs AND LUCs OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4-1 / REV 0

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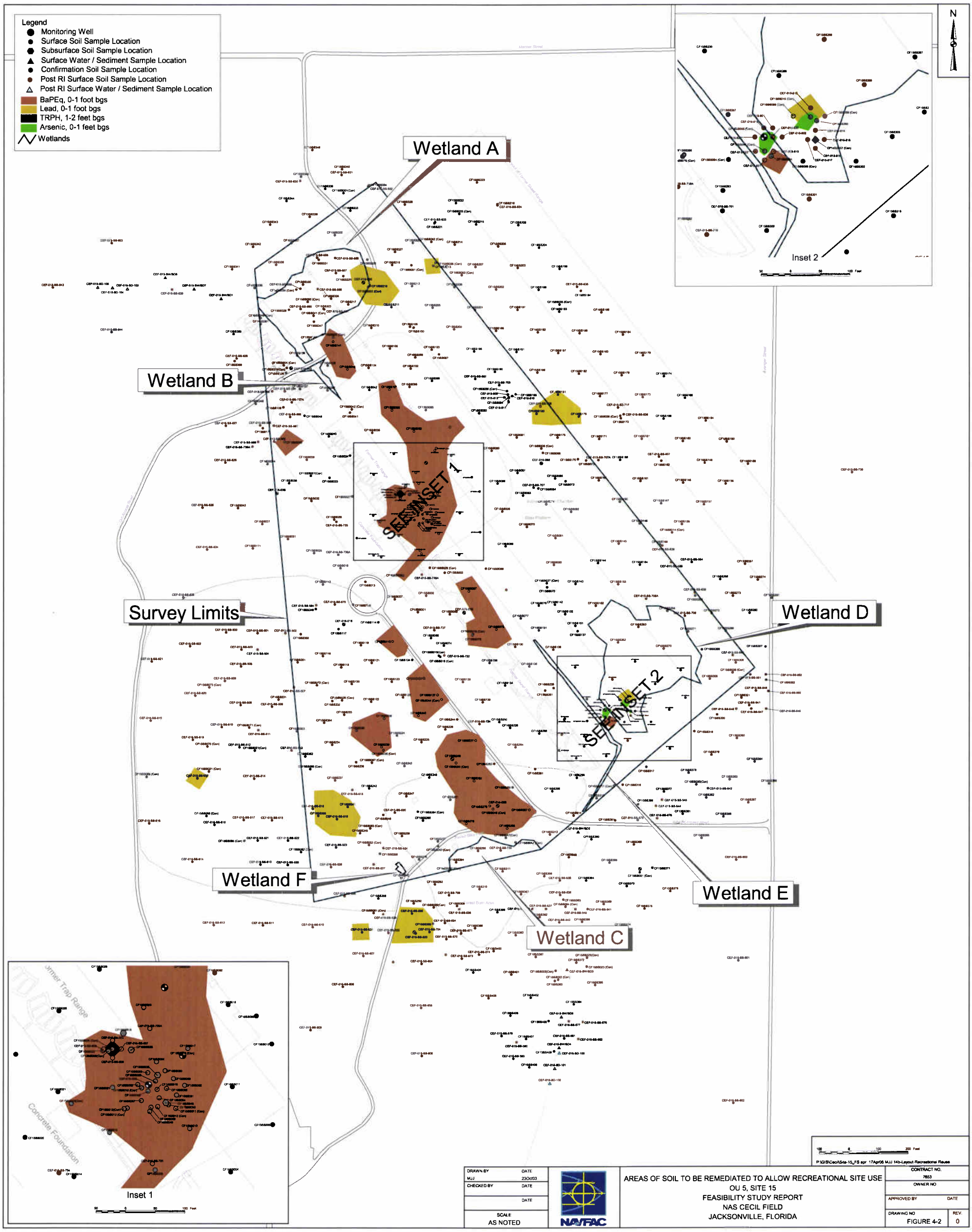
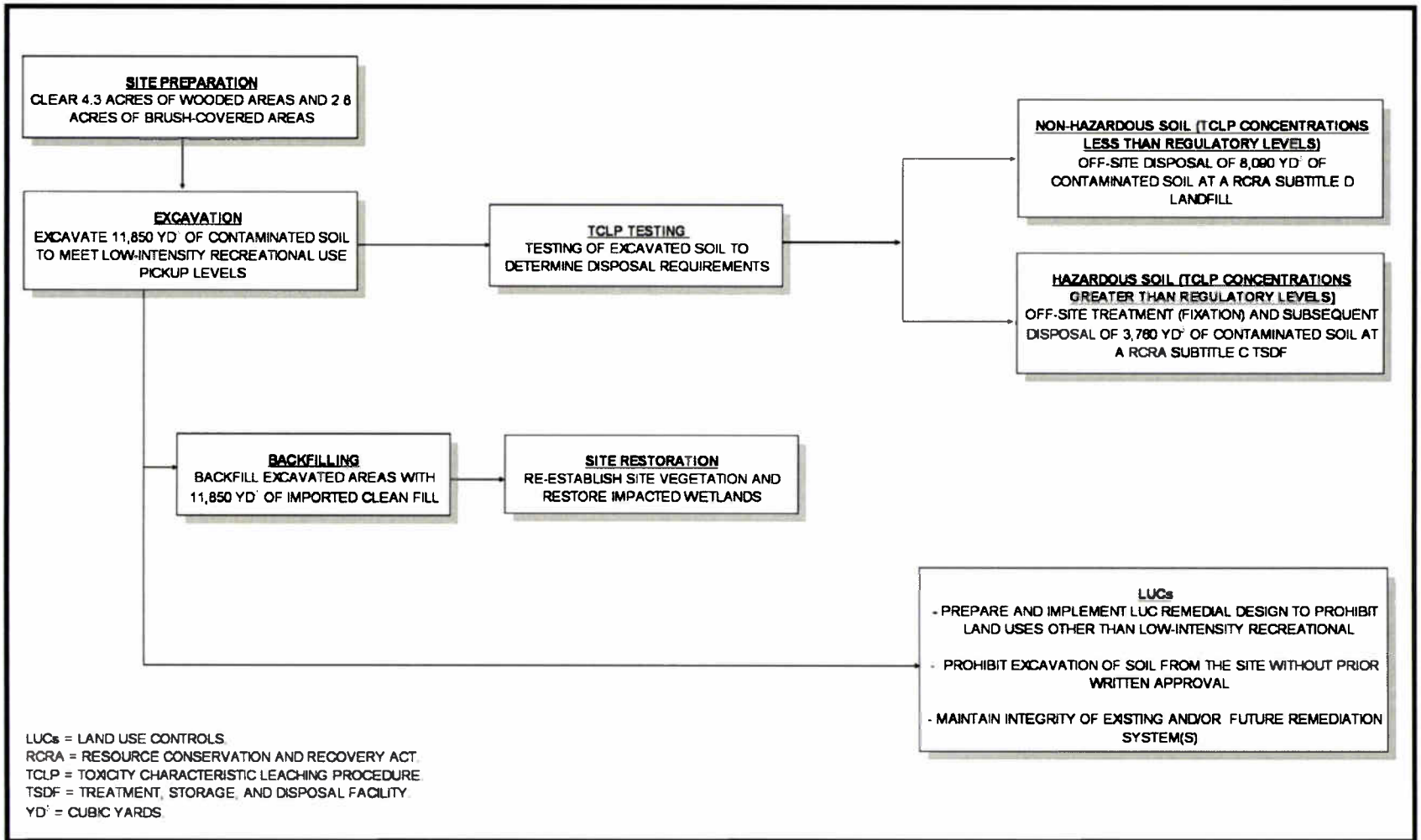

Legend
Monitoring Well
Surface Soil Sample Location
Subsurface Soil Sample Location
Surface Water / Sediment Sample Location
Confirmation Soil Sample Location
Post RI Surface Soil Sample Location
Post RI Surface Water / Sediment Sample Location
BaPEq, 0-1 foot bgs
Lead, 0-1 foot bgs
TRPH, 1-2 feet bgs
Arsenic, 0-1 feet bgs
Wetlands
N
Wetland A
Wetland B
Wetland C
Wetland D
Wetland E
Wetland F
Survey Limits
SEE INSET 1
SEE INSET 2
Inset 1
Inset 2
Former Trap Range
Concrete Foundation
P:\GIS\Cecil\5ds-15_FS apr 17Apr06 MJJ 14b-Layout-Recreational Reuse
DRAWN BY MJJ DATE 23Oct03
CHECKED BY DATE
DATE
SCALE AS NOTED
NAVFAC
AREAS OF SOIL TO BE REMEDIATED TO ALLOW RECREATIONAL SITE USE
OU 5, SITE 15
FEASIBILITY STUDY REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 7653
OWNER NO
APPROVED BY DATE
DRAWING NO FIGURE 4-2
REV. 0



LUCs = LAND USE CONTROLS
RCRA = RESOURCE CONSERVATION AND RECOVERY ACT
TCLP = TOXICITY CHARACTERISTIC LEACHING PROCEDURE
TSDF = TREATMENT, STORAGE, AND DISPOSAL FACILITY
YD³ = CUBIC YARDS

DRAWN BY: MJJ	DATE: 04Apr06	ALTERNATIVE 3A: EXCAVATION TO MEET RECREATIONAL RAOs, OFF-SITE TREATMENT AND DISPOSAL, AND LUCs OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER: 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE: AS NOTED	NAVFAC		DRAWING NO: FIGURE 4-3 / REV: 0

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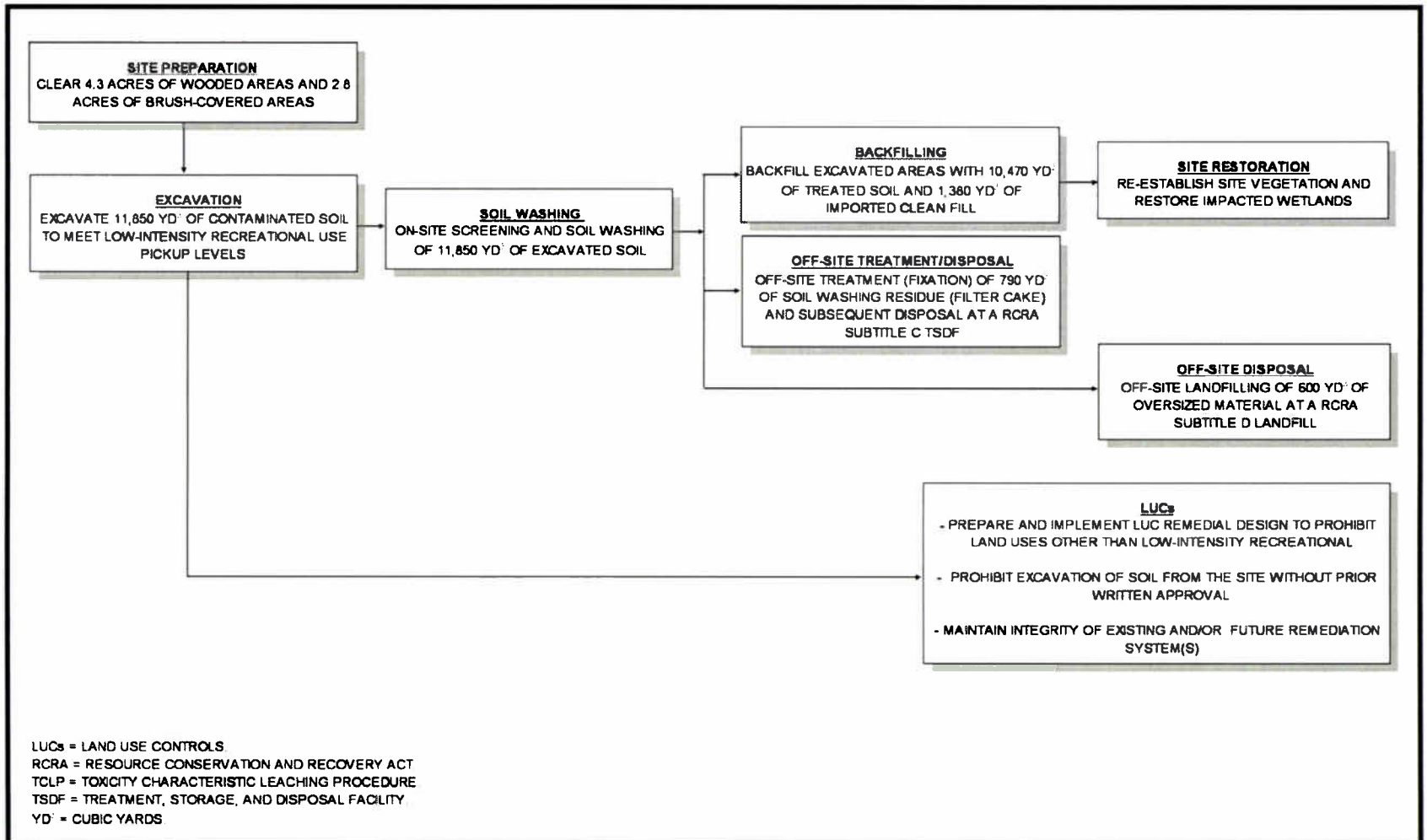

LUCs = LAND USE CONTROLS
RCRA = RESOURCE CONSERVATION AND RECOVERY ACT
TCLP = TOXICITY CHARACTERISTIC LEACHING PROCEDURE
TSDF = TREATMENT, STORAGE, AND DISPOSAL FACILITY
YD³ = CUBIC YARDS

DRAWN BY: MJJ	DATE: 04Apr08	ALTERNATIVE 3B: EXCAVATION TO ALLOW RECREATIONAL RAOs, ON-SITE SOIL WASHING AND REUSE, AND LUCs OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER: 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE: AS NOTED	NAVFAC		DRAWING NO.: FIGURE 4-4 / REV: 0

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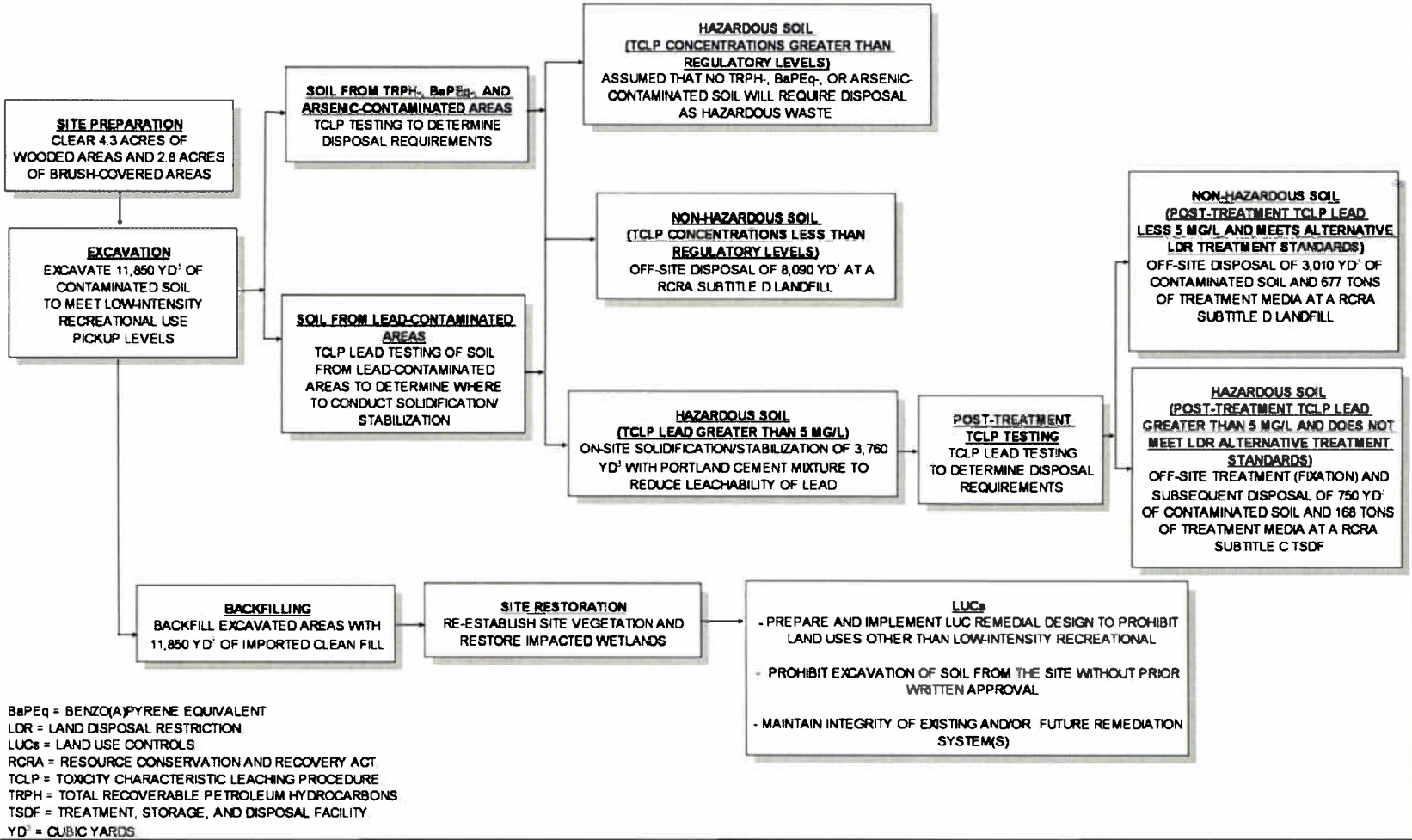

BaPEq = BENZO(A)PYRENE EQUIVALENT
LDR = LAND DISPOSAL RESTRICTION
LUCs = LAND USE CONTROLS
RCRA = RESOURCE CONSERVATION AND RECOVERY ACT
TCLP = TOXICITY CHARACTERISTIC LEACHING PROCEDURE
TRPH = TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
TSDF = TREATMENT, STORAGE, AND DISPOSAL FACILITY
YD³ = CUBIC YARDS

DRAWN BY MJJ	DATE 04Apr06	ALTERNATIVE 3C: EXCAVATION TO MEET RECREATIONAL RAOs, ON-SITE SOLIDIFICATION/STABILIZATION, OFF-SITE TREATMENT AND DISPOSAL, AND LUCs OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4-5 / REV 0

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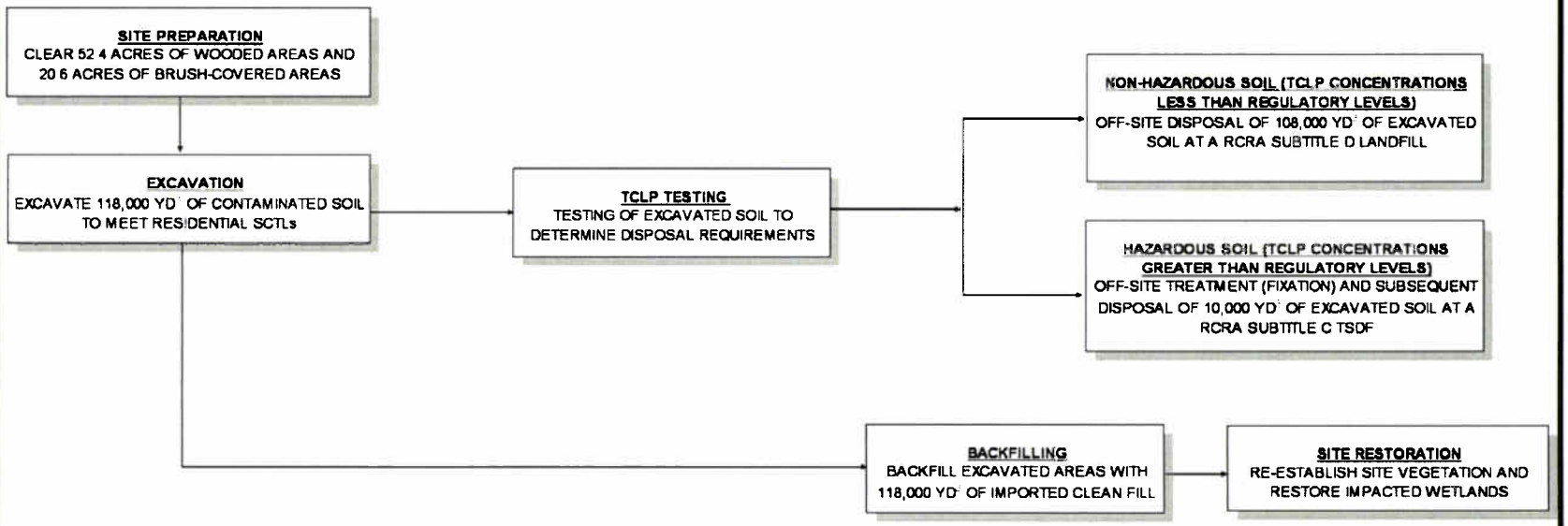

RCRA = RESOURCE CONSERVATION AND RECOVERY ACT
SCTLs = SOIL CLEANUP TARGET LEVELS
TCLP = TOXICITY CHARACTERISTIC LEACHING PROCEDURE
TSDF = TREATMENT, STORAGE, AND DISPOSAL FACILITY
YD³ = CUBIC YARDS

DRAWN BY: MJJ	DATE: 04Apr06	ALTERNATIVE 4A: EXCAVATION TO ALLOW UNRESTRICTED SITE USE AND OFF-SITE TREATMENT AND DISPOSAL OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER: 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
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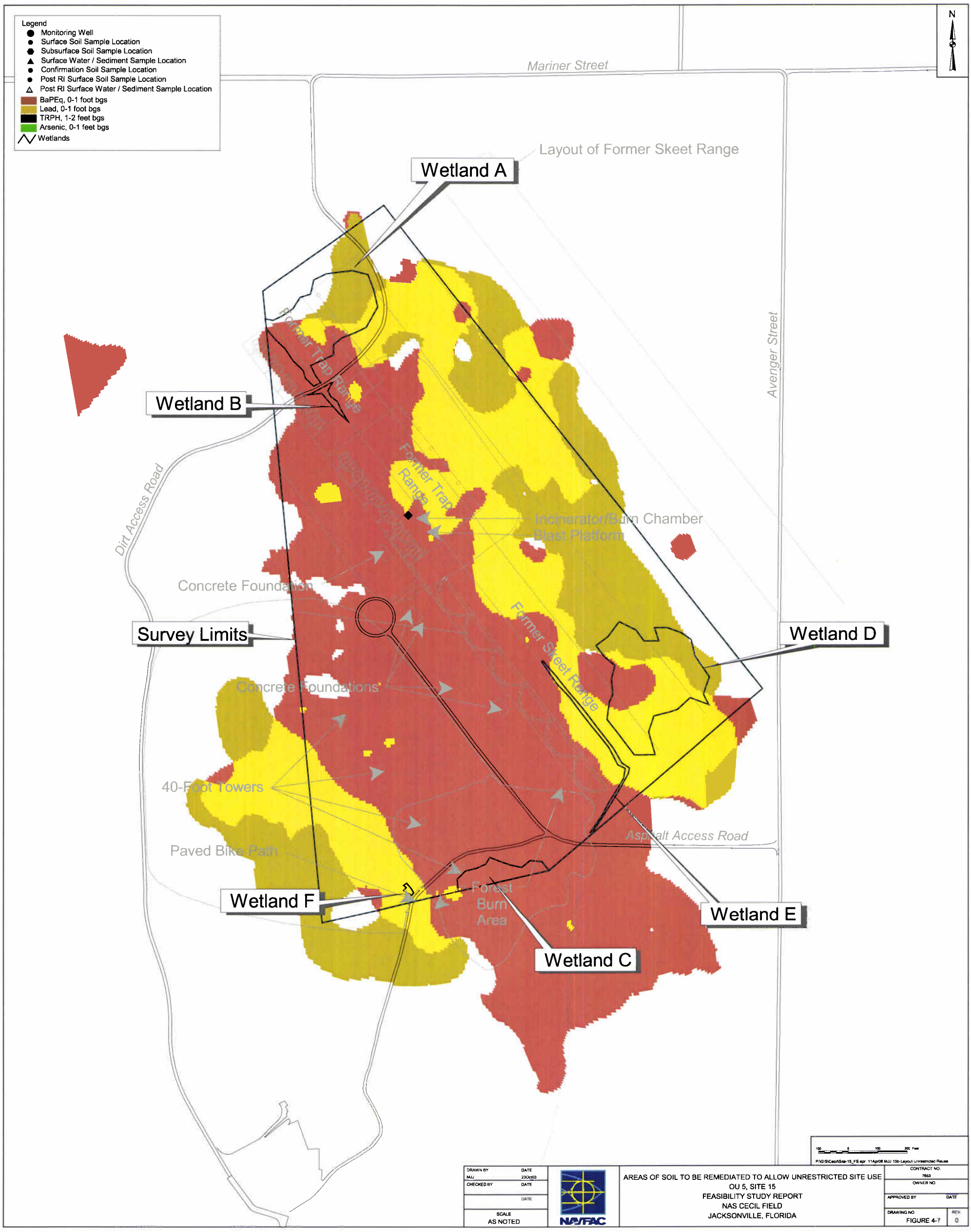
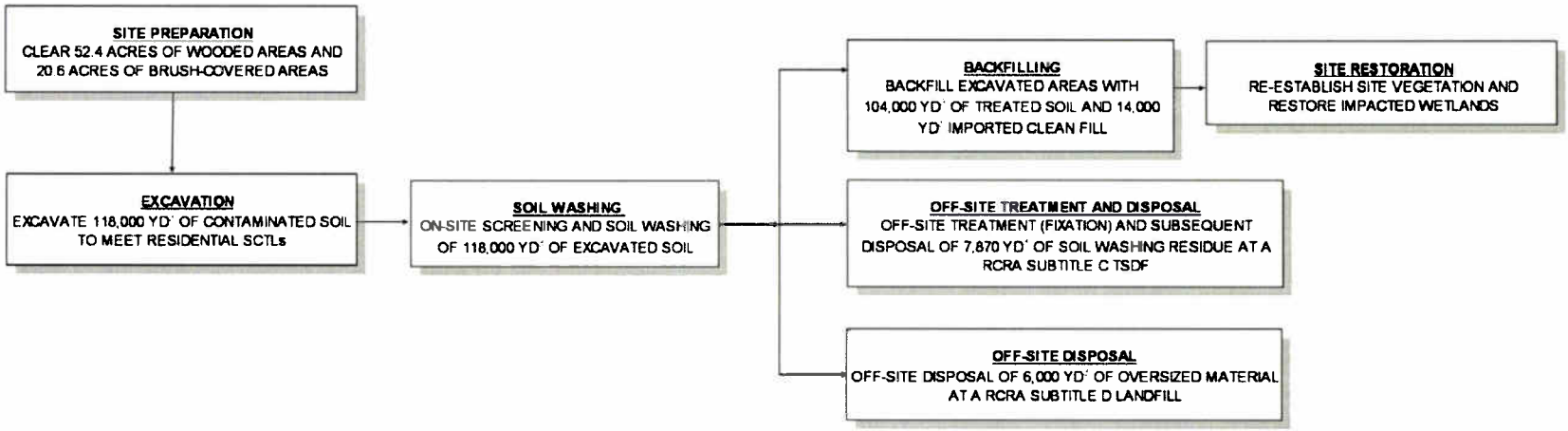

Legend
Monitoring Well
Surface Soil Sample Location
Subsurface Soil Sample Location
Surface Water / Sediment Sample Location
Confirmation Soil Sample Location
Post RI Surface Soil Sample Location
Post RI Surface Water / Sediment Sample Location
BaPEq, 0-1 foot bgs
Lead, 0-1 foot bgs
TRPH, 1-2 feet bgs
Arsenic, 0-1 feet bgs
Wetlands
N
Mariner Street
Layout of Former Skeet Range
Wetland A
Wetland B
Wetland C
Wetland D
Wetland E
Wetland F
Survey Limits
Avenger Street
Dirt Access Road
Former Trap Range
Former Trap Range
Incinerator/Burn Chamber
Blast Platform
Concrete Foundation
Former Skeet Range
Concrete Foundations
40-Foot Towers
Asphalt Access Road
Paved Bike Path
Forest Burn Area
DRAWN BY MJJ DATE 23Oct03
CHECKED BY DATE
SCALE AS NOTED
NAVFAC
AREAS OF SOIL TO BE REMEDIATED TO ALLOW UNRESTRICTED SITE USE
OU 5, SITE 15
FEASIBILITY STUDY REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO. 7853
OWNER NO
APPROVED BY DATE
DRAWING NO FIGURE 4-7
REV 0



RCRA = RESOURCE CONSERVATION AND RECOVERY ACT
SCTLs = SOIL CLEANUP TARGET LEVELS
TSDF = TREATMENT, STORAGE, AND DISPOSAL FACILITY
YD³ = CUBIC YARDS

DRAWN BY MJJ	DATE 04Apr08	ALTERNATIVE 4B: EXCAVATION TO ALLOW UNRESTRICTED SITE USE AND ON-SITE TREATMENT AND REUSE OU 5, SITE 15 AMENDED FEASIBILITY STUDY REPORT NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-8 / REV 0

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5.0 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

This section compares the analyses presented for each of the remedial alternatives in Section 4.0 of this FS. The criteria for comparison are identical to those used for the detailed analysis of individual alternatives.

The following remedial alternatives for soil are being compared in this section:

- 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 Treatment and Reuse

5.1 OVERALL PROTECTION OF HEALTH AND THE ENVIRONMENT

Alternative 1 would not be protective. Alternatives 2, 3A, 3B, 3C, 4A, and 4B would be protective; however, because of the dependence on LUCs to prevent residential, commercial/industrial, and high and medium-intensity recreational uses in the future, Alternatives 2, 3A, 3B, and 3C would be ranked lower than Alternatives 4A and 4B. Alternatives 3A, 3B, and 3C would be ranked higher than Alternative 2 because of the removal of contaminated soil in the former. Alternatives 3B and 4B would be ranked marginally higher than Alternatives 3A and 4A, respectively, because of their use of on-site treatment to remove COCs. Alternative 3C would be as protective as Alternative 3B because the COCs would no longer be on site after the action was conducted.

5.2 COMPLIANCE WITH ARARS AND TBCS

Alternative 1 would not comply with chemical-specific or location-specific ARARs. Action-specific ARARs do not apply to Alternative 1. Alternative 2 would not comply with chemical-specific ARARs, but exposure to soil with contaminant concentrations greater than these ARARs would be prevented by the soil cover and LUCs. Alternatives 3A, 3B, 3C, 4A, and 4B would comply with chemical-, location-, and action-specific ARARs.

5.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1 would not be effective in the long term and offers no permanent solution. Alternatives 2, 3A, 3B, 3C, 4A and 4B offer varying degrees of long-term effectiveness and permanence.

Alternatives 4A and 4B offer remedies that remove COCs from the site without the need for LUCs to prevent residential and commercial/industrial development and medium- and high-intensity recreational use. Alternatives 2, 3A, 3B, and 3C depend on LUCs and may be somewhat less effective in the long term. Because of the removal of COCs from the site with on-site and/or off-site treatment/disposal, Alternatives 3A, 3B, and 3C are superior to Alternative 2, which depends on the maintenance of a soil cover for its effectiveness. Alternative 3B would be marginally superior to Alternatives 3A and 3C because the volume of contaminated material requiring off-site treatment/disposal is smaller, and therefore the relative magnitude of future liability associated with the disposed material is less under Alternative 3B.

5.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternatives 1 and 2 do not employ any treatment. Alternatives that employ treatment are ranked in the following order of decreasing volumes of soil treated: Alternative 4B (112,000 yd^3), Alternative 3B (11,250 yd^3), Alternative 4A (10,000 yd^3), and Alternatives 3A and 3C (3,760 yd^3). However, only Alternatives 3B and 4B would reduce the volume and toxicity of soil COCs at the site by irreversible treatment. Alternative 3B would treat 11,250 yd^3 of contaminated soil to reduce BaPEq concentrations by over 90 percent and 3,760 yd^3 of high lead-content soil (included in the 11,250 yd^3) to attain the lead UTS, resulting in approximately 790 yd^3 (or 1,600 tons) of highly contaminated filter cake treatment residue being removed from the site. Alternative 4B would treat 112,000 yd^3 of contaminated soil to reduce BaPEq concentrations by over 99 percent and 10,000 yd^3 of high lead-content soil (included in the 112,000 yd^3) to attain the lead UTS, resulting in approximately 7,870 yd^3 (or 15,900 tons) of highly contaminated filter cake treatment residue being removed from the site. Alternatives 3A and 4A would reduce the mobility of COCs by off-site treatment of a portion of the excavated soil, and Alternative 3C would reduce the mobility of COCs by on-site and off-site treatment of a portion of the excavated soil. The off-site treatment volume for Alternative 4A would be 10,000 yd^3 compared to 3,760 yd^3 for Alternative 3A to achieve lead mobility reduction. Alternative 3C would include on-site treatment of 3,760 yd^3 of lead-contaminated soil to reduce mobility and subsequent additional off-site treatment of 750 yd^3 of this soil to further reduce mobility.

5.5 SHORT-TERM EFFECTIVENESS

All of the alternatives would be effective in the short term with respect to short-term risks to workers, the community, and the environment, except Alternative 1 for which there are no relevant issues to address. Alternatives 3B and 4B would require less off-site transport of soil and therefore would have less of an impact on the community during implementation. Alternative 2 would involve the least volume of excavation and movement of contaminated soil and is likely to pose the least short-term risk. Alternatives 3A and 3C have similar amounts of soil transported and disposed, but lead-contaminated soil transported under alternative 3C would be stabilized and therefore present less risk to transportation workers, the community, and the environment. However, Alternative 3C involves more potential worker contact with the soil during on-site solidification/stabilization. Alternative 3A is less likely to pose a short-term risk than Alternative 4A because of the lower volume of contaminated soil being excavated. Short-term risks for all alternatives, except Alternative 1, would be properly mitigated by application of engineering controls and adherence to OSHA requirements. Alternative 1 would not achieve the soil RAOs. The approximate time frames for implementation and attainment of RAOs would be 1 year for Alternatives 2, 3A, 3B, and 3C, 2 years for Alternative 4A, and 3 years for Alternative 4B.

5.6 IMPLEMENTABILITY

Alternative 1 would be readily implementable because there is no action to implement. The other alternatives would be ranked in the following decreasing order of ease of implementability: Alternative 4A, Alternative 3A, Alternative 2, and Alternatives 3B, 3C, and 4B. Alternative 4A would be the easiest to implement because no on-site treatment or long-term maintenance would be required. Alternative 3A would be expected to be somewhat more difficult to implement than Alternative 4A because of the need to maintain long-term site monitoring and LUCs. Alternative 2 would require maintenance of LUCs as well as maintenance of the cap. Alternatives 3B, 3C, and 4B employ on-site treatment, which requires specialized engineering and trained technicians, and therefore they are likely to be more difficult to implement. Alternative 4B would require treatability studies and additional processing to meet more stringent on-site reuse requirements than Alternative 3B. A treatability study would also be required for Alternative 3C.

5.7 COST

The capital costs, NPW of O&M costs, and NPW costs of the alternatives are as follows. Costs have been rounded to the nearest $1,000 to reflect the preliminary nature of the estimates. Detailed cost estimates are provided in Appendix G.

Alternative	Capital ($)	30-Year NPW of O&M ($)	30-Year NPW ($)
1	0	0	0
2	1,373,000	59,000	1,620,000
3A	3,872,000	35,000	3,907,000
3B	4,415,000	35,000	4,450,000
3C	2,767,000	35,000	2,767,000
4A	20,100,000	0	20,100,000
4B	27,114,000	0	27,114,000

5.8 SUMMARY OF COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

Table 5-1 summarizes the comparative analysis of the soil remedial alternatives.

TABLE 5-1

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES
SITE 15 AMENDED FEASIBILITY STUDY
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 Washingt 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 Alternative 4	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
ARARs Applicable or Relevant and Appropriate Requirements
BaPEq Benzo(a)pyrene equivalent
LUCs Land use controls
NPW Net present worth
O&M Operation and maintenance
RAOs Remedial Action Objectives
TBCs To Be Considered
TCLP Toxicity Characteristic Leaching Procedure
UTS Universal Treatment Standard

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. October.

ABB-ES, 1998. Feasibility Study, Operable Unit 5. Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. March.

BCT [Base Realignment and Closure (BRAC) Cleanup Team], 2006. Meeting of October 4, 2006, Minute No. 2344, Decision No. 713.

Efroymson, R.A., M.E. Will, and G.W. Suter II. 1997. Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and heterotrophic Process: 1997 Revision. Oak Ridge National Laboratory. November. ES/ER/TM-126/R2.

Envirodyne Engineers, 1985. Initial Assessment Study of Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Energy and Support Activity, NEESA 13-073. Port Hueneme, California.

FDEP (Florida Department of Environmental Protection), 2001. FDEP Technical Review of the Technical Memorandum for No Further Groundwter Monitoring at U5, Site 15, Naval Air Station Cecil Field. Letter to Mr. Mark Davidson from Mr. David Grabka. August 30.

FDEP, 2002. FDEP Standard Operating Procedures FS2200. F.A.C. Chapter 62-160, Quality Assurance Rule, April.

FDEP, 2005. Contaminant Cleanup Target Levels. Florida Administrative Code (F.A.C.) Chapter 62-777. April.

HLA (Harding Lawson Associates), 1988. RCRA Facilities Investigation Report, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. March.

HLA, 1998a. NAS Cecil Field Inorganic Background Data Set. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. July.

HLA, 1998b. Basewide Ecological Assessment Report, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. September.

MacDonald, D.D., C.G., Ingersoll, D.E. Smorong, R.A. Lindskoog, G. Sloane, and T. Biernacki, 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Prepared for Florida Department of Environmental Protection. Tallahassee, Florida. January.

Newfields, 2004. Geostatistical Assessment Report, OU 5, Site 15, Naval Air Station Cecil Field. October 19

TtNUS (Tetra Tech NUS, Inc.), 1998. Base-Wide Generic Work Plan at NAS Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. October.

TtNUS, 2000. Sampling and Analysis Plan, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field. March.

TtNUS, 2001a. Final Work Plan for Operable Unit 5, Site 15, Naval Air Station Cecil Field. prepared for NAVFAC EFD SOUTH, North Charleston, South Carolina. June.

TtNUS, 2001b. Development of Ecologically-Based Remediation Goals for Lead and PAHs in Soil, Site 15, Blue 10 Ordnance Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, June.

TtNUS, 2003a. Phase X Sampling and Analysis Plan Revision 1, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field. June.

TtNUS, 2003b. Wetland Delineation Report for Operable Unit 5, Site 15, Naval Air Station Cecil Field. Prepared for NAVFAC EFD SOUTH, North Charleston, South Carolina. December.

TtNUS, 2006a. Technical Memorandum for No Further Groundwater Monitoring at OU 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field. Prepared for NAVFAC EFD SOUTH, North Charleston, South Carolina. June.

TtNUS, 2006b. Sampling and Analysis Work Plan, Round VI for Groundwater, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. August 22.

USDA (United States Department of Agriculture), 1978. Soil Survey of City of Jacksonville, Duval County, Florida. Soil Conservation Service.

U.S. EPA (United States Environmental Protection Agency), 1988. Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA

U.S. EPA, 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, EPA/600/R-93/089, Office of Research and Development, Washington, DC .

U.S. EPA, 1996. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. Technical Working Group for Lead, Washington, DC.

U.S. EPA Region 4, 1996. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. Athens, GA. May.

U.S. EPA, 1997. Exposure Factors Handbook, Office of Research and Development, National Center for Environmental Assessment, EPA/600/8-89/043, Washington, D.C.

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

APPENDIX A

GROUNDWATER TECHNICAL MEMORANDUM FOR NO FURTHER ACTION

Technical Memorandum
for
No Further Groundwater Monitoring
at
OU 5, Site 15
Blue 10 Ordnance Disposal Area

Naval Air Station Cecil Field
Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888

Contract Task Order 0039

August 2001

Revised December 2003

REVISION 1
DECEMBER 2003

TECHNICAL MEMORANDUM
FOR NO FURTHER GROUNDWATER MONITORING
OU 5, SITE 15
BLUE 10 ORDNANCE DISPOSAL AREA

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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This document that describes this Technical Memorandum for Operable Unit 5, Site 15, Blue 10 Ordnance Disposal Area at Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

_____

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LIST OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc
BCT	BRAC Cleanup Team
bgs	below ground surface
BRAC	Base Realignment and Closure
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FGS	Florida Geologic Survey
ft/ft	feet per foot
GCTL	Groundwater Cleanup Target Level (FDEP)
IBDS	Inorganic Background Data Set
HLA	Harding Lawson Associates
HMX	cyclotetramethylenetetranitramine
i	hydraulic gradient
IAS	Initial Assessment Study
IR	Installation Restoration
K	hydraulic conductivity
MCL	Maximum Contaminant Level (USEPA)
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
n	effective porosity
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NC	no criterion
NGVD	National Geodetic Vertical Datum
NTU	nephelometric turbidity unit
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PEL	probable effect level

PETN	pentaerythritoltetranitrate
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylenetrinitramine
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SCTL	Soil Target Cleanup Level (FDEP)
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TEL	threshold effect level
TNB	trinitrobenzene
TNT	trinitrotoluene
TOC	total organic carbon
TRPH	total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
USDA	U.S. Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
UXO	unexploded ordnance
V	velocity
VOC	volatile organic compound
yd^3	cubic yard

1.0 INTRODUCTION

This Technical Memorandum for Operable Unit (OU) 5, Site 15, Blue 10 Ordnance Disposal Area (Site 15) at Naval Air Station (NAS) Cecil Field, has been prepared by Tetra Tech NUS, Inc. (TtNUS) for the Department of the Navy Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). The work was conducted under the Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0039. The Base Realignment and Closure (BRAC) Cleanup Team (BCT) elected to resample and evaluate the groundwater at Site 15 for potential leaching of polynuclear aromatic hydrocarbons (PAHs), nitroaromatic compounds, and metals from contaminated soil.

TtNUS performed a field investigation at Site 15 in April/May 2000 AND IN July 2003 to supplement the results of previous investigations. The purpose of the April/May 2000 investigation was to collect groundwater samples from existing monitoring wells and evaluate the results to determine the extent of PAHs, nitroaromatic compounds, and metal contamination, if any. The purpose of the July 2003 investigation was to install new monitoring wells at locations with concentrations of soil contamination greater than the Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for leachability to groundwater and to collect groundwater samples from these new wells to determine if the groundwater has been impacted by the soil contamination. The July 2003 investigation was conducted as a confirmatory sampling event to verify that there were no impacts to groundwater, as requested by the FDEP (FDEP, 2001 and BCT, 2003).

This technical memorandum presents information from the previous investigations conducted at Site 15 including the confirmation groundwater investigations conducted in April/May 2000 and July 2003 by TtNUS. This report also includes related field operations, results, conclusions, and recommendations associated with the groundwater at Site 15.

2.0 SITE BACKGROUND

The following sections describe the background of Site 15. Figure 2-1 provides a site location map. Figure 2-2 shows features in the vicinity of the site. Figure 2-3 provides the current, general arrangement of the site.

2.1 SITE DESCRIPTION

Site 15 is located in the southwest section of the Yellow Water Weapons Area (Figure 2-1). The area of investigation is approximately 85 acres with elevations ranging from approximately 79 feet National Geodetic Vertical Datum (NGVD) to 72 feet NGVD. The site is heavily forested, primarily with slash pine and understory vegetation and includes a paved access road, oriented northwest to southeast.

The ordnance burn chamber and static rocket firing pad are the only structures currently at the site. The burn chamber is a rounded, steel, tank-like container, approximately 10 feet in length and 4 feet in height. The chamber has a burn stack that rises approximately 3 feet above the body of the chamber. Access is gained to the chamber through a 2-foot by 2-foot hinged door. When full, the burn chamber can accommodate 1.5 cubic yards (yd^3) of material. The static rocket firing pad is an L-shaped concrete structure approximately 10 feet long by 4 feet wide by 6 feet high. Steel firing rods are seated into the concrete at 45-degree angles. Several concrete building foundations, remnants of buildings that supported skeet range activities, are located in the area surrounding the burn chamber and firing pad.

An area of stressed vegetation, referred to as the forest burn area, is present in the south-central portion of the site, approximately 900 feet south of the burn chamber and firing pad. Several slash pines are partially burned in this area. Controlled burns (burning of low-level vegetation in and around the trunks of slash pine) are commonly undertaken in this area to control understory growth in the planted pine forests. This is an area where elevated PAH concentrations were detected.

Drainage features are not distinct in the central portion of the site. The primary drainage feature is a stream located south of the ordnance disposal area that drains the southern part of the site into a low-lying, swampy area and eventually into Yellow Water Creek. The northern part of the site drains overland into a swamp, which drains into Caldwell Branch (located approximately 1,000 feet west of the site) and eventually into Yellow Water Creek.

The majority of Site 15 remains dry throughout the year; however, the central area of the site may contain 2 to 4 inches of standing water during portions of the year. The historic area of Site 15 (ordnance burn chamber and firing pad) is approximately one-half acre in size and is located in the central-western part of

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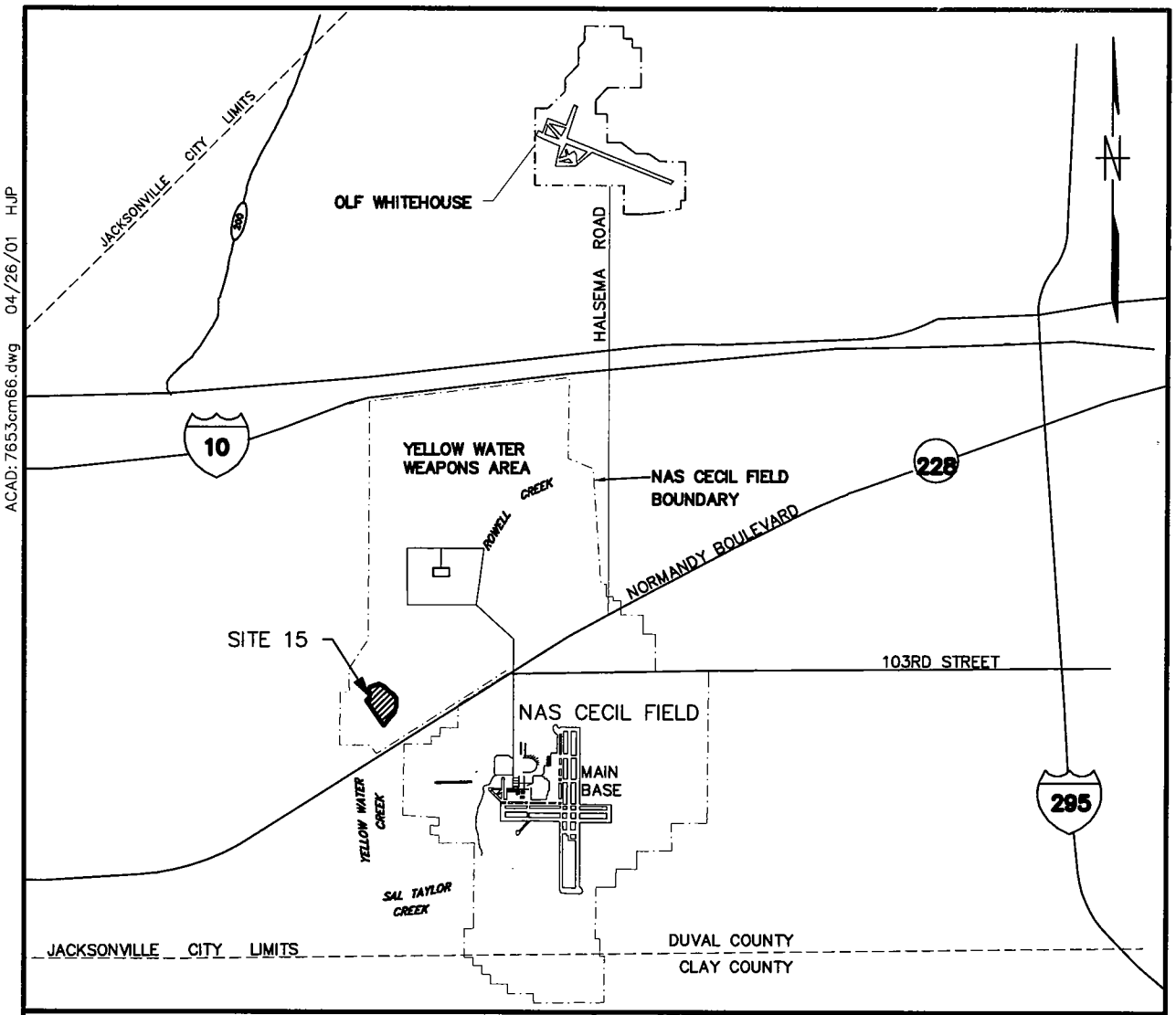

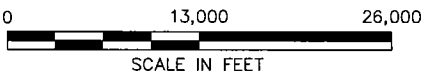

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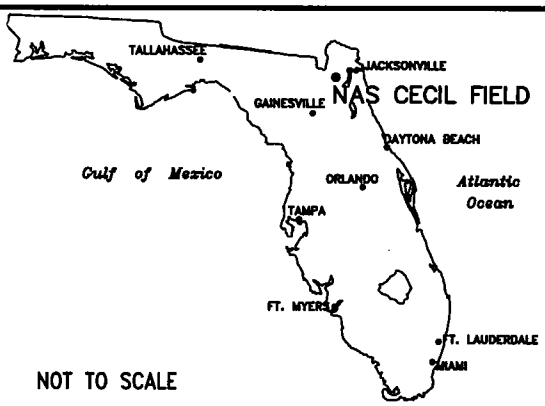

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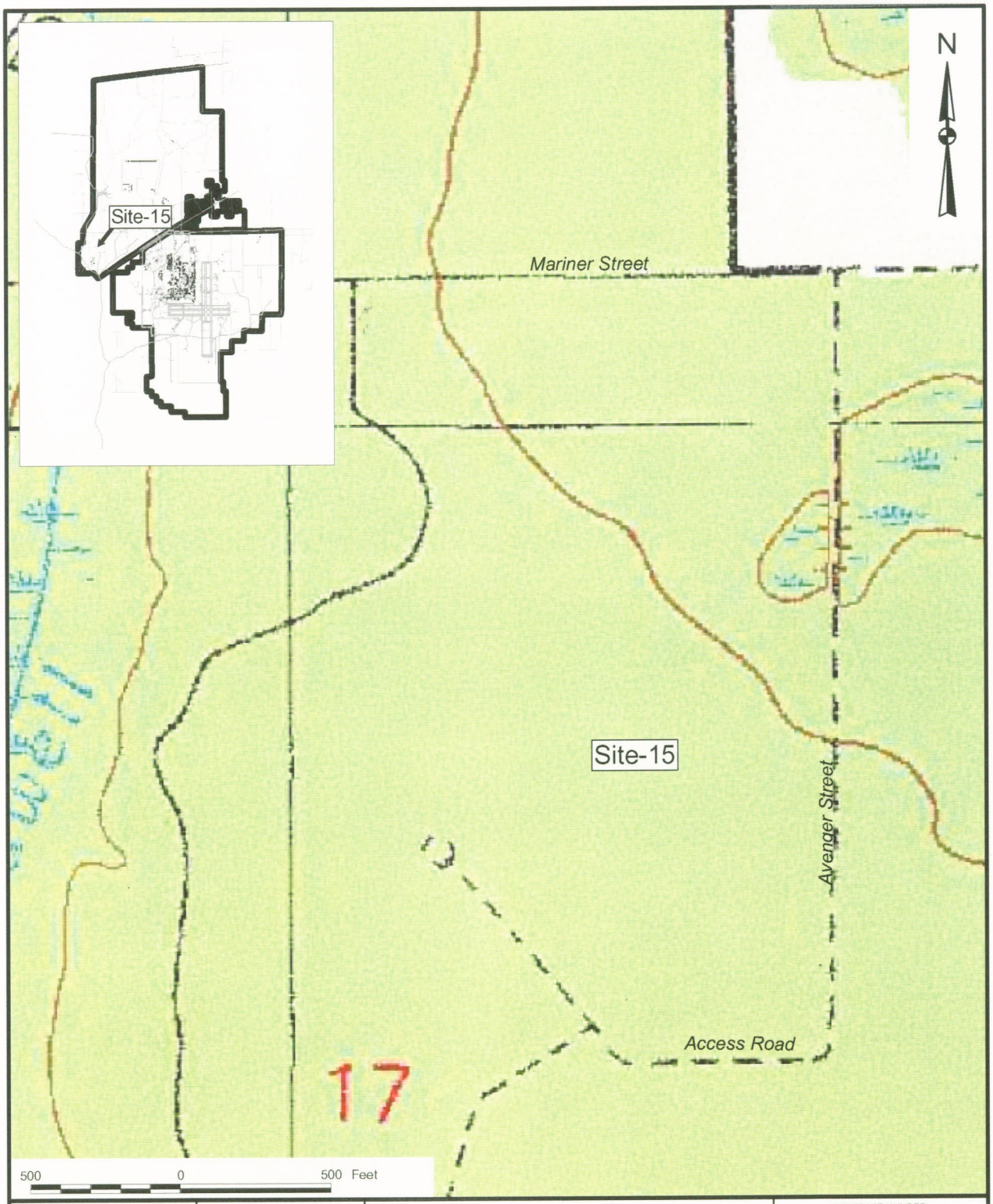

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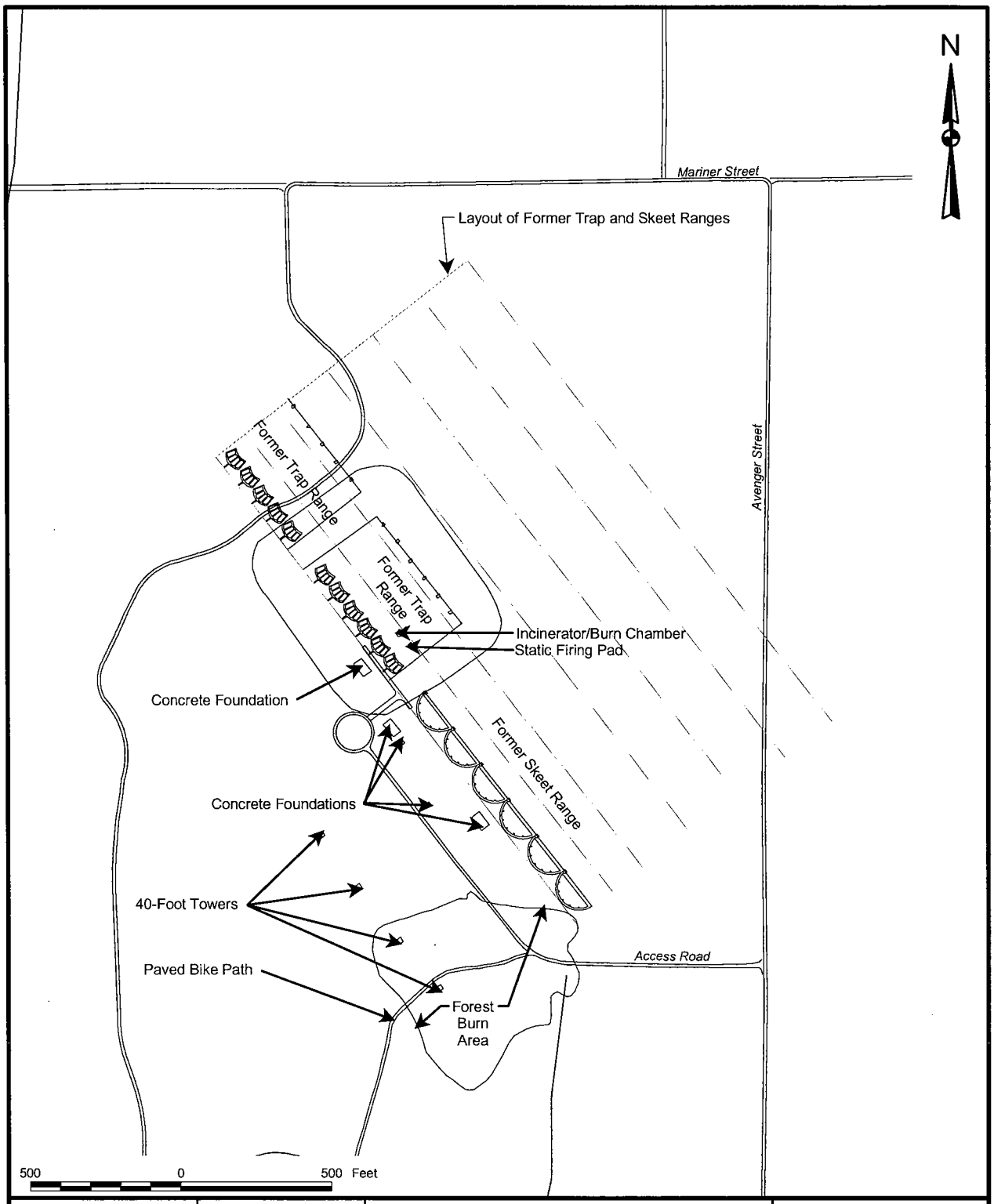

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the skeet range that encompasses much of the eastern area of the site. However, evaluation of the surface soil screening data indicated surface soil contamination, which caused the site to increase in size to approximately 85 acres, extending radially around the burn chamber and firing pad and downrange of the shooting area. The trap and skeet range was included because it was interpreted that lead shot from shooting activities provided the main source of lead contamination. The forest burn area was included because combustion products of wood may produce organic residue similar to other organic burning reactions. This area is heavily planted with slash pines, and typically supports a 4- to 6-inch cover of duff (pine straw and other forest detritus) over the land surface. The primary residuals produced from wood and forest floor duff and litter burning would be PAHs.

2.2 SITE 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 of at Site 15 from the mid-1960s through 1977 and consisted of burning of ordnance materials in a large metal chamber and static firing of rockets (Envirodyne Engineers, 1985). The ordnance disposal structures were located west of the skeet range. The majority of ordnance disposed of 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 ignitors, 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 of 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 of at the site each month; overall an estimated 350 tons of ordnance was disposed of at the site while 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 located 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. Forest burning has continued to take place in the southwestern corner of Site 15. The latest burning event took place in the spring of 1999 just prior to the latest Site 15 soil sampling event that occurred in June 1999.

2.3 SITE CHARACTERISTICS

2.3.1 Surface Hydrology

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 stream, 500 feet in length, that drains the south-central section of the site. It appears to be a natural drainage conduit, that begins in a shallow depression, 3 to 4 feet in depth and 10 to 12 feet in width. This shallow depression is located adjacent to and south of the paved road in the south-central portion of the site and drains south into a swampy area and ultimately into the Yellow Water Creek. Flow through the stream, although generally continuous, is dependent upon rainfall and could be fed by groundwater at certain times of the year. The second drainage pathway is a stream that flows past the northwest perimeter of the site. This stream is relatively shallow, 8 to 10 inches in depth and approximately 2 to 3 feet wide. Flow through the stream is continuous and the rate of flow depends upon rainfall. This stream drains southwest into Caldwell Branch and ultimately into Yellow Water Creek.

2.3.2 Geology

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. Depth-to-water in the soil types ranges from less than 10 inches below ground surface (bgs) for two to four 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 [U.S. Department of Agriculture (USDA), 1978].

The subsurface geologic materials recovered during monitoring well installation activities indicate that the site is underlain by undifferentiated, fine-grained sand. Lenses and stringers of silty or clayey material may be encountered intermittently. The stringers are generally less than 1 inch thick and are not continuous. Lithologic descriptions recorded during monitoring well installation indicate that sand is present from ground surface to 14 feet bgs, the total depth of the wells.

2.3.3 Hydrogeology

Three water-bearing systems are present beneath Site 15 according to the Florida code of hydrostratigraphic nomenclature as described in the Florida Geologic Survey (FGS) Special Publication 28 (FGS, 1986). These units include, in descending order, the Surficial Aquifer system, the Intermediate Aquifer or Secondary Artesian 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 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 upon 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 each of the monitoring well lithologic logs. Each monitoring well was screened across the water table in the upper zone of the Surficial Aquifer.

2.3.3.1 Florida Groundwater Classification

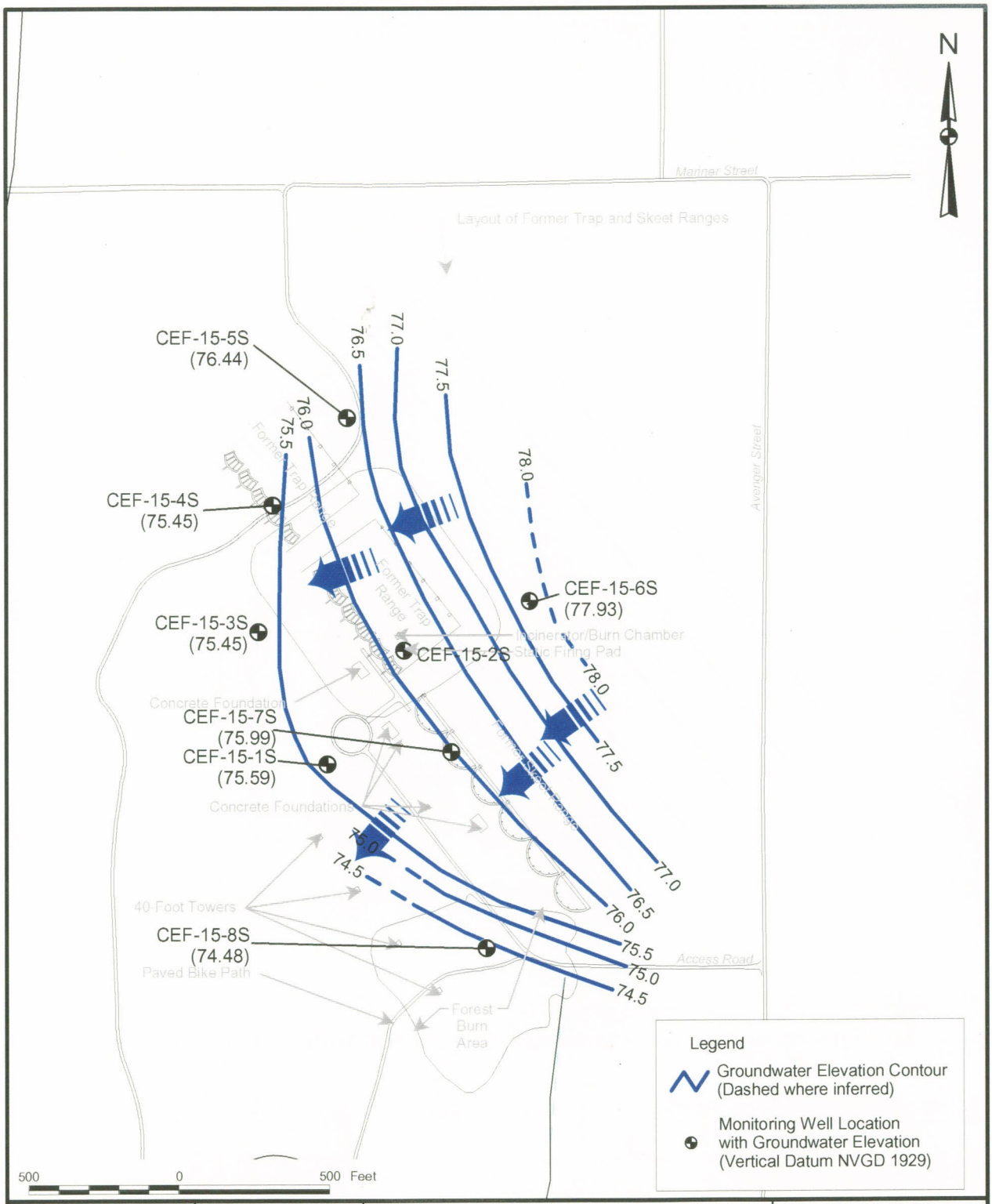
According to Florida Administrative Code (FAC) 62-520.410 (Classification of Ground Water, Usage, Reclassification), the Surficial Aquifer system in northeast Florida comes under the classification of G-II. The code's definition of G-II is as follows: "Potable water use, groundwater in aquifers which has a total dissolved solids content of less than 10,000 milligrams per liter (mg/L), unless otherwise classified by the Commission." The total dissolved solids levels of the Surficial Aquifer system in the area of NAS Cecil Field have been shown to be between 146 and 309 mg/L (Fairchild, 1972). Also, the Surficial Aquifer system is suitable for domestic use.

2.3.3.2 Aquifer Characteristics

During the Remedial Investigation (RI), the direction of groundwater flow in the Surficial Aquifer at Site 15 was assessed by collecting water-level elevation measurements from monitoring wells at the site. These data were utilized to estimate hydraulic gradient calculated from groundwater-level elevation data. Hydraulic conductivity, a quantitative measurement of permeability within an aquifer, also was estimated at each monitoring well location through collection and analysis of slug test data (Bouwer & Rice, 1976). Using these data and an estimated effective porosity of 0.20 [U.S. Geological Survey (USGS), 1996], flow rates within the Surficial Aquifer were estimated.

Groundwater-level elevation measurements were recorded periodically for piezometers and monitoring wells at Site 15. Review and evaluation of the water-level elevation data collected from four piezometers installed at the site indicated groundwater flow was to the west and southwest. Groundwater flow directions established from piezometric data were similar to the directions established as a result of monitoring well groundwater-level elevation data.

Two rounds of water-level elevation data were collected from Site 15 monitoring wells during the RI. The first round was collected on April 15, 1995, and the second round was collected on September 6, 1995. Since the flow direction established during each round was to the southwest, only data from the September event is shown on the potentiometric map in Figure 2-4. The horizontal gradient in the



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SCALE AS NOTED				DRAWING NO. FIGURE 2-4 / REV 0

POTENTIOMETRIC MAP SEPTEMBER 1995
SITE 15
TECHNICAL MEMORANDUM
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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Surficial Aquifer at Site 15 was 0.0028 feet per foot (ft/ft) based on April 1995 data and 0.0030 ft/ft based on September 1995 data.

Also during the RI, slug tests were conducted on the Site 15 monitoring wells to estimate horizontal hydraulic conductivity (K). The calculated K values are summarized in Table 2-1 and the data sets and calculations for K are presented in Chapter 6.0 of the OU 5 RI report [ABB Environmental Services, Inc. (ABB-ES), 1997]. Hydraulic conductivity values ranged from 3.1 feet/day to 9.8 feet/day with an average K value across the site of 5.1 feet/day. These values are consistent with NAS Cecil Field Surficial Aquifer K values collected by the USGS (USGS, 1996) and at other NAS Cecil Field Installation Restoration (IR) sites.

The seepage velocity or the rate at which groundwater moves through the aquifer at Site 15 was calculated using a modified form of Darcy's equation:

$$V = Ki / n$$

Where,

V is the horizontal seepage velocity, ft/day
K is the horizontal hydraulic conductivity, ft/day
i is the hydraulic gradient, ft/ft
n is the effective porosity, dimensionless (assumed at 0.20 for fine sands)

Aquifer performance tests conducted at NAS Cecil Field by the USGS indicate that a hydraulic conductivity of 3 feet/day is a representative K value for the entire Surficial Aquifer (USGS, 1996). Using this estimated value for K, an estimated effective porosity (n) of 0.20 (USGS,1996) and hydraulic gradients (i) of 0.0028 ft/ft and 0.0030 ft/ft for Site 15, the seepage velocity was calculated to be 15 to 16 feet/year. When the site-specific hydraulic conductivity value of 5.1 feet/day (representing the upper zone of the Surficial Aquifer at Site 15) was used, the corresponding seepage velocity was calculated to be in the range of 26 to 28 feet/year. Hydrogeologic parameters are summarized in Table 2-2.

TABLE 2-1

HYDRAULIC CONDUCTIVITY ESTIMATES FOR UPPER ZONE SURFICIAL AQUIFER
OPERABLE UNIT 5, SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring Well	Hydraulic Conductivity (ft/day)
CF15MW1S	3.6
CF15MW2S	3.9
CF15MW3S	4.7
CF15MW4S	3.1
CF15MW5S	6.6
CF15MW6S	5.5
CF15MW7S	9.8
CF15MW8S	3.3
Average	**5.1**

NOTE:

Hydraulic conductivity in feet per day as measured from slug test data

TABLE 2-2

SUMMARY OF AQUIFER CHARACTERISTICS FOR UPPER ZONE SURFICIAL AQUIFER
OPERABLE UNIT 5, SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Estimates
Hydraulic Gradient (feet per foot)	0.0028 to 0.0030
Average Hydraulic Conductivity (feet per day)	5.1
Effective Porosity (unitless)	0.20
Estimated Groundwater Seepage Velocity (feet per year)	15 to 16
Site-Specific Groundwater Seepage Velocity (feet per year)	26 to 28

3.0 PREVIOUS INVESTIGATIONS

3.1 DESCRIPTION OF INVESTIGATIONS

The following investigations were performed at Site 15. Figure 3-1 shows the PAH sampling locations selected during the RI screening and confirmatory sampling of Site 15 surface and subsurface soils and sediments. Figure 3-2 shows the lead sampling locations selected during the RI screening and confirmatory sampling of Site 15 surface and subsurface soils and sediments. Figures 3-3 and 3-4 show the trinitrotoluene (TNT) and total recoverable petroleum hydrocarbon (TRPH) sampling locations, respectively, selected during the RI screening of Site 15 surface soils.

- 1985 - An Initial Assessment Study (IAS) was prepared (Envirodyne Engineers, 1985) under the Navy Assessment and Control of Installation Pollutants (NACIP) program, that was eventually replaced by the Navy's IR Program. The IAS consisted of the following stages: (1) records search, (2) onsite survey, (3) confirmation study ranking, (4) site ranking, and (5) confirmation study recommendations.

- 1988 - A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was performed [Harding Lawson Associates (HLA), 1988]. The goals of the RFI were to verify the existence of suspected hazardous constituents at various waste disposal sites, delineate the boundaries of potentially contaminated sites, investigate the surficial aquifer and potable water supply wells, and investigate selected surface areas for possible contamination. Only one surface soil sample was collected at Site 15 under the RFI. A geophysical survey was also conducted at this site.

- 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. The UXO survey was completed at the site prior to the sampling activities. No unexploded ordnance was found; however, several pieces of metal, shell casings, etc. were located and removed. The soil screening program was designed to delineate the nature and extent of PAH, lead, TNT, and TRPH contamination present in surface soil using onsite and offsite data analysis. Surface soil screening consisted of samples being collected from 0 to 1 foot bgs with spacing on 100-foot grid squares over an area approximately 2,000 feet by 3,000 feet except in the area around the burn chamber and static firing pad where the spacing density was increased to 25-foot grid squares over an area 100 feet by 100 feet. Collection and analysis of samples for a target screening parameter continued outward from the burn chamber and firing pad until a "no detection" result could be obtained for that particular parameter, thus delineating the extent of contamination for that parameter. When no detection of a compound was obtained, analysis for that compound ceased while analyses for other target parameters with detections continued outward.

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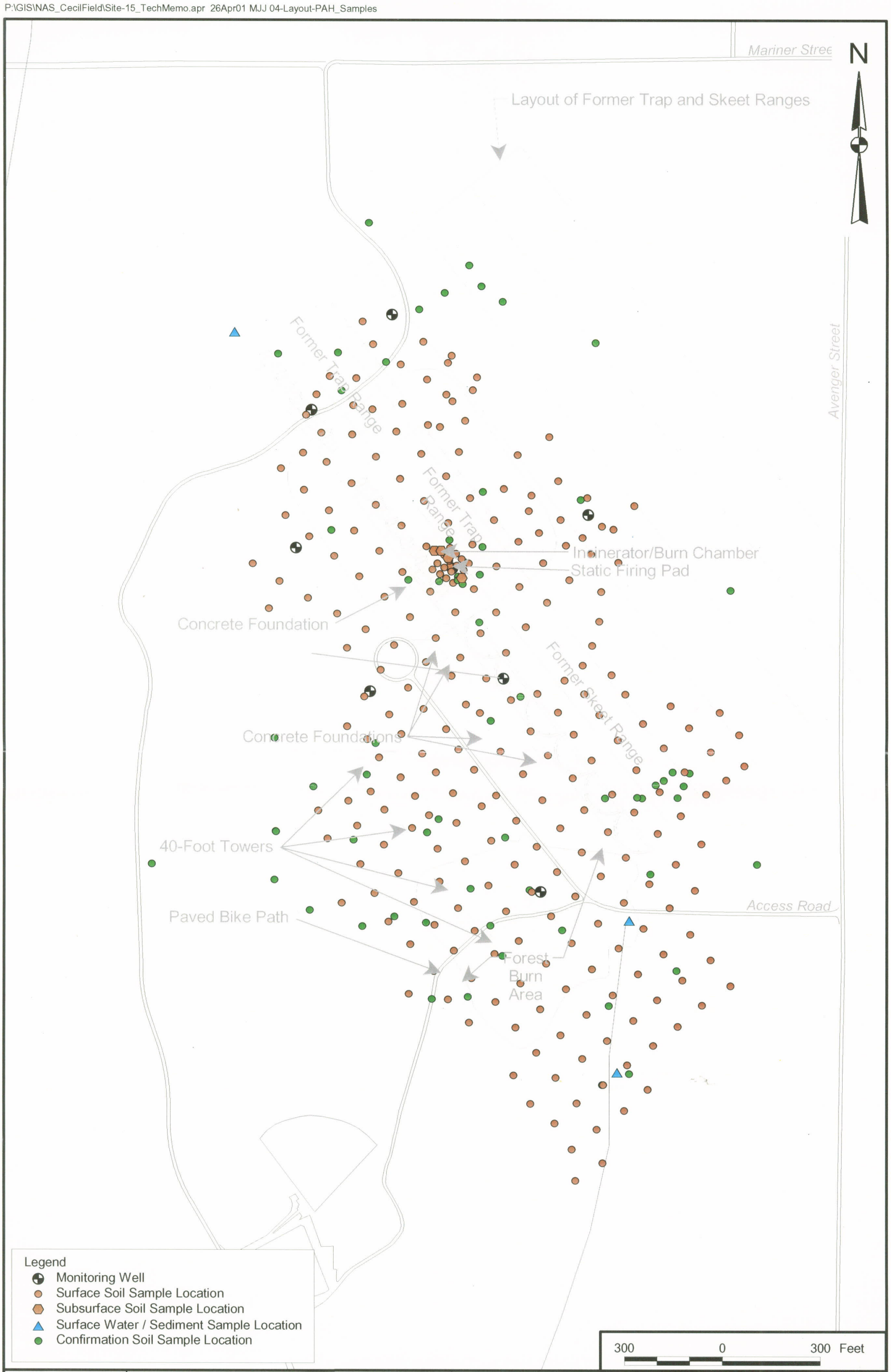

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CHECKED BY — DATE	RI SOIL AND SEDIMENTSAMPLES LOCATIONS PAHs SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY — DATE 05/02/01	
COST/SCHEDULE-AREA		APPROVED BY — DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-1	REV 0

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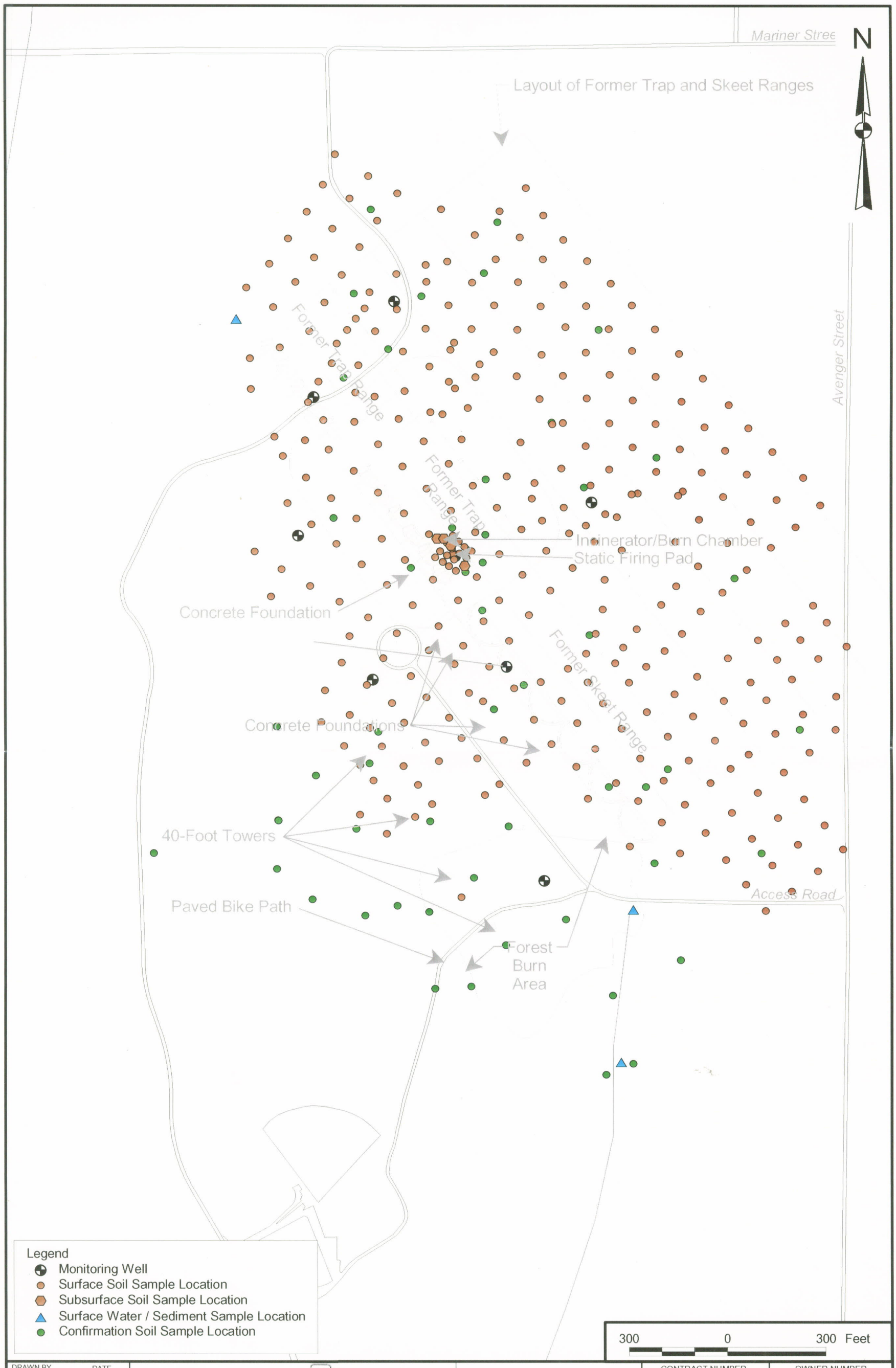

DRAWN BY MJJ	DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY	DATE	RI SOIL AND SEDIMENTSAMPLES LOCATIONS LEAD SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-2	REV 0

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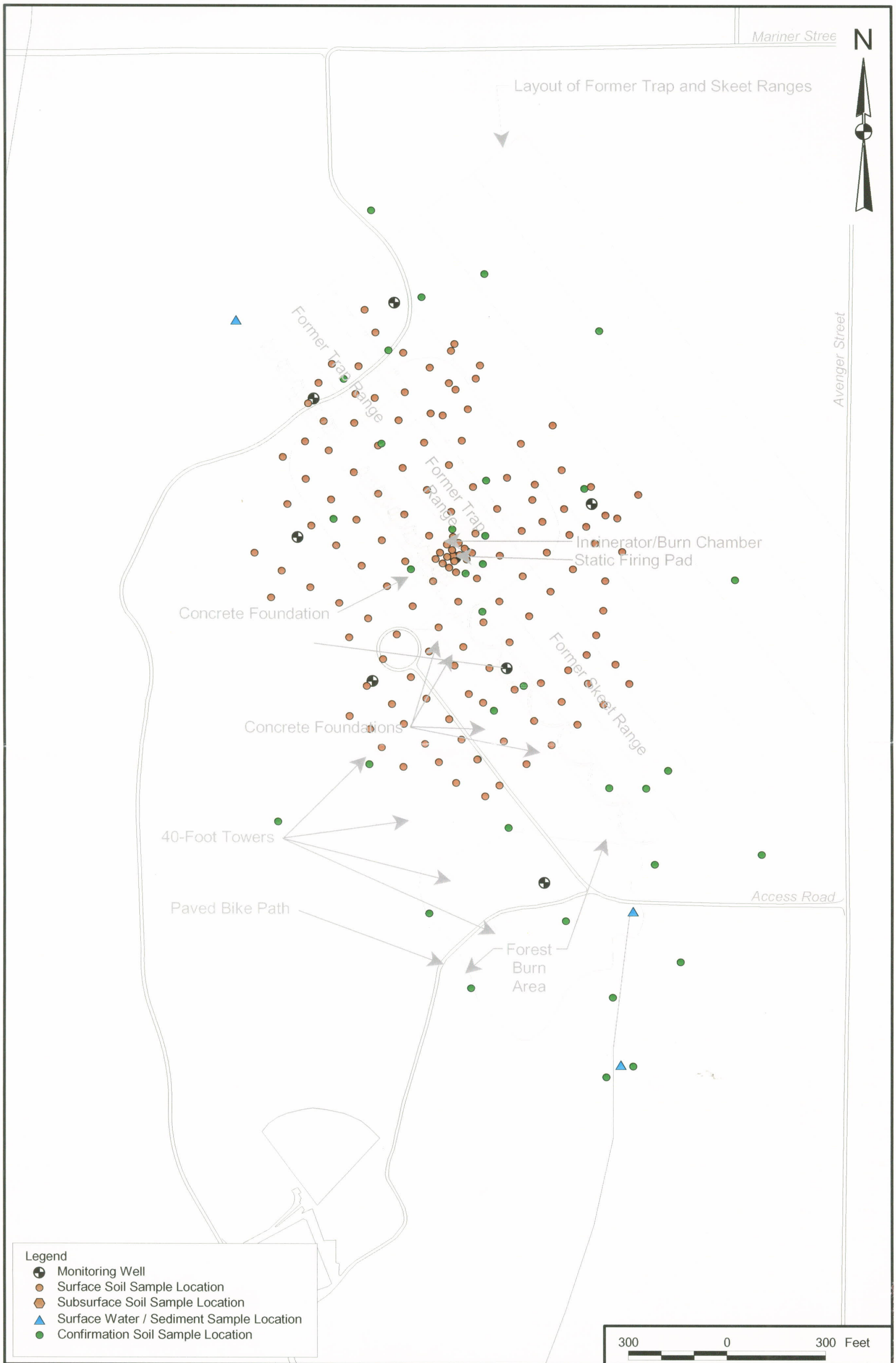

DRAWN BY MJJ	DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY	DATE	RI SOIL SAMPLES LOCATIONS TNT SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-3	REV 0

REVISION 1
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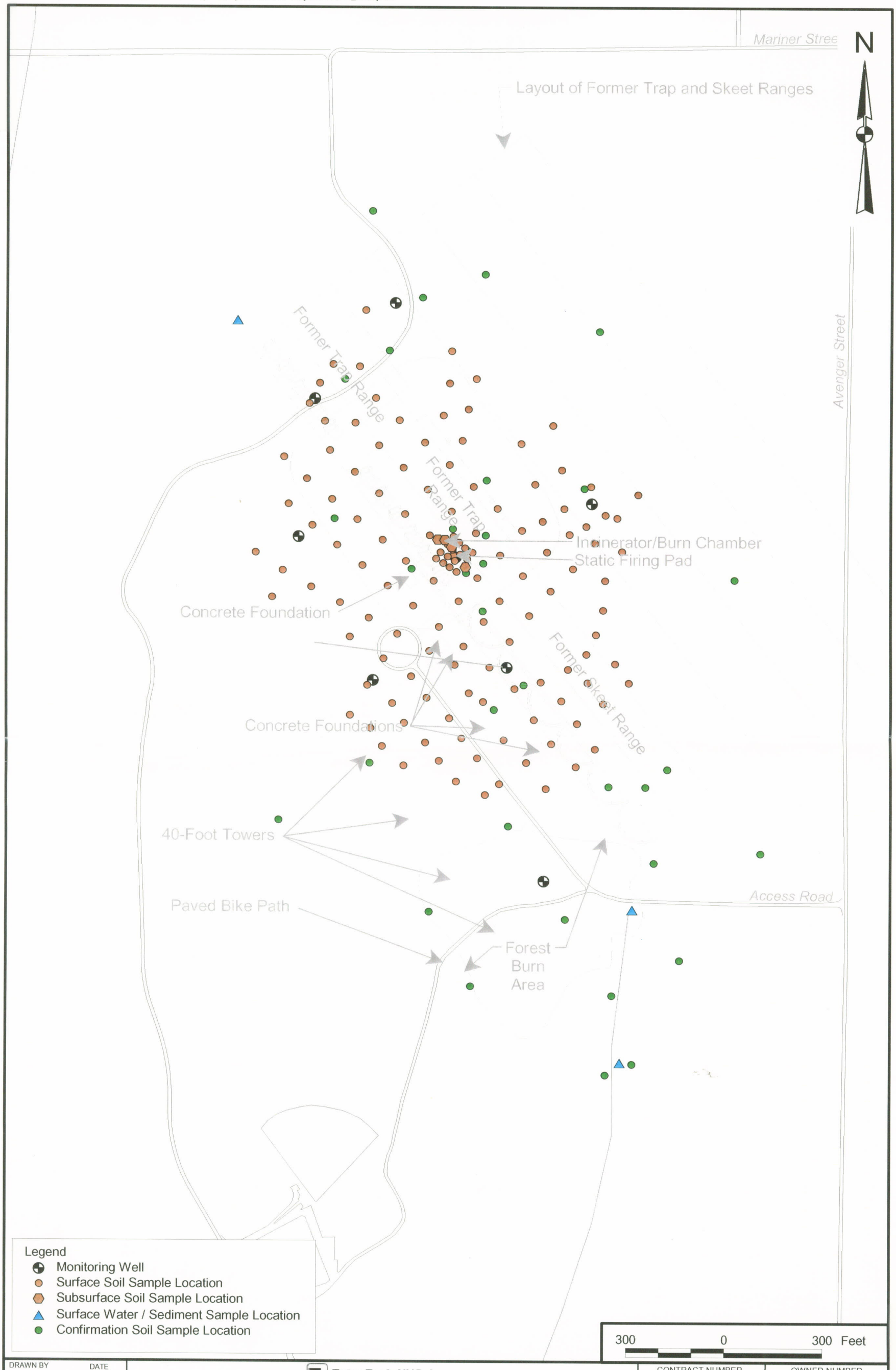

DRAWN BY MJJ DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	RI SOIL SAMPLES LOCATIONS TRPH SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 3-4	REV 0

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This screening technique resulted in varying combinations of analyses for samples collected from the 409 locations. A total of 324 samples were collected for offsite lead analysis, 263 samples were collected for onsite PAH analysis, 146 samples were collected for onsite TNT analysis, and 136 samples were collected for onsite TRPH analysis during the surface soil screening program. Subsurface soil screening consisted of the collection of 16 subsurface soil samples from four soil borings advanced in the area of the burn chamber and static firing pad. Samples were collected a depths of 0 to 1 foot bgs, 1 to 3 feet bgs, 3 to 5 feet bgs, and 5 to 7 feet bgs at each of the four borings. Subsurface soil samples were analyzed offsite for lead and onsite 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 was to the southwest toward Yellow Water Creek. A groundwater screening program was not implemented at Site 15 because the potential contaminants of concern were known to be relatively immobile once sorbed to site soil. However, eight monitoring wells that would be used during the confirmatory sampling event, were selected based on the water level data and installed.

- July/August 1995 – Also as part of the RI (ABB-ES, 1997) a confirmatory sampling event was performed for surface and subsurface soil to verify the nature and extent of contamination in soil detected 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) organic compounds, Target Analyte List (TAL) inorganic compounds, TRPH, and nitroaromatic compounds. 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 nitroaromatic compounds. Two of the surface soil samples were also submitted for geotechnical analyses including pH, moisture content, sieve and hydrometer size distribution, bulk density, and cation exchange capacity. Also during this sampling round, 12 subsurface soil samples, collected at depths of 1 foot to 3 feet (immediately above the water table), were analyzed for TCL organic compounds, TAL inorganic compounds, TRPH, and nitroaromatic compounds. In addition, four of these samples were analyzed for total organic carbon (TOC). One additional subsurface soil sample was analyzed for PAHs only and one additional subsurface soil sample was analyzed for nitroaromatic compounds only. In addition, confirmatory groundwater samples collected from the eight Site 15 monitoring wells were submitted for analysis for TCL organic compounds, TAL inorganic compounds, TRPH, and nitroaromatic compounds. Selected groundwater samples were also submitted for TOC analysis and slug tests on the monitoring wells were performed. Finally, a confirmatory 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 from the site and

two downgradient surface water/sediment samples were collected and analyzed for TCL organic compounds, TAL inorganic compounds, TRPH, and nitroaromatic compounds. 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. Field measurements of surface water pH, temperature, turbidity, conductivity, and dissolved oxygen were recorded at each location at the time of sample collection.

- June 1996 - To support the toxicity testing, six soil samples were collected for whole-soil toxicity testing, including a reference sample. Two 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 the lead shot and lead shot fragments from the 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 ground surface to a depth of one foot. Single samples were collected at a depth of 0 to 1 foot from the remaining ten locations of lesser lead concentrations, but still greater than the United States Environmental Protection Agency (U.S. EPA) soil screening value (400 mg/kg). The 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 additional surface soil samples to be analyzed for lead, 9 additional surface soil samples to be analyzed for antimony and arsenic, and 8 additional subsurface soil samples to be analyzed for PAHs. This represented the last data that was included in the OU 5 (Site 15) RI Report (ABB-ES, 1997).

- December 1997 - Nine additional soil samples were collected from four locations. Existing documents do not address these samples. Seven of these samples were analyzed for antimony and arsenic while the other two samples were analyzed for PAHs.

- April/June 1999 – A post-RI surface soil and sediment sampling took place. The purpose of this sampling was to further determine the limits of lead and PAH contamination in the site surface soil and remove the necessity of having to extrapolate analytical data to verify the delineation of these

contaminants. 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 both PAHs and lead.

- February 2000 – A post-RI sampling event was conducted to determine site-specific leachability values for PAHs at the site. Five surface soil samples were collected from 0 to 1 foot bgs and analyzed for PAHs and Synthetic Precipitation Leaching Procedure (SPLP) PAHs.

- April 2000 - Groundwater samples were collected from the eight existing wells at the site. The samples were analyzed for PAHs, nitroaromatics, arsenic, antimony, and lead. Because of high turbidity, one of the wells was redeveloped and resampled for the inorganics. The results of the groundwater analysis were presented in a Technical Memorandum for No Further Groundwater Monitoring dated August 2001.

- June 2001 – A post-RI sampling event was conducted to confirm the previously detected soil lead concentrations 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) above the mineral horizon. This investigation also included the collection of 15 invertebrate samples that were analyzed for lead. This investigation was conducted to generate ecological remediation goals for PAHs and lead in surface soil at Site 15.

- May 2003 – A post-RI soil 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/August 2003 - A post-RI 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, 3 samples from 0 to 1 foot bgs, 1 sample from 1 to 2 feet bgs, and 2 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 the highest levels of soil contaminant concentrations exceeding the FDEP SCTLs for leachability to groundwater criteria were detected.

3.2 SUMMARY OF RESULTS

3.2.1 Summary of RFI Results

The one surface soil sample collected at Site 15 during the RFI contained lead and 14 PAHs at concentrations above detection limits. The geophysical survey identified several anomalies that were located along the southwest edge of the site.

3.2.2 Summary of the RI Field Investigations

3.2.2.1 Surface Soil

In the field screening program, lead was detected in 255 of 324 samples at concentrations ranging from 12.6 to 65,500 milligrams per kilogram (mg/kg). The highest concentrations were detected downrange of the trap and skeet field and approximately 750 feet north of the ordnance disposal areas. Lead concentrations greater than the U.S. EPA recommended lead screening criterion of 400 mg/kg were distributed over a wide area associated with the trap-and-skeet range. PAHs were detected in 171 of 263 samples at concentrations ranging from 0.2 to 13,000 mg/kg (expressed as total PAHs). These results indicated a widespread distribution of PAHs with the highest concentrations in samples collected in the burn chamber and static firing pad area, and in the forest burn area. TNT was detected in 30 of 146 samples at concentrations ranging from 1.0 to 68 mg/kg. The highest concentrations of TNT were detected about 100 feet north of the burn chamber and static firing pad areas. TRPH was detected in 26 of 136 samples at concentrations ranging from 10 to 430 mg/kg. The highest concentrations of TRPH were detected along the southwest side of the former trap and skeet range.

The confirmatory sampling program verified that surface soil contamination at the site is generally continuous and widespread, covering an area of approximately 37 acres, with discrete areas of higher concentrations not always coincident for each of the contaminants. Two VOCs, including acetone and xylenes; three nitroaromatic compounds, including cyclotetramethylenetetranitramine (HMX), 3-nitrotoluene, and 4-nitrotoluene; and six pesticides, including endosulfan II, dieldrin, endrin, 4,4'-DDE, 4,4'-DDT, and methoxychlor, were detected in surface soil samples.

Several PAHs including benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene, and three metals including antimony, arsenic, and lead were detected at concentrations greater than the FDEP SCTLs. One other organic, carbazole, was detected at a concentration greater than its FDEP SCTL. Tables 3-1 and 3-2 summarize the frequency of detection, the concentration ranges, and the cleanup goals for organic and inorganic compounds, respectively, that were positively detected in either the screening or confirmatory sampling of surface soil. The Florida cleanup goals are considered to be the

TABLE 3-1

SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SURFACE SOIL
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels (1)
Volatile Organic Compounds, mg/kg			
Acetone	1/39	0.006	2.8
Xylenes, total	1/39	0.002	0.2
Semivolatile Organic Compounds, mg/kg			
1-Methylnaphthalene	12/68	0.057 - 1.4	2.2
2-Methylnaphthalene	25/132	0.022 - 3.7	6.1
Acenaphthene	75/421	0.031 - 3,100	2.1
Anthracene	98/421	0.0068 - 14,000	2,500
Benzo(a)anthracene	196/421	0.0058 - 93,000	1.4
Benzo(a)pyrene	179/421	0.0066 - 110,000	0.1
Benzo(b)fluoranthene	187/421	0.0079 - 150,000	1.4
Benzo(g,h,i)perylene	132/421	0.0074 - 57,000	2,300
Benzo(k)fluoranthene	160/421	0.0069 - 55,000	15.0
Bis(2-ethylhexyl)phthalate	11/57	0.027 - 1.8	76.0
Butylbenzylphthalate	10/57	0.082 - 0.44	310
Carbazole	27/57	0.021 - 9,600	0.6
Chrysene	213/421	0.0138 - 100,000	77
Dibenzo(a,h)anthracene	69/421	0.022 - 19,000	0.1
Dibenzofuran	14/57	0.035 - 2,000	15.0
Di-n-butylphthalate	37/57	0.061 - 6.7	47
Fluoranthene	220/421	0.008 - 160,000	1,200
Fluorene	46/421	0.043 - 2,600	160
Indeno(1,2,3-cd)pyrene	122/421	0.0054 - 51,000	1.5
Naphthalene	52/421	0.024 - 2,200	1.7
Phenanthrene	164/421	0.0056 - 60,000	250
Pyrene	212/421	99,000	880
Pesticides/Herbicides, mg/kg			
4,4'-DDD	1/45	0.000053	4
4,4'-DDE	3/45	0.00016 - 0.0013	3.3
4,4'-DDT	4/45	0.0069 - 0.021	3.3
Aldrin	11/45	0.00021 - 0.0019	0.07
Dieldrin	2/45	0.00037 - 0.0024	0.004
Endosulfan II	5/45	0.00014 - 0.0019	3.8
Endrin aldehyde	1/45	0.0027	NC
Endrin Ketone	1/45	0.0027	NC
Gamma Chlordane	2/45	0.016 - 0.019	3.1
Methoxychlor	1/45	0.049	160

TABLE 3-1

SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SURFACE SOIL
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels (1)
Nitroaromatic Compounds, mg/kg			
Cyclotetramethylenetetranitramine (HMX)	1/42	3.001	NC
Trinitrotoluene (TNT)	30/146	1.0 - 68	0.06
3-Nitrotoluene	1/42	5.08	2.4
4-Nitrotoluene	2/42	1.17 - 4.34	3.3
Miscellaneous Parameters, mg/kg			
TRPH	58/175	10.0 - 450	340
TOC	14/14	3,700 - 46,000	NC

NOTES: The following samples were used for the data in this table.

For VOCs and Pesticides
CF15-SS1 through CF15-SS32
CF15-SS46 through CF15-SS47
For Nitroaromatics (Except TNT)
CF15-SS1 through CF15-SS32
CF15-SS42 through CF15-SS44
CF15-SS46 through CF15-SS47
For SVOCs (non PAHs)
CF15-SS1 through CF15-SS32
CF15-SS46 through CF15-SS47

For PAHs
CF15-SS1 through CF15-SS32
CF15-SS39 through CF15-SS41
CF15-SS45 through CF15-SS47
CF15-SS49 through CF15-SS50
Plus 263 Screening Samples
For TNT
CF15-SS1 through CF15-SS32
CF15-SS42 through CF15-SS44
CF15-SS46 through CF15-SS47
Plus 146 Screening Samples
For TRPH
CF15-SS1 through CF15-SS32
CF15-SS46 through CF15-SS47
Plus 136 Screening Samples

1 - FAC 62-777. The FDEP SCTL is considered to be the most restrictive of the residential direct exposure or leachability to groundwater SCTL value.

NC - No Criteria

TABLE 3-2

SUMMARY OF INORGANIC COMPOUNDS DETECTED IN SURFACE SOIL
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels (1)	Background Screening Concentrations (2)
Inorganic Analytes, mg/kg				
Aluminum	39/41	24.9 - 7,140	72,000	4,430
Antimony	32/57	0.46 - 2,440	5.0	9.44
Arsenic	36/57	0.91 - 451	0.8	2.04
Barium	40/41	0.88 - 107	110	14.4
Cadmium	7/41	0.30 - 2.4	8.0	1.72
Calcium	30/41	38.3 - 102,000	NC	9.44
Chromium	10/41	0.49 - 26.9	38.0	7.75
Cobalt	6/41	0.27 - 0.35	4,700	3.11
Copper	11/41	1.1 - 21.2	110	5.97
Iron	39/41	68.8 - 1,340	23,000	1,490
Lead	492/523	65,500	400	197
Magnesium	11/41	60.6 - 631	NC	329
Manganese	27/41	0.45 - 32.2	1,600	22.0
Mercury	4/41	0.15 - 0.80	2.1	0.16
Nickel	11/41	0.69 - 2.2	110	3.89
Potassium	16/41	21.7 - 1,340	NC	102
Selenium	3/41	1.2 - 1.7	5.0	1.68
Silver	2/41	0.61 - 0.62	17.0	2.13
Sodium	16/41	118 - 881	NC	343
Thallium	1/41	0.45	NC	2.84
Vanadium	36/41	0.28 - 5.2	15.0	6.3
Zinc	3/41	28.3 - 32.6	6,000	37.0
Cyanide	4/39	0.20 - 0.27	30.0	1.19

NOTES: The following samples were used for the data in this table.

For Inorganics (Except Sb, As, Pb)
CF15-SS1 through CF15-SS32
CF15-SS46 through CF15-SS47
For Arsenic and Antimony
CF15-SS1 through CF15-SS32
CF15-SS46 through CF15-SS47
CF15-SS51 through CF15-SS59
For Lead
CF15-SS1 through CF15-SS38
CF15-SS46 through CF15-SS47
CF15-SS60 through CF15-SS73
Plus 324 Screening Samples

1 - FAC 62-777. The FDEP SCTL is considered to be the most restrictive of the residential direct exposure or leachability to groundwater SCTL value.

2 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998).

NC - No Criteria

most restrictive of residential direct exposure or leachability to groundwater SCTLs. Table 3-2 also shows the NAS Cecil Field Inorganic Background Data Set (IBDS) concentrations for inorganic compounds (HLA, 1998).

Additional sampling was done in February of 1997 to evaluate the leachability of lead and particulate distribution characteristics of lead contamination at the site. The results of this sampling effort indicated that most of the lead shot at the site has oxidized and is now associated with medium to fine-grained sand with smaller amounts associated with silt and clay soil fractions. As a result there would be little benefit in sieving out the remaining lead shot from Site 15 soil. The data also showed that although the lead concentrations decreased with depth, decreases are not significant enough to warrant remediation to a depth of less than one foot. Finally, based on the results of lead TCLP data, soil samples containing lead concentrations greater than 700 mg/kg generally failed to meet the TCLP lead regulatory level of 5.0 mg/L for classifying potential solid waste (excavated contaminated soil) as hazardous waste.

3.2.2.2 Subsurface Soil

In the field screening program no VOCs were detected. Total PAHs were detected in 15 of the samples with concentrations ranging from 4.0 to 140 mg/kg to a depth of 7 feet bgs. Generally, PAH concentrations decreased with depth. TRPH showed sporadic detection in 5 of 16 subsurface samples collected with concentrations ranging from 12 to 570 mg/kg. Lead was detected in 11 of 16 samples to a depth of 7 feet bgs. Subsurface lead concentrations ranging from 15 to 210 mg/kg were generally several orders of magnitude lower than corresponding surface soil samples.

The confirmatory sampling event indicated the presence of two VOCs, acetone and xylenes, several SVOCs, and 13 inorganic analytes in the subsurface soil at Site 15. Tables 3-3 and 3-4 summarize the frequency of detection, the concentration ranges, and the cleanup goals (the most restrictive of the residential direct exposure or leachability to groundwater SCTL) for organic and inorganic compounds, respectively, that were positively detected in either the screening or confirmatory sampling of subsurface soil. Table 3-4 also shows the IBDS concentrations for the inorganic compounds.

3.2.2.3 Groundwater

One SVOC [bis(2-ethylhexyl)phthalate], three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT), three nitroaromatic compounds [cyclotrimethylenetrinitramine (RDX), 3-nitrotoluene, and nitrobenzene], and several inorganic compounds were detected in groundwater samples from the site. Bis(2-ethylhexyl)phthalate was detected in four of eight wells at concentrations ranging from 1.0 to 220 micrograms per liter (µg/L) which exceeds the Florida maximum contaminant level (MCL) and GCTL of 6 µg/L. The three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in one of eight

TABLE 3-3

SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SUBSURFACE SOIL
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels (1)
Volatile Organic Compounds, mg/kg			
Acetone	2/14	0.009 - 0.013	2.8
Xylenes, total	3/31	0.003 - 0.004	0.2
Semivolatile Organic Compounds, mg/kg			
2-Methylnaphthalene	2/27	0.051 - 0.110	6.1
Acenaphthene	16/45	0.340 - 50	2.1
Anthracene	16/45	0.032 - 9.2	2,500
Benzo(a)anthracene	21/45	0.030 - 36	1.4
Benzo(a)pyrene	35/45	0.035 - 35	0.1
Benzo(b)fluoranthene	36/45	0.045 - 53	1.4
Benzo(g,h,i)perylene	19/45	0.034 - 14	2,300
Benzo(k)fluoranthene	29/45	0.040 - 24	15.0
Bis(2-ethylhexyl)phthalate	2/18	0.052 - 0.053	76.0
Butylbenzylphthalate	1/18	0.056	310
Carbazole	7/18	0.027 - 4.3	0.6
Chrysene	20/45	0.040 - 40	77
Dibenzo(a,h)anthracene	11/45	0.028 - 5.2	0.1
Dibenzofuran	2/18	0.085 - 0.460	15.0
Di-n-butylphthalate	13/18	0.099 - 5.7	47
Fluoranthene	36/45	0.039 - 63	1,200
Fluorene	4/45	0.110 - 1.1	160
Indeno(1,2,3-cd)pyrene	20/45	0.024 - 14	1.5
Naphthalene	7/45	0.064 - 1.1	1.7
Phenanthrene	33/45	0.033 - 27	250
Pyrene	35/45	0.041 - 51	880
Miscellaneous Parameters, mg/kg			
TRPH	15/30	12 - 570	340
TOC	6/6	1,600 - 5,800	NC

NOTES: The following samples were used for the data in this table.

For VOCs and TRPH
CF15-SB7 through CF15-SB13
CF15-SB17 through CF15-SB19
CF15-SB21, CF15-SB25
Plus 16 Screening Samples

For SVOCs
CF15-SB7 through CF15-SB13
CF15-SB17 through CF15-SB19
CF15-SB21, CF15-SB25

For PAHs
CF15-SB7 through CF15-SB13
CF15-SB17 through CF15-SB19
CF15-SB21, CF15-SB25, CF15-SB45
CF15-SB49 through CF15-SB56
Plus 16 Screening Samples

For TOC
CF15-SB7, CF15-SB10
CF15-SB18, CF15-SB19

1 - FAC 62-777. The FDEP SCTL is considered to be the most restrictive of the residential direct exposure or leachability to groundwater SCTL value.

NC - No Criteria

TABLE 3-4

SUMMARY OF INORGANIC COMPOUNDS DETECTED IN SUBSURFACE SOIL
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels (1)	Background Screening Concentrations (2)
Inorganic Analytes, mg/kg				
Aluminum	14/14	224 - 2,360	72,000	4,430
Antimony	5/14	0.93 - 4.2	5.0	9.44
Barium	13/14	0.75 - 17.4	110	14.4
Calcium	11/14	62.7 - 2,510	NC	9.44
Chromium	3/14	1.9 - 2.7	38.0	7.75
Cobalt	1/14	0.35	4,700	3.11
Iron	14/14	66.6 - 298	23,000	1,490
Lead	25/30	1.10 - 210	400	197
Manganese	10/14	0.82 - 3.0	1,600	22.0
Nickel	10/14	0.73 - 1.4	110	3.89
Potassium	2/14	22.7 - 27.6	NC	102
Sodium	3/14	156 - 251	NC	343
Vanadium	14/14	0.49 - 2.2	15.0	6.30

NOTES: The following samples were used for the data in this table.

For Inorganics (Except Lead)
CF15-SB7 through CF15-SB13
CF15-SB17 through CF15-SB19
CF15-SB21, CF15-SB25

For Lead
CF15-SB7 through CF15-SB13
CF15-SB17 through CF15-SB19
CF15-SB21, CF15-SB25
Plus 16 Screening Samples

1 - FAC 62-777. The FDEP SCTL is considered to be the most restrictive of the residential direct exposure or leachability to groundwater SCTL value.

2 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998).

NC - No Criteria

groundwater samples, but were not detected in the associated duplicate sample from the same well. Only 4,4'-DDE (0.26 µg/L) exceeded its FDEP Groundwater Cleanup Target Level (GCTL) of 0.1 µg/L. 3-Nitrotoluene was detected in the eight groundwater samples at concentrations ranging from 1.87 to 3.89 µg/L, but did not exceed the FDEP GCTL for this compound (250 µg/L). None of the other nitroaromatic compounds exceeded their respective FDEP GCTLs.

Thallium, detected in two of eight groundwater samples at concentrations of 5 and 6.1 µg/L, exceeded Federal and State MCLs of 2 µg/L, but was less than the IBDS concentration in groundwater (13.3 µg/L) and was not detected in the surface or subsurface soil samples. Concentrations of aluminum and iron, which were detected in all eight monitoring wells, exceeded their respective secondary MCL values, but neither exceeded the IBDS concentrations. No lead or PAHs were detected in the eight monitoring wells sampled. Table 3-5 summarizes the frequency of detection, the concentration ranges, and the cleanup goals for organic and inorganic compounds detected in groundwater. Table 3-5 also shows the IBDS concentrations for inorganic compounds. Figure 3-5 shows the locations of the eight Site 15 groundwater monitoring wells that were sampled during the RI.

3.2.2.4 Surface Water and Sediment

No VOCs or pesticides were found in the three surface water samples analyzed for these constituents. Four nitroaromatic compounds (1,3,5-trinitrobenzene, 3-nitrotoluene, 4-nitrotoluene, and tetryl) and several inorganic compounds were found in the surface water. However, only lead, which was present in the seven samples analyzed, copper, which was present in only one out of three samples, and iron, which was below the IBDS concentration, exceeded its Florida surface water criterion. Generally, the highest concentration of these metals occurred in the surface water sample collected approximately 1,700 feet south of the ordnance disposal area. Table 3-6 summarizes the frequency of detection, the concentration ranges, and the Florida water criteria for organic and inorganic compounds detected in surface water. Table 3-6 also shows the IBDS concentrations for the inorganic compounds.

One VOC, several SVOCs (including one nitroaromatic and twelve PAHs), four pesticides, TRPH, and several inorganic compounds were detected in sediment samples. Concentrations of seven PAHs (pyrene, phenanthrene, fluoranthene, benzo(a)anthracene, dibenzo(a,h)anthracene, benzo(a)pyrene, and chrysene), and two pesticides (4,4'-DDD and 4,4'-DDE) were greater than their respective threshold effects levels (TELs), but were less than their respective probable effects levels (PELs). Pesticides were detected at one sample location approximately 1,200 feet away from the ordnance disposal area and are therefore not believed to be related to past detonation activities. Also, concentrations of these pesticides detected in sediments at Site 15 were comparable to those detected at other Cecil Field locations and therefore it is most likely that they are the result of previous basewide applications for pest control. Lead was the only inorganic analyte that was detected at concentrations exceeding its TEL. Lead also

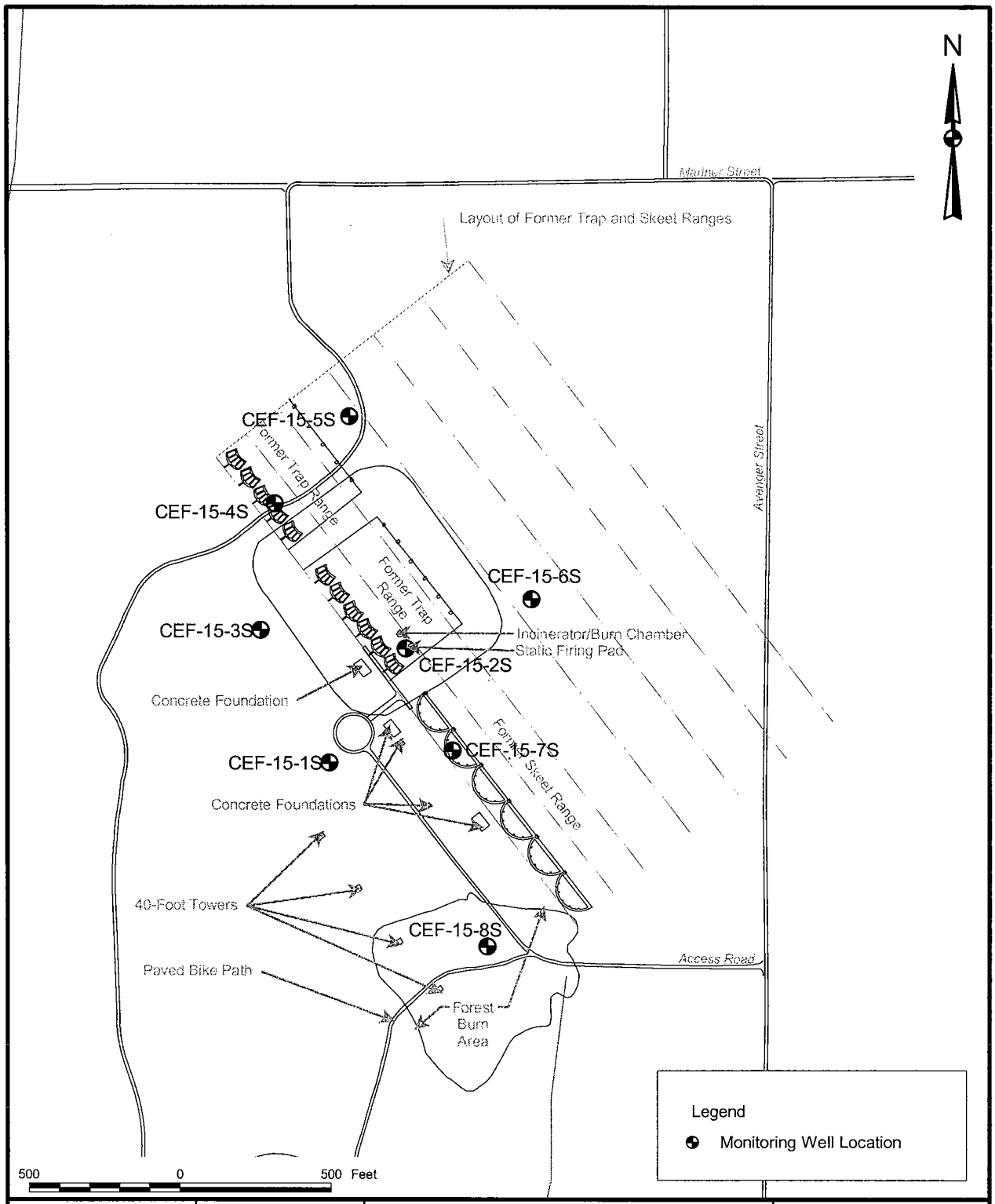
TABLE 3-5

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

Chemical	Frequency of Detection	Range of Detection	FDEP GCTL or MCLs (1)	Background Screening Concentrations (2)
Semivolatile Organic Compounds, µg/L				
Bis(2-ethylhexyl)phthalate	4/8	1.0 - 220	6.0	NA
Pesticides, µg/L				
4,4'-DDD	1/8	0.065	0.1	NA
4,4'-DDE	1/8	0.18	0.1	NA
4,4'-DDT	1/8	0.067	0.1	NA
Nitroaromatic Compounds, µg/L				
3-Nitrotoluene	8/8	1.87 - 3.39	250	NA
Cyclotrimethylenetrinitramine (RDX)	1/8	0.451	1	NA
Nitrobenzene	1/8	0.228	4	NA
Inorganic Analytes, µg/L				
Aluminum	8/8	205 - 635	200	13,100
Antimony (total)	1/8	2	6.0	44.5
Antimony (dissolved)	3/3	2.5 - 8.1	6.0	44.5
Arsenic (total)	0/8	4 U	50.0	7.1
Arsenic (dissolved)	0/3	4 U	50.0	7.1
Barium	8/8	14.3 - 28.7	2,000	88.2
Beryllium	1/8	1.0	4.0	3.5
Calcium	2/8	5,620 - 6,380	NC	81,100
Cobalt	3/8	1.4 - 1.8	420	12.8
Copper	6/8	4.7 - 8.7	1,000	12.5
Iron	8/8	633 - 3,140	300	7,760
Lead (total)	0/8	2 U	15	5.35
Lead (dissolved)	0/3	2 U	15	5.35
Magnesium	8/8	598 - 1,500	49	10,000
Manganese	8/8	8.4 - 49.6	50.0	150
Nickel	1/8	17.5	100	24.5
Potassium	1/8	2,010	NC	4,330
Sodium	5/8	5,510 - 10,800	160,000	16,500
Thallium	2/8	5.0 - 6.1	2.0	13.3
Vanadium	1/8	1.8	NC	20.2
Zinc	3/8	92.0 - 246	5,000	76.8
Cyanide	3/8	3.1 - 3.8	200	22.0

NOTES: The following samples were used for the data in this table: CF15MW1 to CF15MW8

1 - Based on primary or secondary MCL value. In cases where no MCL is available, the FDEP GCTL value (FAC 62-777) is used.
2 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998).
NA - Not Applicable
NC - No Criteria
U - Not Detected at Indicated Detection Limit



DRAWN BY MJJ	DATE 21Jan00	LOCATION OF GROUNDWATER MONITORING WELLS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE 05/02/01
COST/SCHEDULE-AREA			APPROVED BY — DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-5 — REV 0

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TABLE 3-6

SUMMARY OF ORGANIC AND INORGANIC COMPOUNDS DETECTED IN SURFACE WATER
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detection	FDEP Surface Water Criteria (Freshwater) (1)	Background Screening Concentrations (3)
Nitroaromatic Compounds, µg/L				
1,3,5-Trinitrobenzene	1/3	6.73	19	NA
3-Nitrotoluene	1/3	4.95	375	NA
4-Nitrotoluene	3/3	1.11 - 46.1	550.0	NA
Tetryl	2/3	18.4	NC	NA
Miscellaneous, mg/L				
TRPH	1/3	0.6	5000 (2)	NA
Inorganic Analytes, µg/L				
Aluminum	3/3	444 - 649	13	1,040
Aluminum, Filtered	3/3	426 - 585	13	1,040
Arsenic	3/3	4.4 - 12.0	50(2)	5.45
Arsenic, Filtered	2/3	5.6 - 12.2	50(2)	5.45
Barium	3/3	10.1 - 17.1	48 (4)	43.7
Barium, Filtered	3/3	8.8 - 14.9	48 (4)	43.7
Calcium	3/3	620 - 4,510	NC	43,000
Calcium, Filtered	3/3	538 - 3,765	NC	43,000
Copper	1/3	6.0	3.6 *	7.35
Iron	3/3	612 - 1,980	1000 (2)	3,030
Iron, Filtered	3/3	490 - 1,650	1000 (2)	3,030
Lead	3/3	91.0 - 275	3.2 *	5.35
Lead, Filtered	3/3	79.5 - 225	3.2 *	5.35
Magnesium	3/3	429 - 503	NC	5,580
Magnesium, Filtered	3/3	396 - 458	NC	5,580
Potassium	1/3	247	NC	2,060
Potassium, Filtered	1/3	331	NC	2,060
Sodium	3/3	4,000 - 4,435	18,300 (5)	12,200
Sodium, Filtered	3/3	3,600 - 4,070	18,300 (5)	12,200
Vanadium	1/3	3.3	NC	4.5

NOTES: The following samples were used for the data in this table. CF15SW1 to CF15SW3

1 - FAC 62-777. Surface Water Criteria based on freshwater classification.
2 - FAC 62-302.530. Surface Water Criteria based on Class III freshwater.
3 - NAS Cecil Field Inorganic Background Data Set (HLA, 1998).
4 - Less than 10% above background, per FAC 62-777.
5 - Less than 50% above background, per FAC 62-777.
* - Hardness Dependent, values shown based on hardness of 25 mg/L

NC - No Criteria
NA - Not Applicable

exceeded its PEL concentration. Table 3-7 summarizes the frequency of detection, the concentration ranges, and the FDEP guidance values for organic compounds and inorganic compounds that were positively detected in the confirmatory sampling of Site 15 sediments. IBDS concentrations are also shown in Table 3-7 for the inorganic compounds.

3.3 POST-RI SAMPLING EVENTS

Several post-RI sampling events were conducted at Site 15. The purpose of these events was to further delineate the extent of the PAH, arsenic, lead, and TRPH contamination of surface soil and sediment. One sampling event also involved the collection and analysis of invertebrate samples that were used with the soil data to generate ecological remediation goals for PAHs and lead in the soil at the site. These post-RI sampling events also included evaluation of the site-specific leachability of PAHs from surface soil to groundwater and collection of groundwater samples to determine if the PAH-, arsenic-, lead-, or nitroaromatic-contaminated soil has impacted groundwater.

3.3.1 Extent of PAH and Lead Contamination

In April 1999, 30 surface soil samples and 6 sediment samples were collected and analyzed for PAHs, and 55 surface soil and 6 sediment samples were collected and analyzed for lead. In June 1999, 30 additional surface soil samples were collected and analyzed for PAHs and 23 additional surface soil samples were collected and analyzed for lead. Since the purpose of these sampling programs was to further delineate the lead and PAH contamination at perimeter areas of the site, no statistical tables for this data have been provided but the PAH and lead data has been incorporated in Tables 3-1 and 3-2, respectively, for surface soil and in Table 3-7 for sediment. However, the sampling locations for PAH and lead analyses with respect to the historical sample locations for the same analyses during the RI field investigations are shown on Figures 3-6 and 3-7, respectively. Figures 3-8 and 3-9 show for PAHs and lead, respectively, areas of surface soil with concentrations in excess of the FDEP SCTLs for residential direct exposure based on results from samples collected during both the RI field investigations and the post-RI sampling programs.

During the period of May through August 2003, another 44 surface and subsurface soil samples were collected and analyzed for PAHs, arsenic, lead, and TRPH. The purpose of these sampling programs was to further delineate the vertical extent of PAH, lead, and TRPH contamination in the soil and to delineate the horizontal extent of arsenic contamination in soil. The statistical tables for these data will be prepared and included in the Site 15 Feasibility Study report.

TABLE 3-7

SUMMARY OF ORGANIC AND INORGANIC COMPOUNDS DETECTED IN SEDIMENT
SITE 15
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Chemical	Frequency of Detection	Range of Detection	FDEP Soil Cleanup Target Levels[1]	Background Screening Concentrations[2]
Volatile Organic Compounds, mg/kg				
2-Butanone	2/3	0.009 - 0.018	17	NA
Semivolatile Organic Compounds, mg/kg				
2-Methylnaphthalene	3/9	0.189 - 17.9	6.1	NA
Acenaphthene	4/9	0.069 - 26.1	2.1	NA
Acenaphthylene	2/9	0.100 - 0.160	27	NA
Anthracene	3/9	0.043 - 2.35	2,500	NA
Benzo(a)anthracene	8/9	0.013 - 2.86	1.4	NA
Benzo(a)pyrene	9/9	0.023 - 28.1	0.1	NA
Benzo(b)fluoranthene	8/9	0.020 - 22.8	1.4	NA
Benzo(g,h,i)perylene	7/9	0.108 - 1.71	2,300	NA
Benzo(k)fluoranthene	8/9	0.059 - 6.54	15	NA
Carbazole	1/3	0.058	0.6	NA
Chrysene	9/9	0.056 - 3.66	77	NA
Dibenzo(a,h)anthracene	3/9	0.038 - 0.110	0.1	NA
Di-n-butylphthalate	3/3	0.380 - 3.10	47	NA
Fluoranthene	8/9	0.106 - 42.6	1,200	NA
Fluorene	4/9	0.030 - 12.2	160	NA
Indeno(1,2,3-cd)pyrene	5/9	0.100 - 0.340	1.5	NA
Phenanthrene	6/9	0.086 - 13.7	250	NA
Pyrene	8/9	0.026 - 37.4	880	NA
Nitroaromatic Compounds, mg/kg				
4-Nitrotoluene	1/3	37.5	3.3	NA
Pesticides, mg/kg				
Dieldrin	1/3	0.00046	0.004	NA
4,4'-DDD	2/3	0.0036 - 0.011	4	NA
4,4'-DDE	2/3	0.0034 - 0.0083	3.3	NA
4,4'-DDT	2/3	0.0004 - 0.0081	3.3	NA
Miscellaneous, mg/kg				
TRPH	3/3	15 - 114	340	NA
TOC	3/3	5,600 - 13,000	NC	NA
Inorganic Analytes, mg/kg				
Aluminum	3/3	543 - 2,630	72,000	10,200
Barium	3/3	2.30 - 3.85	110	36.1
Calcium	3/3	62.8 - 90.5	NC	5,920
Chromium	1/3	3.10	38.0	16.0
Iron	3/3	88 - 207	23,000	3,330
Lead	9/9	29 - 574	400	44.6
Magnesium	2/3	29.5 - 58.8	NC	379
Sodium	3/3	145 - 221	NC	388
Vanadium	3/3	0.72 - 2.40	15.0	15.0

NOTES: The following samples were used for the data in this table. CF15SD1, CF15SD2, CF15SD3, CEF-015-SD-100, CEF-015-SD-101, CEF-015-SD-102, CEF-015-SD-103, CEF-015-SD-104, CEF-015-SD-105

1 FAC 62-777. The FDEP SCTL is considered to be the most restrictive of the residential direct exposure or leachability to groundwater SCTL value.
2 NAS Cecil Field Inorgaic Background Data Set (HLA, 1998).
NA - Not Applicable
NC - No Criteria

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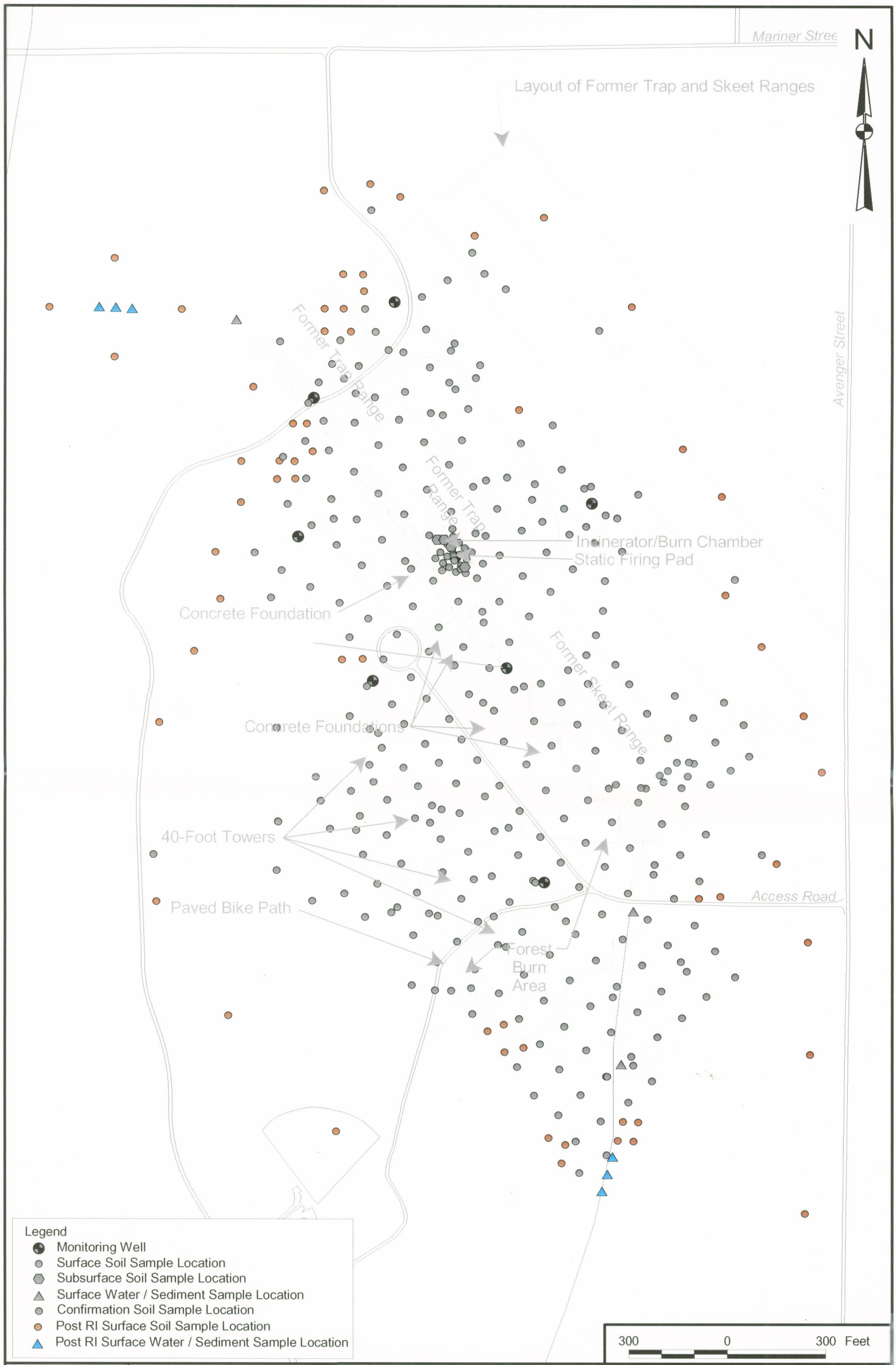

DRAWN BY MJJ DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	APRIL/JUNE 1999 POST RI SURFACE SOIL AND SEDIMENT SAMPLING LOCATIONS, PAHs ANALYSIS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 3-6	REV 0

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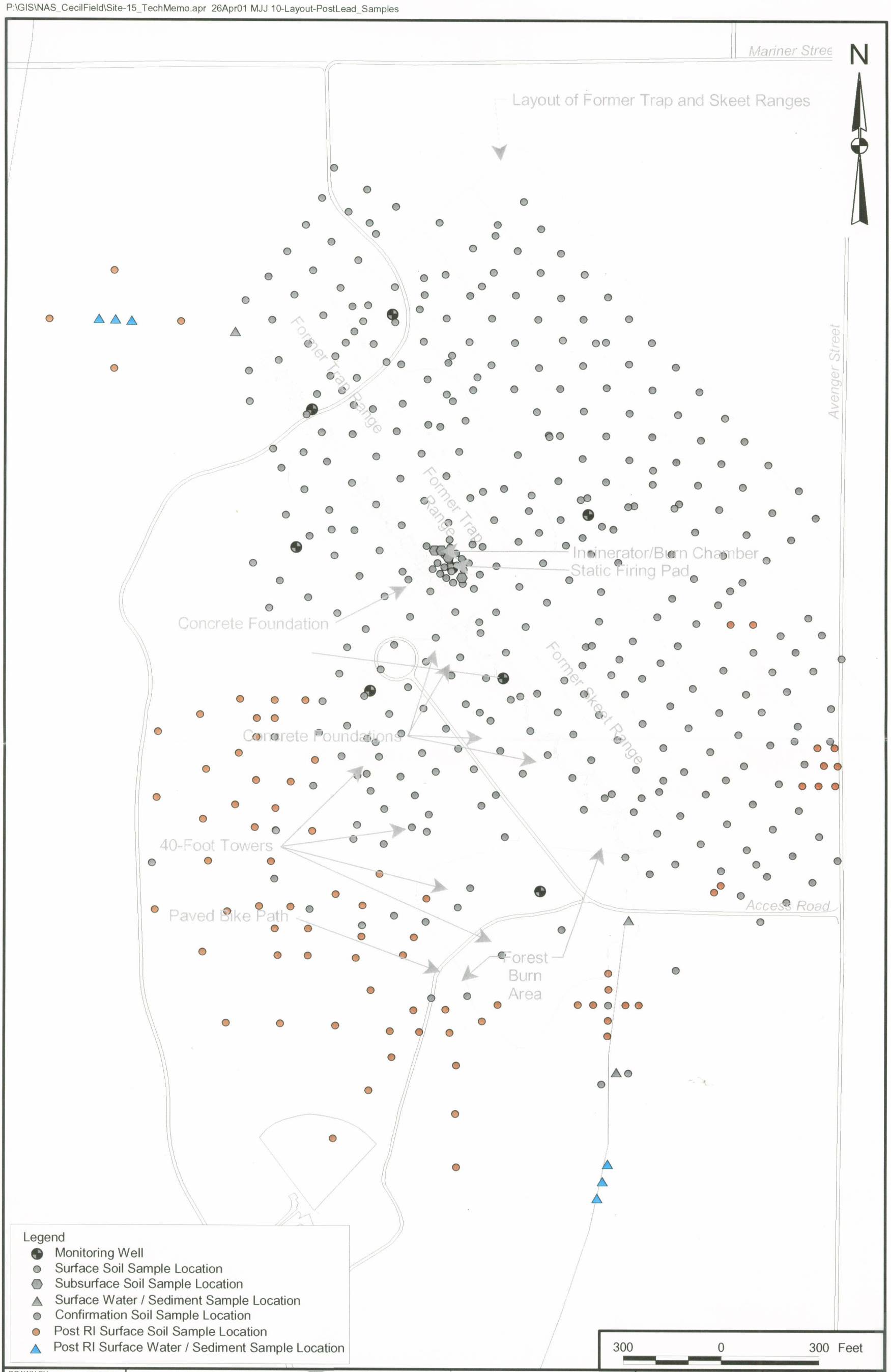

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CHECKED BY — DATE	APRIL/JUNE 1999 POST RI SURFACE SOIL AND SEDIMENT SAMPLING LOCATIONS, LEAD ANALYSIS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY — DATE 05/02/01	
COST/SCHEDULE-AREA		APPROVED BY — DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-7	REV 0

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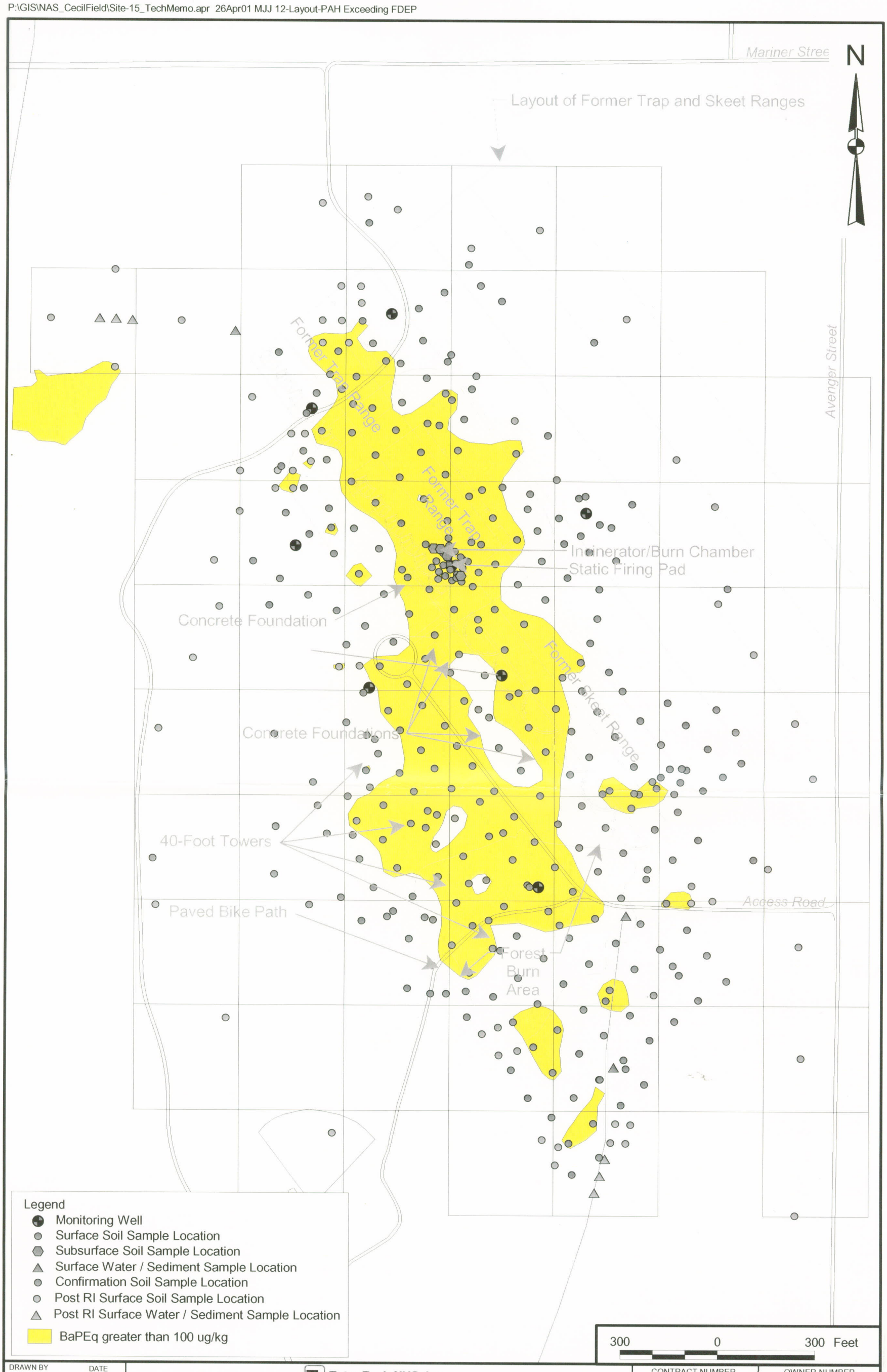
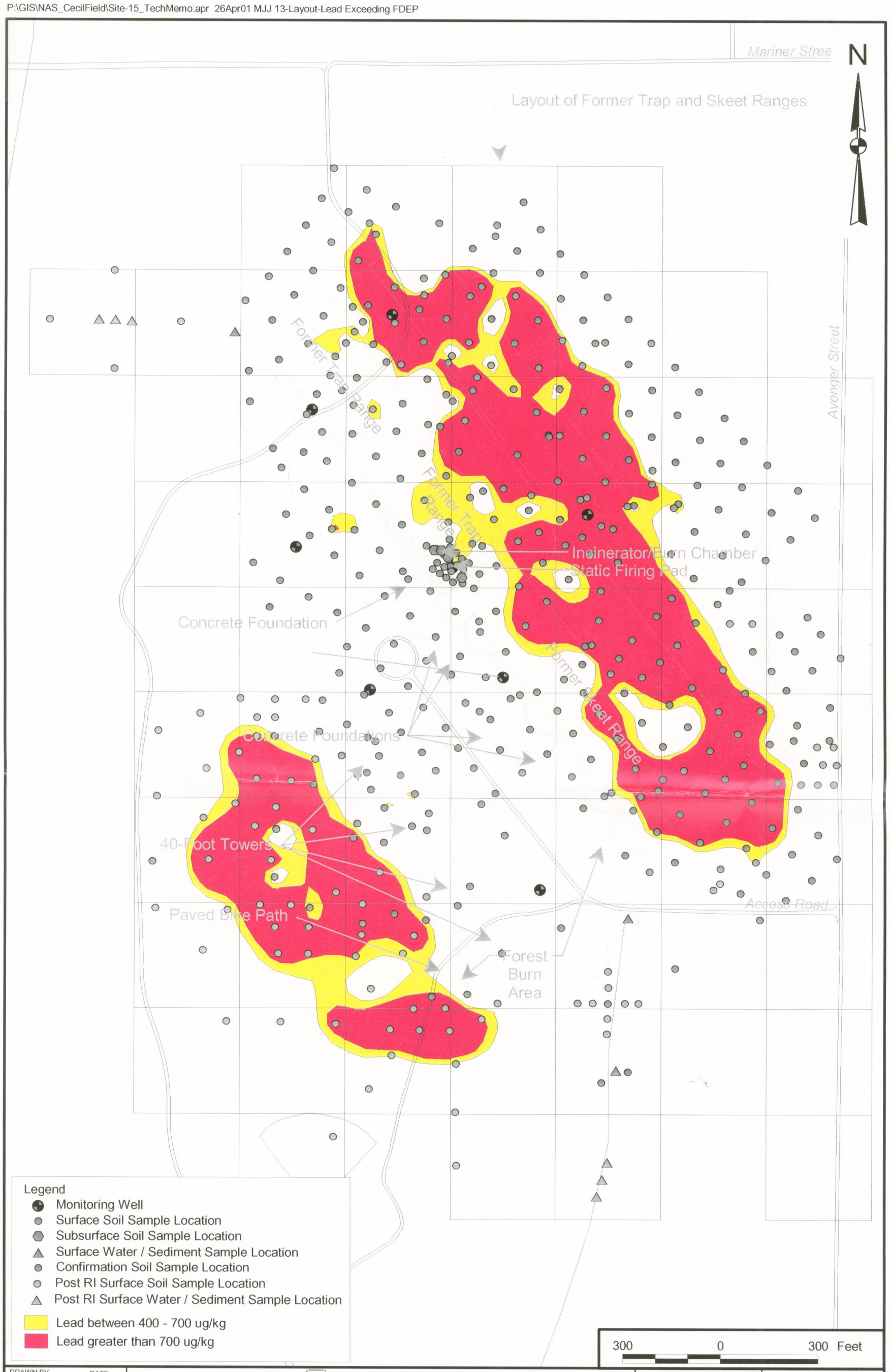


DRAWN BY MJJ DATE 09Feb00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	LOCATIONS OF SURFACE SOIL SAMPLES WITH PAHs CONCENTRATIONS EXCEEDING FDEP SCTLs FOR RESIDENTIAL EXPOSURE SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 3-8	REV 0

REVISION 1
NOVEMBER 2003



DRAWN BY MJJ	DATE 09Feb00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY	DATE	LOCATIONS OF SURFACE SOIL SAMPLES WITH LEAD CONCENTRATIONS EXCEEDING FDEP SCTLs FOR RESIDENTIAL EXPOSURE SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY	DATE 05/02/01
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-9	REV 0

REVISION 1
NOVEMBER 2003

3.3.2 PAH Leachability to Groundwater

In February 2000, four surface soil samples were collected and analyzed for PAHs. The same samples were then submitted to an SPLP and the extract from that procedure was also analyzed for PAHs to evaluate the leachability of these contaminants to groundwater. Results of the soil and SPLP extract analyses are summarized in Table 3-8 and Table 3-9, respectively. Table 3-8 also compares the PAHs concentrations measured in soil to the FDEP SCTLs for direct residential exposure and for leachability to groundwater. Table 3-9 also compares the PAHs concentrations measured in the SPLP extracts to the FDEP GCTLs.

As shown on Table 3-8, concentrations of several PAHs detected in three of the four surface soil samples (CEF-015-SS-702, CEF-015-SS-703, and CEF-015-SS-704) exceeded either the FDEP SCTL for direct residential exposure or for leachability to groundwater or both of these criteria. As shown on Table 3-9, the PAHs concentrations detected in the SPLP extract from two of the four collected surface soil samples (CEF-015-SS-702 and CEF-015-SS-703) exceeded the FDEP GCTLs.

TABLE 3-8

SUMMARY OF PAHS DETECTED IN SURFACE SOIL
SITE 15, FEBRUARY 2000 POST-RI SAMPLING
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FOLRIDA

Constituents	FDEP SCTL Residential Direct Contact	FDEP SCTL Leachability to Groundwater	Sampling Locations				
			CEF-15-SS-701	CEF-15-SS-702	CEF-15-SS-703	CEF-15-SS-703 Dup	CEF-15-SS-704
PAHs (µg/kg)							
Acenaphthene	1,900,000	2,100	723	162,000	90,800	64,700	11,500
Acenaphthylene	1,100,000	27,000	99 U	17,000	16,000	6.420	2,370
Anthracene	18,000,000	2,500,000	110	63,200	31.100	18,800	3,120
Benzo(a)anthracene	1,400	3,200	796	**193,000**	**129,000**	**71,600**	**22,200**
Benzo(a)pyrene	100	8,000	**857**	**120,000**	**89,600**	**67,600**	**23,100**
Benzo(b)fluoranthene	1,400	10,000	904	**130,000**	**96,800**	**62,600**	**24,100**
Benzo(g.h,I)perylene	2,300,000	32,000,000	462	4,260	22,000	15,100	7,160
Benzo(k)fluoranthene	15,000	25,000	147	**63,000**	**45,000**	**29,300**	10,200
Chrysene	140,000	77,000	797	**155,000**	123,000	62,200	24,500
Dibenzo(a,h)anthracene	100	30,000	27	**6,520**	**6,580**	**5,010**	**1,830**
Fluoranthene	2,900,000	1,200,000	2,240	505,000	312,000	173,000	48,400
Fluorene	2,200,000	160,000	1,400 U	15,000	9,910	2,560	1,400 U
Indeno(1,2,3-cd)pyrene	1,500	28,000	970	**42,500**	**38,400**	**29,500**	**12,600**
1-Methylnaphthalene	68,000	2,200	410	**168,000**	**94,300**	53,200	13,500
2-Methylnaphthalene	83,000	6,100	417	**204,000**	**108,000**	61,800	14,100
Naphthalene	40,000	1,700	99 U	12,200	7,040	4,090	1,930
Phenanthrene	2,000,000	250,000	516	155,000	102,000	47,900	11,200
Pyrene	2,200,000	880,000	1,080	319,000	207,000	109,000	35,100

NOTES:

Bolding indicates exceedance of the FDEP SCTL for residential direct contact
Shading indicates exceedance of the FDEP SCTL for leachability to groundwater
U undetected at the indicated detection limit

TABLE 3-9

SUMMARY OF PAHS DETECTED IN SURFACE SOIL SPLP EXTRACTS
SITE 15, FEBRUARY 2000 POST-RI SAMPLING
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FOLRIDA

Constituents	FDEP GCTL	Sampling Locations			
		CEF-15-SS-702	CEF-15-SS-703	CEF-15-SS-703 Dup	CEF-15-SS-704
PAHs (µg/L)					
Acenaphthene	20	2.3	1.2	1.5	1 U
Acenaphthylene	210	1 U	1 U	1 U	1 U
Anthracene	2,100	1.1	1 U	1 U	1 U
Benzo(a)anthracene	0.2	1.3	0.63	0.69	0.2 U
Benzo(a)pyrene	0.2	1.8	0.8	0.58	0.2 U
Benzo(b)fluoranthene	0.2	2	0.89	0.91	0.2 U
Benzo(g.h,I)perylene	210	1.4	0.8	0.68	0.2 U
Benzo(k)fluoranthene	0.5	0.73	0.34	0.38	0.2 U
Chrysene	4.8	1.8	0.93	0.93	0.21
Dibenzo(a,h)anthracene	0.2	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene	280	5.9	4.6	5	1
Fluorene	280	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	0.2	1.3	0.65	0.66	0.2 U
1-Methylnaphthalene	20	1	1 U	1 U	1.5
2-Methylnaphthalene	20	2.2	1.7	1.6	1 U
Naphthalene	20	2	1 U	1 U	1.4
Phenanthrene	210	5.8	2.3	2.6	1 U
Pyrene	210	5	2.5	2.6	0.6

NOTE:

Shading indicates exceedance of the FDEP GCTL
U undetected at the indicated detection limit

4.0 FIELD INVESTIGATION

Three groundwater sampling events were conducted. The first sampling event was conducted in April 2000 and consisted of collecting groundwater samples from eight existing monitoring wells (CEF-015-01S to CEF-015-08S). One duplicate groundwater sample was collected for quality assurance/quality control (QA/QC) purposes at CEF-015-01S. The field investigation was performed in accordance with the Site 15 Sampling and Analysis Work Plan provided in Appendix A. The second sampling event was conducted in May 2000 and consisted of re-developing and re-sampling existing well CEF-015-01S that had exhibited a relatively high turbidity [501 nephelometric turbidity units (NTUs)] during the first sampling event. Locations of the sampled monitoring wells are shown on Figure 3-5. Groundwater sampling logs are provided in Appendix B.

The third investigation was conducted, as requested by the FDEP (FDEP, 2001 and BCT, 2003), as a confirmatory sampling event to determine if the groundwater has been impacted by the soil contamination. The third sampling event was conducted in July 2003 and consisted of collecting groundwater samples from one existing monitoring well (CEF-015-02S) and from six new monitoring wells (CEF-015-09S to CEF-015-14S) installed at locations with the highest concentrations of contamination greater than the FDEP SCTLs for leachability to groundwater. One duplicate groundwater sample was collected for quality assurance/quality control (QA/QC) purposes at CEF-015-11S. The field investigation was performed in accordance with the Site 15 Phase X Sampling and Analysis Work Plan Revision 1 provided in Appendix A. Locations of the existing and new monitoring wells are shown on Figure 4-1. Groundwater sampling logs are provided in Appendix B.

Groundwater samples for the first and second sampling events were collected in general agreement with the procedures described in the U.S. EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (U.S. EPA Region 4, 1996) and the NAS Cecil Field Base-Wide Generic Work Plan (TtNUS, 1998). The groundwater samples for the third sampling event were collected in general agreement with the procedures described in the FDEP Standard Operating Procedure FS2200 (FDEP, 2002), the Remedial Investigation Report for Sites 36 and 37 (TtNUS, 1999), and current TtNUS standard operating procedures. FAC Quality Assurance Rule (FAC 62-160) was updated in April 2002 and incorporates new SOPs developed and adopted by the FDEP for the collection and analysis of environmental media. The groundwater sampling activities for the third event were conducted in general agreement with FS2200, which reference additional applicable SOPs as necessary. As agreed by the BCT, no rinsate and trip blank samples were collected.

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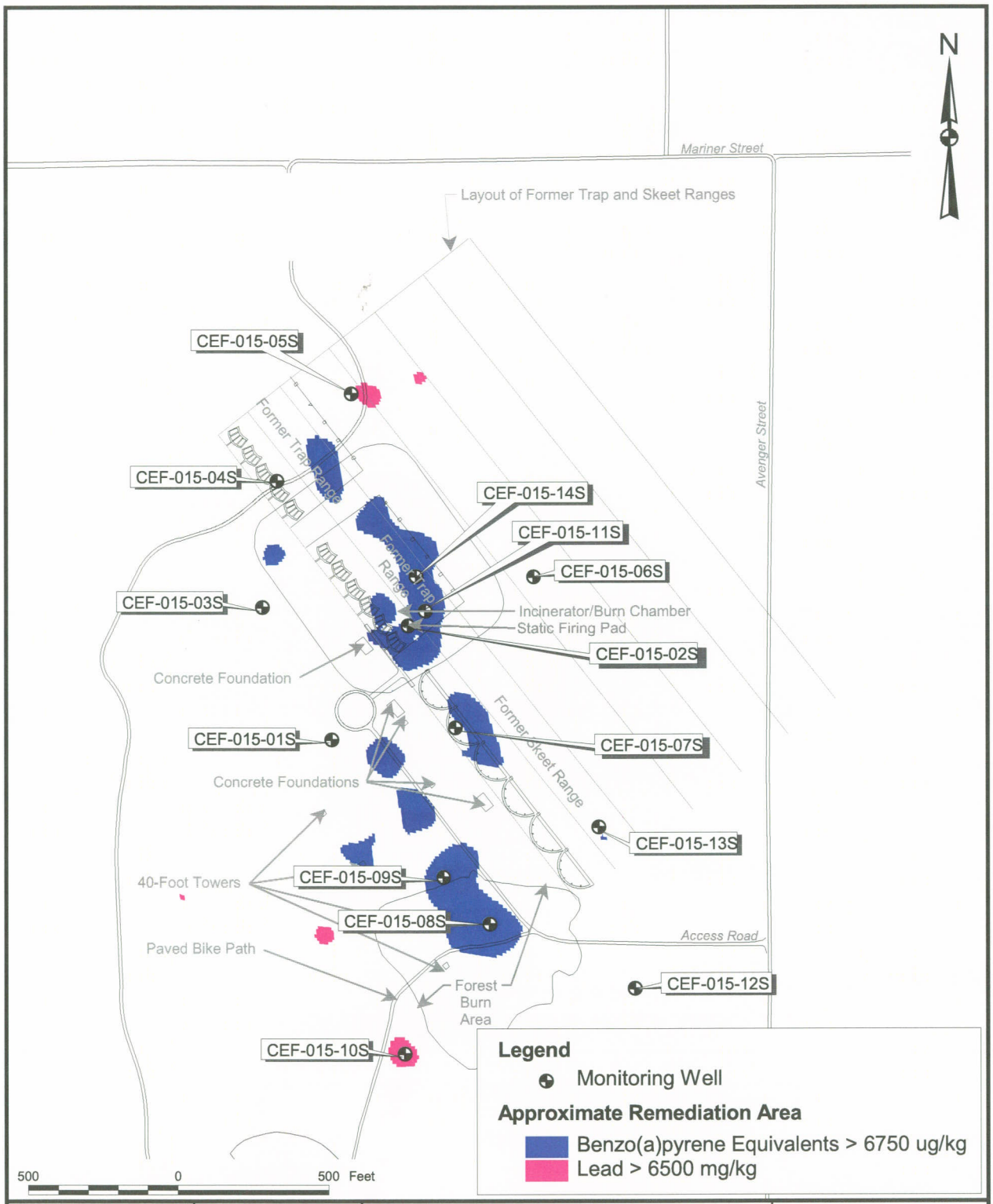


DRAWN BY MJJ	DATE 29Sept03	LOCATION OF GROUNDWATER MONITORING WELLS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY RFO	DATE 9/29/03		APPROVED BY MJJ / DATE 12/1/03
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-1 / REV 0

P:\GIS\NAS_CecilField\Site-15_TechMemo.apr 29Sept03 MJJ 14-Layout-MonitoringWells

Samples from the first event were analyzed for PAHs; nitroaromatic compounds; and total and filtered antimony, arsenic, and lead using U.S. EPA SW-846 Methods 8310, 8330, and 6010B, respectively. The sample from the second event was only analyzed for antimony, arsenic, and lead. Samples from the third event were analyzed for PAHs, nitroaromatic compounds, total arsenic, and/or total lead. Accutest SouthEast in Orlando, Florida performed the analyses.

5.0 NATURE AND EXTENT OF CONTAMINATION

Analytical results for the groundwater samples collected during the first (April 2000) field investigation are presented on Table 5-1 and compared to their associated FDEP GCTLs. Analytical results for metals are also compared to their associated NAS Cecil Field IBDS values. Complete analytical laboratory results are provided in Appendix C.

As shown on Table 5-1, concentrations of PAHs and nitroaromatic compounds were below analytical detection limits. Positive detections of total and filtered antimony were recorded in only two wells with maximum concentrations of 42.9 and 46.2 µg/L, respectively, measured in well CEF-015-08S. This later concentration very slightly exceeded the IBDS value of 44.5 µg/L. There were no positive detections of either total or filtered arsenic in the wells. The results of the groundwater analysis did not identify groundwater PAH contamination in excess of any FDEP GCTLs. The results were below the method detection limit. Positive detections of total lead were recorded in only two wells, with a maximum concentration of 21.7 µg/L measured in well CEF-015-01S. This concentration exceeded both the FDEP GCTL of 15 µg/L and the IBDS value of 5.35 µg/L. However, there were no positive detections of filtered lead in the wells and the turbidity measured in well CEF-015-01S was 501 NTUs which is very high. It was thus hypothesized that a significant portion of the total lead concentration measured in well CEF-015-01S was in fact associated with suspended solids rather than groundwater. To verify this, a second sampling of well CEF-015-01S was performed in May 2000 and the well was developed until measured turbidity was approximately 20 NTUs. A sample was then collected and analyzed for total and filtered lead. Analytical results showed that concentration of filtered lead was below the detection limit and concentration of total lead was 9 µg/L. This concentration is above the IBDS value but well below the FDEP GCTL.

Analytical results for the groundwater samples collected during the third (July 2003) field investigation are presented on Table 5-2 and compared to their associated FDEP GCTLs. Analytical results for metals are also compared to their associated NAS Cecil Field IBDS values. The rationale for the location of the new monitoring wells and the rationale for sampling monitoring well CEF-015-02S are provided in Table 5-3. Complete analytical laboratory results are provided in Appendix C.

As shown in Table 5-2, positive detections of total arsenic were recorded in one well; arsenic was detected at a concentration of 13.7 µg/L in monitoring well CEF-015-13S. This arsenic concentration slightly exceeds the IBDS value of 7.1 µg/L but is less than the FDEP GCTL of 50 µg/L. None of the other metals were detected above the detection limits. The detection limits were below the FDEP GCTLs

TABLE 5-1

APRIL 2000 GROUNDWATER SAMPLING ANALYTICAL RESULTS
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FOLRIDA
PAGE 1 OF 2

Constituents	FDEP GCTL	NAS CF IBDS	Well Locations CEF-015-								
			-01S	-01S Dup	-02S	-03S	-04S	-05S	-06S	-07S	-08S
PAHs (µg/L)											
Acenaphthene	20	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Acenaphthylene	210	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2. 2 U	2.2 U
Anthracene	2100	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Benzo(a)anthracene	0.2	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Benzo(a)pyrene	0.2	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Benzo(b)fluoranthene	0.2	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Benzo(g.h,I)perylene	210	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Benzo(k)fluoranthene	0.5	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Chrysene	4.8	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Dibenzo(a,h)anthracene	0.2	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Fluoranthene	280	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Fluorene	280	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Indeno(1,2,3-cd)pyrene	0.2	NA	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Naphthalene	20	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
1-Methylnaphthalene	20	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
2-Methylnaphthalene	20	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Phenanthrene	210	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Pyrene	210	NA	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Nitroaromatic Compounds (µg/L)											
2-amino-4,6-Dinitrotoluene	NC	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
4-amino-2,6-Dinitrotoluene	NC	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
1,3-Dinitrobenzene	8	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
2,4-Dinitrotoluene	0.1	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
2,6-Dinitrotoluene	0.1	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
HMX	350	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
Nitrobenzene	4	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
o-Nitrotoluene	250	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
m-Nitrotoluene	250	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
p-Nitrotoluene	250	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
PETN	1	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
RDX	10	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
Tetryl	NC	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U

TABLE 5-1

APRIL 2000 GROUNDWATER SAMPLING ANALYTICAL RESULTS
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FOLRIDA
PAGE 2 OF 2

Constituents	FDEP GCTL	NAS CF IBDS	Well Locations CEF-015-								
			-01S	-01S Dup	-02S	-03S	-04S	-05S	-06S	-07S	-08S
1,3,5-Trinitrobenzene	210	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
2,4,6-Trinitrobenzene	NC	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
2,4,6-Trinitrotoluene	10	NA	3.9 U	3.9 U	5.0 U	5.0 U	5.2 U	5.2 U	5.0 U	18 U	6.5 U
Total Metals (µg/L)											
Antimony	6	44.5	2.4 U	2.4 U	2.4 U	2.9 B	2.4 U	3.3 B	2.4 U	2.4 U	42.9
Arsenic	50	7.1	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.9 B	3.4 U	3.4 U	3.4 U
Lead[1]	15	5.35	19.8	21.7	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	2.3 B
Filtered Metals (µg/L)											
Antimony	6	44.5	2.4 U	2.4 U	2.9 B	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	46.2
Arsenic	50	7.1	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U
Lead	15	5.35	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U

NOTES:

Shading denotes an exceedance of cleanup target levels

1 Groundwater from CEF-015-01S had very high turbidity (501 NTUs) during April 2000 sampling. Redevelopment of this well in May 2000 yielded much lower turbidity readings (10 to 20 NTUs) and lead concentrations (9.0 µg/L total, 1.6 U µg/L filtered).

FDEP Florida Department of Environmental Protection
GCTL Groundwater Cleanup Target Level
HMX Cyclotetramethylenetetranitramine
IBDS Inorganic Background Data Set
NA not available
NAS CF Naval Air Station Cecil Field
NC no criterion
PAHs polycyclic aromatic hydrocarbons
PETN pentaerythrioltetranitrate
RDX Cyclotrimethylenetrinitramine
U undetected at indicated analytical detection limit

TABLE 5-2

JULY 2003 GROUNDWATER SAMPLING ANALYTICAL RESULTS
SITE 15, BLUE ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Constituent	FDEP GCTL (1)	NAS CF IBDS (2)	Well CEF-015-							
			-02S	-09S	-10S	-11S	-11S Dup	-12S	-13S	-14S
Polynuclear Aromatic Hydrocarbons (ug/L)										
1-Methylnaphthalene	20	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
2-Methylnaphthalene	20	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Acenaphthene	20	NC	0.53 U	0.52 U	NA	0.53 U	0.53 U	NA	NA	NA
Acenaphthylene	210	NC	0.53 U	0.52 U	NA	0.53 U	0.53 U	NA	NA	NA
Anthracene	2100	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Benzo(a)anthracene	0.2	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Benzo(a)pyrene	0.2	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Benzo(b)fluoranthene	0.2	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Benzo(g,h,i)perylene	210	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Benzo(k)fluoranthene	0.5	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Chrysene	4.8	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Dibenzo(a,h)anthracene	0.2	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Fluoranthene	280	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Fluorene	280	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Naphthalene	20	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.2	NC	0.11 U	0.1 U	NA	0.11 U	0.11 U	NA	NA	NA
Phenanthrene	210	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Pyrene	210	NC	0.27 U	0.26 U	NA	0.26 U	0.27 U	NA	NA	NA
Carbazole (ug/L)										
Carbazole	4	NC	NA	NA	NA	1.1 U	1.1 U	NA	NA	NA
Nitroaromatics Compounds (ug/L)										
1,3,5-Trinitrobenzene	210	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
1,3-Dinitrobenzene	8	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
2,4,6-Trinitrotoluene	10	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
2,4-Dinitrotoluene	0.1	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
2,6-Dinitrotoluene	0.1	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
2-amino-4,6-Dinitrotoluene	NC	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
4-amino-2,6-Dinitrotoluene	NC	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
HMX	350	NC	NA	NA	NA	0.081 U	0.08 U	0.081 U	NA	0.081 U
Nitrobenzene	4	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
3-Nitrotoluene	250	NC	NA	NA	NA	0.054 U	0.053 U	0.054 U	NA	0.054 U
4-Nitrotoluene	250	NC	NA	NA	NA	0.081 U	0.08 U	0.081 U	NA	0.081 U
RDX	1	NC	NA	NA	NA	0.081 U	0.08 U	0.081 U	NA	0.081 U
Tetryl	NC	NC	NA	NA	NA	0.081 U	0.08 U	0.081 U	NA	0.081 U
Total Metals (ug/L)										
Arsenic	50	7.1	NA	NA	NA	NA	NA	NA	**13.7**	NA
Lead	15	5.35	NA	NA	3.4 U	NA	NA	NA	NA	NA

Notes:

U = Undetected at indicated analytical detection limit
NA = Not analyzed.
NC = No criterion.
(1) Florida Department of Environmental Protection Groundwater Cleanup Target Levels, FAC 62-777 (FDEP, 1999).
(2) NAS Cecil Field Inorganic Background Data Set (HLA, 1998).

TABLE 5-3

MONITORING WELL INSTALLATION AND SAMPLING RATIONALE
SITE 15, BLUE ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring Well Location	Sampling Rationale
CEF-015-02S	Area of high PAH concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine PAH concentrations and potential impacts to groundwater.
CEF-015-09S	Area of high PAH concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine PAH concentrations and potential impacts to groundwater.
CEF-015-10S	Area of high lead concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine lead concentrations and potential impacts to groundwater.
CEF-015-11S	Area of high carbazole and nitroaromatic concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine carbazole and nitroaromatic concentrations and potential impacts to groundwater.
CEF-015-12S	Area of high nitroaromatic concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine nitroaromatic concentrations and potential impacts to groundwater.
CEF-015-13S	Area of high arsenic concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine arsenic concentrations and potential impacts to groundwater.
CEF-015-14S	Area of high nitroaromatic concentrations in soil. Soil concentrations are greater than FDEP SCTL for leachability to groundwater criteria. A sample was collected from this well to determine nitroaromatic concentrations and potential impacts to groundwater.

Concentrations of PAHs, carbazole, and nitroaromatic compounds were less than analytical detection limits, as shown on Table 5-2. The results of the groundwater analysis did not identify groundwater PAH, carbazole, or nitroaromatic concentrations in excess of FDEP GCTLs.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSION

Based upon the findings of the field investigation discussed in Section 5.0, it can be concluded that, although the Site 15 soil contains PAHs, carbazole, nitroaromatic, and inorganic compounds at concentrations that exceed the FDEP SCTL for leachability to groundwater, these contaminants have not impacted groundwater quality at the site. The results of the groundwater analysis indicate that these contaminants have not leached from the soil into the groundwater. Based on the groundwater analysis, the BCT has determined that these contaminants will not pose a concern for groundwater if they remain at the site.

6.2 RECOMMENDATION

Based upon the above conclusion, it is recommended that no further groundwater monitoring be required at Site 15. Because the results of the groundwater analysis did not show exceedances of FDEP GCTLs, it is recommended that No Further Action for the groundwater at Site 15 is required.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1997. *Remedial Investigation, Operable Unit 5, Sites 14 and 15.* Prepared for Southern Division Naval Facilities Engineering Command (SOUTHDIVNAVFACENGCOM), North Charleston, South Carolina. October.

BCT [Base Realignment and Closure (BRAC) Cleanup Team], 2003. *BCT Meeting Minute No. 1919 and Decision No. 624*, Meeting of April 9, 2003.

Bower, H. and H. C. Rice, 1976. *A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells.* Water Resources Research 12(3):423-28.

Envirodyne Engineers, 1985. *Initial Assessment Study of Naval Air Station Cecil Field, Jacksonville, Florida.* Prepared for Naval Energy and Support Activity, NEESA 13-073. Port Hueneme, California.

Fairchild, R.W., 1972. *The Shallow-Aquifer System in Duval County, Florida.* Bureau of Geology, Florida Department of Natural Resources, Tallahassee, Florida.

FDEP (Florida Department of Environmental Protection), 1999a. *Groundwater Cleanup Target Levels and Soil Cleanup Target Levels.* Florida Administrative Code (FAC) Chapter 62-777. August.

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

FDEP, 2001. *FDEP Technical Review of the Technical Memorandum for No Further Groundwter Monitoirng at U5, Site 15, Naval Air Station Cecil Field.* Letter to Mr. Mark Davidson from Mr. David Grabka. August 30.

FDEP, 2002. *FDEP Standard Operating Procedures FS2200.* FAC Chapter 62-160, Quality Assurance Rule, April.

FGS (Florida Geological Survey), 1986. *Hydrogeological Units of Florida.* Compiled by the Southeastern Geological Society Ad Hoc Committee.

HLA (Harding Lawson Associates), 1998. *NAS Cecil Field Inorganic Background Data Set.* Prepared for SOUTHDIVNAVFACENGCOM, North Charleston, South Carolina. July.

TtNUS (Tetra Tech NUS, Inc.), 1998. *Base-Wide Generic Work Plan at NAS Cecil Field, Jacksonville, Florida.* Prepared for SOUTHDIVNAVFACENGCOM, North Charleston, South Carolina. October.

TtNUS, 1999. *Remedial Investigation Report for Sites 36 and 37, NAS Cecil Field, Jacksonville, Florida.* Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, August.

TtNUS, 2000. *Sampling and Analysis Plan, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field.* March.

TtNUS, 2003. *Phase X Sampling and Analysis Plan Revision 1, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field.* June.

USDA (U.S. Department of Agriculture), 1978. *Soil Survey of City of Jacksonville, Duval County, Florida.* Soil Conservation Service.

U.S. EPA Region 4 (United States Environmental Protection Agency Region 4), 1996. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.* Athens, GA. May.

USGS (U.S. Geological Survey), 1996. *Ground-Water Flow in the Surficial Aquifer System and Potential Movement of Contaminants From Selected Waste-Disposal Sites at Cecil Field Naval Air Station, Jacksonville, Florida.* Administrative release.

APPENDIX A

SAMPLING AND ANALYSIS WORK PLANS

Sampling and Analysis Work Plan
Site 15, Operable Unit 5
Naval Air Station Cecil Field
Jacksonville, Florida

March 29, 2000

Sampling and analysis of existing monitoring wells is proposed to investigate groundwater at Site 15. The locations of the existing wells are as shown in Figure A. The groundwater sampling effort is being conducted to determine if soil contamination in excess of the established leachability criteria has impacted groundwater. Previous soil investigations identified contamination in excess of FDEP Soil Cleanup Target Level for leachability for PAHs, lead, antimony, arsenic, 2,4,6-trinitrotoluene, 3-nitrotoluene, and 4-nitrotoluene.

The groundwater sampling activities and procedures described in this Work Plan will be performed in accordance with the U.S. EPA Region 4 Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) and the Base-Wide Generic Work Plan for Naval Air Station (NAS) Cecil Field. Specifically, the Base-Wide Generic Work Plan includes procedures for management of investigation-derived wastes in Volume I and standard operating procedures in the Project Operations Plan in Volume II. **Purging of the wells prior to collection of the sample will be conducted in accordance with the SOP and it is important that the turbidity requirement are met. The groundwater will be sampled using low-flow techniques.** Due to the potentially remote locations of the monitoring wells to be sampled, it may be necessary to place the IDW drums in an area other than next to the wells so they are accessible by truck.

Personnel protection equipment and other waste trash (e.g. disposable trowels) will not be considered hazardous and will be disposed in a municipal landfill. Such trash will be collected in a plastic bag and disposed in a suitable trash receptacle.

Sampling handling, bottleware, preservation, and holding time requirements for the analysis proposed for this sampling event are as identified in the following table:

Analysis (1)	Analytical Method	Bottleware	Preservation	Holding Time(2)
PAHs	SW-846 8310	2 1-liter amber glass; Teflon-lined lid	Cool to 4°C	7 days to extraction; 40 days to analysis
Lead, arsenic, and antimony	SW-846-6010B	1 1-liter HDPE	Cool to 4° C pH < 2 with NHO_3	180 days to analysis
Energetics / Nitroaromatics (2,4,6-trinitrotoluene, 3-nitrotoluene, and 4-nitrotoluene	SW-846-8330	1 2-liter amber glass	Cool to 4°C	7 days to extraction; 40 days to analysis

(1) Verify detection limits achieve GCTLs.
(2) Holding times are measured from the date/time of sample collection.

Analytical results will be provided on a 14-day turn around basis.

The laboratory contracted to do this work is as follows:

ACCUTEST SOUTHEAST
4405 Vineland Road, Suite C-15
Orlando, Florida 32881
Attention: Linda Williams
(407) 425-6700 Fax: (407) 425-0707

As agreed upon by the BCT, the collection of rinsate and trip blanks has been eliminated at NAS Cecil Field. In addition, field blanks will not be collected during this sampling program because there will be no decontamination of sampling equipment. In accordance with these changes, the following table summarizes the frequency and type of field Quality Assurance/Quality Control (QA/QC) samples to be collected for this sampling program.

Type of Samples	Frequency	Samples to be Collected
Field Duplicate	1/10 sample/matrix	1 groundwater
Lab MS/MSD	1/20 samples	1 groundwater [1]

[1] MS/MSD is a laboratory QA/QC requirement, separate sample not required, only additional volume.

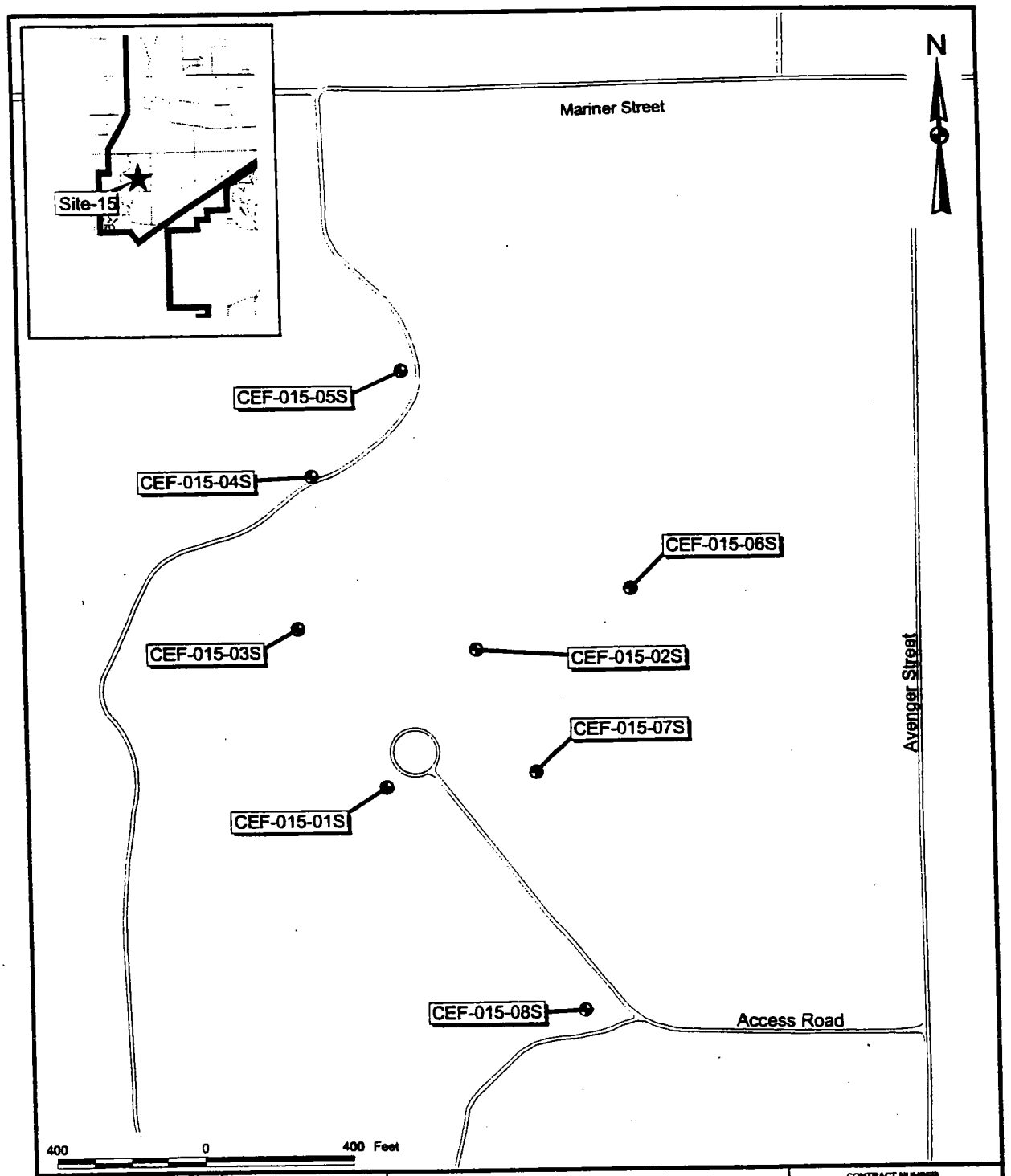
As agreed upon by the BCT, formal data validation has been eliminated from the installation restoration program at NAS Cecil Field. However, the analytical data packages generated by the analytical laboratory will be reviewed by Tetra Tech NUS personnel to eliminate false positives and false negative results.

Table 1

Groundwater Sampling and Analysis
Site 15, OU5

Sample ID	Location	Analysis			
		Energetics / Nitroaromatics (2,4,6-trinitrotoluene, 3-nitrotoluene, and 4-nitrotoluene)	PAHs	Lead, arsenic, and antimony	
				Filtered	Unfiltered (1)
CEF-015-GW-01S-01	Existing Monitoring Well CEF-015-01S	X	X	X	X
CEF-015-GW-02S-01	Existing Monitoring Well CEF-015-02S	X	X	X	X
CEF-015-GW-03S-01	Existing Monitoring Well CEF-015-03S	X	X	X	X
CEF-015-GW-04S-01	Existing Monitoring Well CEF-015-04S	X	X	X	X
CEF-015-GW-05S-01	Existing Monitoring Well CEF-015-05S	X	X	X	X
CEF-015-GW-06S-01	Existing Monitoring Well CEF-015-06S	X	X	X	X
CEF-015-GW-07S-01	Existing Monitoring Well CEF-015-07S	X	X	X	X
CEF-015-GW-08S-01	Existing Monitoring Well CEF-015-08S	X	X	X	X

(1) Filter using a 1-micron filter during collection of the sample.



DRAWN BY / DATE		MONITORING WELL LOCATIONS SITE 15, OPERABLE UNIT 5 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER —
CHECKED BY / DATE			APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV 0

P:\GIS\CECIL\site-15_groundwater.apr 27Mar00 MJJ Layout1

TABLE

SUMMARY OF FIXED-BASED LABORATORY PARAMETERS
SITE 15
NAS CECIL FIELD, JACKSONVILLE, FLORIDA

Analysis	Analytical Method	Sample Volume	Bottleware	Preservation[1]	Holding Time[2]
SITE 15 (8 Monitoring Wells: CEF-15-01S, CEF-15-02S, CEF-15-03S, CEF-15-04S, CEF-15-05S, CEF-15-06S, CEF-15-07S, and CEF-15-08S plus duplicate)					
14 day Turnaround					
PAHs	SW-846 8310	2 x 1 L	Amber glass; Teflon-lined cap	Cool to 4°C; dark	Extraction 7 days; analysis within 40 days
Energetics/Nitroaromatics • 3-Nitrotoluene • 4-Nitrotoluene • 2,4,6-Trinitrotoluenel	SW-846 8330	2 x 1 L	Amber glass; Teflon-lined cap	Cool to 4°C; dark	Extraction 7 days; analysis within 40 days
Select Inorganics (Total and Dissolved) • Antimony • Arsenic • Lead	SW-846 6010B/ 7000A Series	1 L	Polyethylene bottle, plastic cap, plastic liner	HNO_3 to pH<2	Within 180 days

1 HNO_3 - Nitric acid
2 Holding times are measured from the date/time of sample collection.
NA - Not applicable.

Phase X Sampling and Analysis Work Plan Rev. 1
Site 15, Blue 10 Ordnance Disposal Area
Naval Air Station Cecil Field
Jacksonville, Florida

June 24, 2003

The objective of this sampling is to further delineate the horizontal extent of arsenic in soil, vertically delineate TRPH in soil and to install and sample six monitoring wells to characterize groundwater conditions in areas where soil contaminant concentrations exceed FDEP leachability to groundwater criteria. The proposed sampling locations are based on prior sampling events conducted by ABB and TtNUS that include over 500 samples. During this investigation, 2 soil samples will be collected from 0 to 1 foot below ground surface (bgs), 1 soil sample will be collected from 1 to 2 foot below ground surface (bgs) and seven groundwater samples will be collected from the six new monitoring wells and one existing monitoring well. Approximate locations are identified on Figure A and described in Table 1.

The well installation and sampling activities, quality assurance/quality control (QA/QC) procedures, and data validation requirements for field activities described in this work plan are in general agreement with the U.S. EPA Region IV Environmental Investigation Standard Operating Procedures (SOPs) and Quality Assurance Manual (EISOPQAM), FDEP SOPs FS3000, Remedial Investigation report for Sites 36 and 37, and current Tetra Tech NUS, Inc. (TtNUS) SOPs. Florida Administrative Code (FAC) Quality Assurance Rule (FAC 62-160) was updated in April of 2002 and incorporates new SOPs developed and adopted by the FDEP for the collection and analysis of environmental media. Accordingly, the soil and groundwater activities that will be conducted in this work plan will abide by SOPs FS3000 (for soil) and FS2200 (for groundwater), both of which reference additional applicable SOPs as necessary.

Prior to the installation of the monitoring wells, utilities must be located or cleared by TtNUS.

The monitoring wells shall be installed in the shallow groundwater zone and shall be identified as indicated on Table 1. The well screen will be 0.010-inch slot, with a screen length of ten feet from 5' to 15' bgs. The well will be constructed of certified-clean material including a 2-inch, flush-threaded PVC well screen and riser. The locations and top of casing elevations will be surveyed by a registered surveyor.

The surface soil samples (0 to 1 foot bgs and 1 to 2 foot bgs) will be collected as grab samples using plastic, disposable trowels. The proposed soil sample locations shall be surveyed by a registered land surveyor prior to sampling and marked with a wooden stake or pin flag labeled with the sample identification as listed in Table 1.

Personnel protection equipment and other waste trash (e.g. disposable trowels) will not be considered hazardous and will be disposed in a municipal landfill. Such trash will be collected in a plastic bag and disposed in a suitable trash receptacle. Removed soil from the surface soil sampling in excess of sampling volume requirements will be placed back on the ground.

Requirements for sample handling, bottleware, preservation, and holding time for the analyses proposed for this sampling event are as identified in the following table:

Analysis	Analytical Method	Bottleware	Preservation	Holding Time(1)
		SOIL		
ARSENIC	SW-846 6010B	4 oz. glass jar	Cool to 4°C	180 days to extraction
TRPH	Florida PRO	8-oz. glass jar	Cool to 4° C	14 days to analysis
		GROUNDWATER		
PAHs plus Carbazole	SW-846 8310	2 1-liter amber glass; Teflon-lined cap	Cool to 4° C	7 days to extraction; 40 days to analysis
Nitro Aromatics	SW-846 8330	2 1-liter amber glass; Teflon-lined cap	Cool to 4° C	7 days to extraction; 40 days to analysis
Total Lead	SW-846 6010B/7000A Series	1 1-liter glass or polyethylene; Teflon-lined lid	HNO3 to pH<2, Cool to 4° C	180 days to analysis
Total Arsenic	SW-846 6010B/7000A Series	1 1-liter glass or polyethylene; Teflon-lined lid	HNO3 to pH<2, Cool to 4° C	180 days to analysis

(1) Holding times are measured from the date/time of sample collection.

PAHs = Polynuclear aromatic hydrocarbons.
TRPH = Total recoverable petroleum hydrocarbons.
PRO = Petroleum Range Organic method.

Analytical results will be reported on a *14-day* turn around basis.

The laboratory contracted to do this work is as follows:

ACCUTEST SOUTHEAST
4405 Vineland Road, Suite C-15
Orlando, Florida 32881
Attention: Linda Williams
(407) 425-6700
Fax: (407) 425-0707

As agreed upon by the BCT, the collection of rinsate and trip blanks has been eliminated at NAS Cecil Field. In addition, field blanks will not be collected during this sampling program because there will be minimal decontamination of sampling equipment. In accordance with these changes, the following table summarizes the frequency and type of field Quality Assurance/Quality Control (QA/QC) samples to be collected for this sampling program.

Type of Samples	Frequency	Samples to be Collected
Field Duplicate	1/10 sample/matrix	1 soil / 1 groundwater
Lab MS/MSD	1/20 samples/matrix	1 soil (1)/ 1 groundwater (1)

(1) MS/MSD is a laboratory QA/QC requirement, separate samples not required, only additional volume (2x).

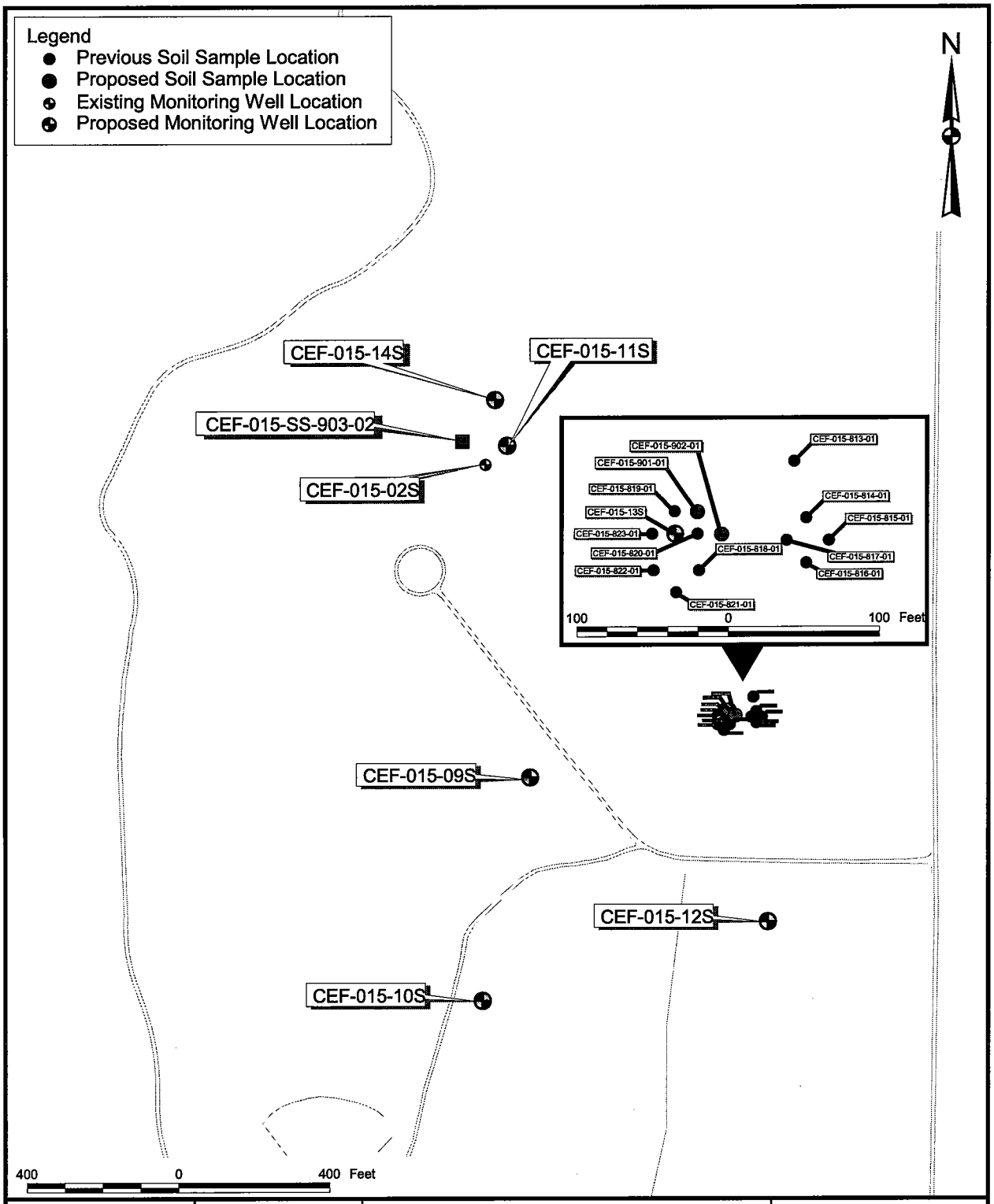
As agreed upon by the BCT, formal data validation has been eliminated from the installation restoration program at NAS Cecil Field. However, the analytical data packages generated by the analytical

laboratory will be reviewed by Tetra Tech NUS personnel to eliminate false positives and false negative results.

Table 1

Phase X Sampling and Analysis Work Plan
Site 15, Blue 10 Ordnance Disposal Area

Sample ID CEF-015-	Location	Sample Interval (bgs)	Analysis					
			Arsenic	PAHs	Carbazole	TRPH	Nitro Aromatics	Lead
SOIL								
SS-901-01	15 feet north of previous sample location CEF-015-820-01	0'-1'	●					
SS-902-01	15 feet east of previous sample location CEF-015-820-01	0'-1'	●					
SS-903-02	Previous sample location CEF-015-827-02	1'-2'	●			●		
GROUNDWATER								
GW-02S-02	Existing well CEF-015-02S			●				
GW-09S-02	Proposed Well CEF-015-09S			●				
GW-10S-02	Proposed Well CEF-015-10S							●
GW-11S-02	Proposed Well CEF-015-11S			●	●		●	
GW-12S-02	Proposed Well CEF-015-12S						●	
GW-13S-02	Proposed Well CEF-015-13S		●					
GW-14S-02	Proposed Well CEF-015-14S						●	



DRAWN BY MJJ	DATE 20Jun03	PROPOSED PHASE X SAMPLE LOCATIONS OU 5, SITE 15 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE A / REV 0

P:\GIS\NAS_CecilField\Site-15_200301.apr 20Jun03 MJJ Layout8

APPENDIX B

SAMPLING LOGS

B.1 APRIL 2000 SAMPLING LOGS

B.2 MAY 2000 RE-SAMPLING LOGS

B.3 BORING LOGS AND MONITORING WELL SHEETS FOR NEW WELLS

B.4 JULY 2003 SAMPLE LOGS

B.1 APRIL 2000 SAMPLING LOGS

TITLE Site 15

PROJECT NO. 7653
BOOK NO. 1299

Work continued from Page /

0818 Louie Knight departed in POV for Cecil Field.
Merv Dale departed in F250 for same.
Plan of Day at Site 15. Groundwater Sampling. (OWS)
Work Plan dated 3/29/00.
Wells CEF-015-GW-015 thru 085 for PAHs (8310), Lead (Pb), Arsenic (As) and Antimony (Sb) (6010B) and energetics (8330). (METALS - total + dissolved)

0900 At PWC Bldg. 1, load truck with supplies. Calibrate horibas (2). # 906024 & 804048. Rented from Response Rentals. Peristaltic Pumps (3) (from Pine Env.) 00734 and 00823. Water level indicators (HERON) (from Response Rentals) - 100 foot tape (2). Loaded per sampling field checklist.

0930 Paul Calligan arrives @ PWC. PLAN to meet with Nick Agolini (South Div Proj. Eng.). HASP briefing per 4/99 HASP.

0945 P.C. leave to get N.U. @ Cecil Field runway.
M.D. and L.K. to Site 15 to begin locating wells.

1030 P.C./N.U. at Site 15 to pick up M.D. L.K. will continue to uncap (only wells 35 and 78 remain to locate) wells.
Leaving cell ph. with L.K.
N.U./P.C./M.D. to town sites for CTO 121.

1128 L.K. begins water levels (see sheet for details). (H.STOC)

15	5.77
25	6.97
35	7.17
45	7.39
55	4.64
65	6.39
75	7.66
85	5.35

1230 M. Dale call L.K. He's about through taking levels, so we will finish our tour and meet back at PWC.

1330 Back at PWC. L.K. at Rae's for lunch. N.U. and P.C. go to Rae's for lunch. M.D. stay at PWC for lunch.

1400 L.K. pick M.D. up at PWC. Proceed to Site 15.

Work continued to Page 138

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Merwin Dale DATE 4/17/00

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

TITLE Site 15 / RR current ~~CTO 78~~ MD **PROJECT NO.** 7653 **BOOK NO.** 1299 **139**

Work continued from Page —

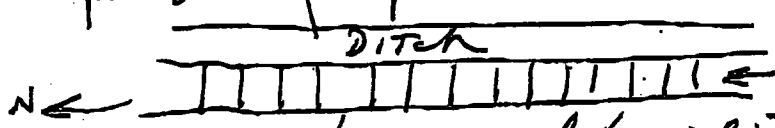
0704 MERV DALE (M.D.) AND ERIC PARKER (E.P.) DEPART IN FESO.
PLAN OF DAY - COMPLETE SAMPLING AT SITE 15 (YELLOW WATER WEAPONS AREA OF CECIL FIELD, JAX, FL.
CELL Ph 614 4443.

EQUIPMENT
(2) HORIBAS (U-10)
(2) HERON WATER LEVEL INDICATORS
(2) Peristaltic Pumps

0847 TRUCK CORRED per checklist. Horibas and D.O calibrated. See Cal. sheet.
Proceed to Site 15. HASP tailgate talk.

0917 E.P. unloaded and set at well 35. M. Dale leave cell ph with E.P. and go to north end of RR to look for ARC Investigators.

0939 Found siding on north end immediately adjacent (east) of main line. Didn't notice RR wood ties/spike plates before. The start almost at north end and parallel at for 0.45 Miles. I marked the north and south end by blue/white striped survey tape.



note: RR ties touch the ballast line! ~~The ties are about as wide as the ballast road. (Top of ballast to toe of ballast). (~9-11' wide).~~ and Ties are about 6-7' long.

1000 BACK AT SITE 15 (circle) WALK TO ERIC and get phone.
ARC called to apologize for missing us. The crew went to the wrong end of the RR. Will try again tomorrow.

1031 M.D. packing over to well 65.

1733 M.D. And E.P. depart Site 15. Drum 15-1 about 40 gallons full from purge water from wells 15 thru 75.
For purge data see gal logs and 10-flow purge sheets.
Sample times as follows:

Work continued to Page 140

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Merv Dale DATE 4/18/00

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

TITLE SITE 15/ SAMPLE MW-85 **PROJECT NO.** 7653 **BOOK NO.** **141**

Work continued from Page

0910 - At field office w/ Alan Pate (AP) & Charles Webber (CW).

TODAY'S AGENDA:
PSC 15- SAMPLE MW-85
PSC 25-
PSC 45-
PSC 21
} COLLECT WATER LEVELS

EQUIPMENT: 2 HORIBAS/PID/ WL INDICATOR/ PERISTALTIC PUMP/ ACCESSORIES

WEATHER: CLEAR: 70s/80s

0920 .. CALIBRATING INSTRUMENTS (PID, 2 HORIBAS)

1018 .. Setting up at MW-085 (PSC 15) ..

DTW MW-85 → (5.60)
(PID READING = 10)
(BZ = 0)

1102 - MW-85 pumping clear at 400 ml/min ..
CW gone back to field house to get 4 more 1-L ambers.

1215 .. Still pumping MW-85 .. TURB ~150 at last reading .. MELV calling PITTSBURGH to discuss protocol.
CW taking round of levels at PSC 45.

1228 - Begin collecting LAB samples (12 1-L ambers & 6 1-L plastics (2 MSMSD sets + regular set)
All these samples labeled "1300" for 'TIME'
1310 - Have now collected 16 of 18 liters from MW-85 .. now collecting filtered samples .. G. Root called to assure no of tick danger out here at PSC 15.
1420 .. At office after lunch .. CW has opened PSC-45 wells

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60606 MADE IN USA

SIGNATURE [signature] DATE
DISCLOSED TO AND UNDERSTOOD BY DATE 4.19.00 WITNESS DATE

TETRA TECH NUS, INC.
7018 AC Skinner Parkway #250
Jacksonville, FL 32256
Telephone: (904) 281-0400
Facsimile: (904) 281-0070

FAX

To: [redacted]	Date: 4/19/00
Company: TTNUS	
Location: Pittsburgh	
Fax Number: 412 921 4040	
From: M. Dane	
No. of Pages Including Cover: 18	

Comments:

Water levels and log sheets for Site 15 g.w. sampling.

Dup.

Note: Duplicate was taken at well 15 and MSMSD at well 85.

Please pass on QA data to Lee Lacks.

Thanks
Marvin

This facsimile contains PRIVILEGED AND CONFIDENTIAL INFORMATION intended only for the use of the Addressee(s) named above. If you are not the intended recipient of this facsimile, or the employee or agent responsible for delivering it to the intended recipient, you are hereby notified that any dissemination or copying of this facsimile is strictly prohibited. If you have received this facsimile in error, please immediately notify us by telephone and return the original facsimile to us at the above address via U.S. Postal Service. Thank you.

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

Sample ID No.: CEF-15-GW-15-01
Sample Location: CEF-15-15

Sampler: ERIC PARKER

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4/18/00								
Time: ~~1400~~ 1600								
Method: Peristaltic	Beni	5.23	.109	21.3	501	1.82	—	—

PURGE DATA

Date: 4/18/00
Method: Peristaltic
Monitor Reading (ppm): 0.0
Well Casing Diameter: 2 in.
Well Casing Material: PVC
Total Well Depth (TD in feet): 15.30
Static Water Level (WL in feet): 5.77
One Casing Volume (gal.): 1.5
Start Purge (hrs): 1350
End Purge (hrs): 1550
Total Purge Time (min): 120
Total Vol. Purged (gal.): 30.5

See Attached Low Flow Purge Data Sheet for Purge Data

15.30
5.77
~9.5 feet factor column

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-500 ml bottle	Accutest	
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml bottle	Accutest	
Energetics	SW846 8330	none	2-1 ~~1-2 liter bottle~~	Accutest	

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

LABS

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-041910

LAB:
COC #:

Check if Collected:

[ ] ~~MS/MSD~~ [✓] DUPLICATE / ID No.: CEF-15-GW-DUP-01

Signature(s): Eric Parker

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

Sample ID No.: CEF- 15-GW-25-01
Sample Location: CEF- 15-25

Sampler: Mervin Dale

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

SAMPLING DATA

		Color	pH S.U.	S.C. mS/cm	Temp. °C.	Turbidity NTU	DO mg/L	ORP mV	
Date:	4/18/00								
Time:	1428								
Method:	Peristaltic	clear	4.91	0.052	20.3	4	1.09	—	

PURGE DATA

Date:	4/18/00
Method:	Peristaltic
Monitor Reading (ppm):	
Well Casing Diameter:	2 IN.
Well Casing Material:	PVC
Total Well Depth (TD in feet):	15.70
Static Water Level (WL in feet):	6.97
One Casing Volume(gal):	5.4
Start Purge (hrs):	1318
End Purge (hrs):	1425
Total Purge Time (min):	67
Total Vol. Purged (gal):	19.1

See Attached Low Flow Purge Data Sheet for Purge Data

8.83 ft standing water
~5.4L to 1 vol.
5.4x3 = 16.2 L

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-~~500 ml~~ bottle	Accutest	
Pb, As, Sb	SW846 6010B	HNO3	1-~~500 ml~~ bottle	Accutest	
Energetics	SW846 8330	none	2-1/~~1-2~~ liter bottle MD	Accutest	

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

Tubing about 2 feet off bottom.

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-041700

LAB:
COC #:

Check if Collected:

[ ] MS / MSD [ ] DUPLICATE / ID No.: none

Signature(s): Mervin W. Dale

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sample ID No.: CEF- 15-GW-35-01
Sample Location: CEF- 15-35
Sampler: E. PARKER

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4-18-00								
Time: 1115								
Method: Peristaltic	Cloudy	4.30	.064	18.6	52	0.75	—	

PURGE DATA

Date: 4-18-00
Method: Peristaltic
Monitor Reading (ppm): 0.0
Well Casing Diameter: 2"
Well Casing Material: PVC
Total Well Depth (TD in feet): 16.18
Static Water Level (WL in feet): 7.17
One Casing Volume (gal): 1.4
Start Purge (hrs): 0915
End Purge (hrs): 1105
Total Purge Time (min): 110
Total Vol. Purged (gal): 28.0

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	4:00
Pb, As, Sb (F) -	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle Plastic	Accutest	↓
Pb, As, Sb	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle Plastic	Accutest	↓
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	↓

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-04/900
LAB:
COC #:

Checklist Collected:
[ ] MS / MSD [ ] DUPLICATE / ID No.: TMW

Signature(s): [signature]

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

Sample ID No.: CEF- 15-45-01 GW
Sample Location: CEF- 15-45
Sampler: M. Dark

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4/17/00								
Time: 1730								
Method: Peristaltic	clear	4.56	0.050	20.5	10	0.54	—	

PURGE DATA

Date:	4/17/00
Method:	Peristaltic
Monitor Reading (ppm):	127
Well Casing Diameter:	2 IN
Well Casing Material:	PVC
Total Well Depth (TD in feet):	15.63
Static Water Level (WL in feet):	7.39
One Casing Volume (gal/L):	1.3 gal 4.9L
Start Purge (hrs):	1525
End Purge (hrs):	1728
Total Purge Time (min):	123
Total Vol. Purged (gal/L)	22.9

See Attached Low Flow Purge Data Sheet for Purge Data

15.63
- 7.39
8.24

3 vols = 3.9 GALS
or
14.7 LITER

4.9 / 24.5 5 vols = 24.5 L

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle MB	Accutest	yes
Pb, As, Sb	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle	Accutest	yes
Energetics	SW846 8330	none	2- ~~1-1-2~~ 1 liter bottle MB	Accutest	yes

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

start tubing 1 foot off bottom of well

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15- 041800

LAB:
COC #:

Check if Collected:

[ ] MS / MSD [ ] DUPLICATE / ID No.: None

Signature(s): Mervin Dale

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field - Site 15
Project No.: N7653.CA0.05A.440

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sample ID No.: CEF- 15-55
Sample Location: CEF- 15-GW-055-01
Sampler: Louis Knight

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4/17/00								
Time:								
Method: Peristaltic	CLEAR	3.79	.059	19.3	0-2	0.93	N/A	

PURGE DATA

Date: 4/17/00
Method: Peristaltic
Monitor Reading (ppm): 0.0
Well Casing Diameter: 2 in.
Well Casing Material: PVC
Total Well Depth (TD in feet): 13.53
Static Water Level (WL in feet): 4.69 (4.69)
One Casing Volume (gal/L): 1.52
Start Purge (hrs): ~~1555~~ 1455
End Purge (hrs): 1550
Total Purge Time (min): 55
Total Vol. Purged (gal/L): ~56

See Attached Low Flow Purge Data Sheet for Purge Data

2 in
13.53
4.64
8.89

3 vol = 4.5

±1°C
±.1 Ph
±10% cond.
10 NTUs

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)*	SW846 6010B	HNO3	1-500 ml bottle	Accutest	yes
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml bottle	Accutest	yes
Energetics	SW846 8330	none	1-2 liter bottle	Accutest	yes

OBSERVATIONS / NOTES

* F = filtered with 1 micron filter

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15- 041800
LAB:
COC #:

Check if Collected:
[ ] MS / MSD [ ] DUPLICATE / ID No.:

Signature(s): Louis Knight

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15

Project No.: N7653.CA0.05A.440

Sample ID No.: CEF- 15-GW-65'-01

Sample Location: CEF- 15-65

Sampler: M. DAZE

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4/18/00								
Time: 1208								
Method: Peristaltic	Clear	4.82	0.035	19.5	0	0.55	—	

PURGE DATA

Date: 4/18/00
Method: Peristaltic
Monitor Reading (ppm): 0.0
Well Casing Diameter: 2 IN.
Well Casing Material: PVC
Total Well Depth (TD in feet): 15.34
Static Water Level (WL in feet): 6.39
One Casing Volume(gal): 5.6
Start Purge (hrs): 1118
End Purge (hrs): 1205
Total Purge Time (min): 47
Total Vol. Purged (gal): 18.2

See Attached Low Flow Purge Data Sheet for Purge Data

15.34
6.39
~ 9 FT

5.6 x 3 = 16.8 L needs for 3 volumes.

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-500 ml bottle	Accutest	↓
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml bottle	Accutest	
Energetics	SW846 8330	none	1-2 liter bottle	Accutest	

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

tubing about 1 foot off bottom.

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811

COC #: 15-04/1900

LAB:

COC #:

Check if Collected

[ ] MS / MSD [ ] DUPLICATE / ID No.: None

Signature(s): [illegible]

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

Sample ID No.: CEF-15-GW-75-01
Sample Location: CEF-15-75

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: Merv Dale

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4/18/00								
Time: 1645								
Method: Peristaltic	clear	4.64	0.056	19.5	3	0.14	—	

PURGE DATA

Date:	4/18/00
Method:	Peristaltic
Monitor Reading (ppm):	0.3
Well Casing Diameter:	2 IN.
Well Casing Material:	PVC
Total Well Depth (TD in feet):	17.34
Static Water Level (WL in feet):	7.72
One Casing Volume(gal/L):	
Start Purge (hrs):	1540
End Purge (hrs):	1639
Total Purge Time (min):	59
Total Vol. Purged (gal/L):	17.7

See Attached Low Flow Purge Data Sheet for Purge Data

17.34
7.72
9.62 ft.
5.8 to 6 bottle per vol
~~1.83 L per 3 vol~~
17.7 to 18 per 3 vols.

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-500 ml bottle	Accutest	↓
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml bottle	Accutest	
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

Tubing about 2 ft. off bottom

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-048900
LAB:
COC #:

Check if Collected:

[ ] MS / MSD [ ] DUPLICATE / ID No.: None

Signature(s): Merwin W. Dale

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7653.CA0.05A.440

Sample ID No.: CEF-15-GW-85-01
Sample Location: CEF-15-85

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: L. Knight

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 4.19.00								
Time: 1300								
Method: Peristaltic	brown	6.01	0.094	22.0	131	0.82	N/A	

PURGE DATA

Date: 4.19.00
Method: PERISTALTIC
Monitor Reading (ppm): 0.0
Well Casing Diameter: 2 in
Well Casing Material: PVC
Total Well Depth (TD in feet): 14.87
Static Water Level (WL in feet): 5.60
One Casing Volume (gal/L): 1.5
Start Purge (hrs): 1034
End Purge (hrs): 1220
Total Purge Time (min): 106
Total Vol. Purged (gal/L): 11

See Attached Low Flow Purge Data Sheet for Purge Data

14.87
-5.60
9.27

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	yes
Pb, As, Sb (F)	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle	Accutest	↓
Pb, As, Sb	SW846 6010B	HNO3	1-~~500 ml~~ 1L bottle	Accutest	↓
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	↓

OBSERVATIONS / NOTES

F = filtered with 1 micron filter

LAB INFO.

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-041900
LAB:
COC #:

Check if Collected:
[X] MS / MSD [ ] DUPLICATE / ID No.: None

Signature(s): M. Lab for L.K.

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 15-041900 | PAGE 1 OF 2

PROJECT NO: 7653

SITE NAME: Site 15

PROJECT MANAGER AND PHONE NUMBER: Rob Simcik 412-921-8163

LABORATORY NAME AND CONTACT: Accutest H. Behzadi

SAMPLERS (SIGNATURE): [signature]

FIELD OPERATIONS LEADER AND PHONE NUMBER: Merv Dale 904-281-0400

ADDRESS: 4405 Vineland Rd, C-15

CARRIER/WAYBILL NUMBER: FEDEX 8185 2037 5039 / 8185 2037 5326

CITY, STATE: Orlando, FL 32811

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE (YEAR 2000)	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	PAH SW 846 8310	Pb, As, Sb SW 846 6010B Unfilter	Pb, As, Sb SW 846 6010B Filter	Energetics Nitroaromatics					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G(2)	P	P	G(2)					
PRESERVATIVE USED						None	HNO3	HNO3	None					
4/18	1600	CEF-15-GW-1S-01	GW	G	5	✓	✓		✓					Cool to 4°C
4/18	1600	CEF-15-GW-1S-01-F	GW	G	1			✓						
4/18	1428	CEF-15-GW-2S-01	GW	G	5	✓	✓		✓					Work Release 13
4/18	1428	CEF-15-GW-2S-01-F	GW	G	1			✓						
4/18	1115	CEF-15-GW-3S-01	GW	G	5	✓	✓		✓					Energetics is
4/18	1115	CEF-15-GW-3S-01-F	GW	G	1			✓						SW 846 8330
														(2,4,6 trinitrotoluene
														3-nitrotoluene
														4-nitrotoluene
														Pb = lead
														As = Arsenic
														Sb = Antimony

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	4-19-00	1800	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY		

COMMENTS: 117653 CAO 05A 440

PINK (FILE COPY)

3/89

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 15-[illegible]/1800 | PAGE 1 OF 2 MB

PROJECT NO: 7653
SITE NAME: [illegible] 15
SAMPLERS (SIGNATURE): [illegible]

PROJECT MANAGER AND PHONE NUMBER: Rob [illegible] 407 721 8163
FIELD OPERATIONS LEADER AND PHONE NUMBER: Mark Dale 904 281 0400
CARRIER/WAYBILL NUMBER: FEDEX 2155 2037 3028

LABORATORY NAME AND CONTACT: Accutest [illegible]
ADDRESS: 4405 Vineland Rd, E-15
CITY, STATE: ORLANDO, FL 32811

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☑ 14 day

DATE YEAR	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	PH	PB, AS, SB	PB, AS, SB	PB, AS, SB					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	P	P	G					
PRESERVATIVE USED						None	HNO3	HNO3	None					
TYPE OF ANALYSIS							Filtered	Unfiltered	Filtered					
		~~CFF-15-GW-15'-01~~	GW	G		✓	✓		✓					Cont. 42
		~~CFF-15-GW-15'-01-F~~	GW	G				✓						
		~~CFF-15-GW-25'-01~~	GW	G		✓	✓		✓					Wrong Bottle
		~~CFF-15-GW-25'-01-F~~	GW	G				✓						
		~~CFF-15-GW-35'-01~~	GW	G		✓	✓		✓					Forgotten in [illegible]
		~~CFF-15-GW-35'-01-F~~	GW	G				✓						
4/17	1730	CFF-15-GW-45'-01	GW	G	5	✓	✓		✓					Cont. turned [illegible] 3 [illegible]
4/17	1730	CFF-15-GW-45'-01-F	GW	G	1			✓						4 [illegible]
4/17	[illegible]	CFF-15-GW-55'-01	GW	G	5	✓	✓		✓					
4/17	[illegible]	CFF-15-GW-55'-01-F	GW	G	1			✓						
														Pb: Lead
														As: Arsenic
														Sb: Antimony

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: [illegible]	4/16/00	1900	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

B.2 MAY 2000 RE-SAMPLING LOGS

172 Site 15

0700 - Briefing for day's activities at office w/ Mr. Dale, C. Waller, & A. Pate present.

- Load truck (F250) w/ equipment needed

0730 - Depart office for Cecil field

0800 - Arrive at Cecil Field

- Give 1 set Gold Tiger well keys & Dolphin well keys to ARC surveying at Site 16

- Proceed to Bldg. 1

0810 - Calibrate PID 2020 Pre-cal: 118 ppm
Post-cal: 120 ppm

- Calibrate Horiba U-22 Pre-cal: 3.99
MFG #: 9292036 Post-cal: 4.00

0823 - Depart Bldg. 1, Finished calibrating PID 2020 & Horiba U-22. Loaded buckets & other materials for well development.

0825 - Load Drum 21-12 & 4 empty drums from drum corral.

0842 - Leave Drum 21-12 at Site 21 (Golf Course) on North side of Bldg. 238.

- Proceed to Site 15

0856 - Arrive Site 15

Personnel: A. Pate & C. Waller

Equipment: 2 submersible pumps, 1 Horiba U-22, 1 W.L.I., 1 surge plunger on loan from Partridge Drilling Co.

Weather: Sunny, partly cldy., hi 80's

Objective: Develop well CEF-15-15

0900 - Begin setting up for well development of CEF-15-15

- Used surge plunger for ~4-5 minutes on well CEF-15-15

0925 - Begin developing well CEF-15-15

- Pump is ~ 1-2' off of bottom. Only pumps for 1-2 min before shutting off.

C. A. Waller 5/16/00

TITLE Site 15

PROJECT NO. 7653

BOOK NO. 1299

Work continued from Page 172

- See Monitoring Well Development Record sheet for details.

1205 - Well has stabilized to produce continuously at ~ 2 gals./min
- continuing development

1535 - End Development of well CEF-15-1S
Break down equipment & load up
Drums # 15-2, 15-3, & 15-4 used for development water & staged next to 15-1 on the SE corner of the circular road. All 3 drums are full (55 gals. each).

1600 - Arrive Bldg. 1
Decon submersible pump, place PID on charge

1630 - Proceed to Site 25 to inspect slopes of land for runoff direction. Arrows drawn on map of Site 25 indicate the overland flow

1658 - Depart Cecil Field for office

1721 - Drop surge plunger off to Partridge Drilling Co. on US. 17.

1750 - Arrive office.

CW.

Work continued to Page

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60608 MADE IN USA

SIGNATURE Charles Walker DATE 5/16/00

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-15-1S
Site: Site 15
Date Installed: NOT KNOWN
Date Developed: 05/16/2000
Dev. Method: Surge&Pump
Pump Type: Submersible

Depth to Bottom (ft.): 15.30
Static Water Level Before (ft.): 7.09
Static Water Level After (ft.): 9.61
Screen Length (ft.): 10
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: C. Waller and A. Pate
Drilling Co.: NOT KNOWN
Project Name: NAS CECIL FIELD
Project Number: 7653

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ~~mS/cm~~)	Turbidity (NTU)	Remarks (odor, color, etc.)
0925		3g	7.09	20.6	5.35	0.090	>999.0	DARK BROWN
0934		8g	9.12	20.5	5.32	0.087	>999.0	" "
0942		9.5	10.12	20.4	5.22	0.081	>999.0	" "
0953		11.0	12.05	20.4	4.89	0.077	>999.0	" "
1005		14.0	10.30	20.4	5.20	0.076	>999.0	" "
1015		20.0	11.71	20.4	5.20	0.073	>999.0	" "
1025		23.5	11.76	20.5	5.19	0.070	>999.0	" "
1035		30.0	11.35	20.7	5.08	0.067	>999.0	" "
1045		35.0	12.29	20.6	5.01	0.066	>999.0	" "
~~1055~~ 1055		38.5	11.02	20.5	5.02	0.066	>999.0	" "
1105		40.5	10.68	20.7	5.02	0.065	>999.0	" "
1115		45.0	11.31	20.5	4.95	0.064	>999.0	" "
1125		50.0	11.48	20.5	4.96	0.060	>999.0	" " ~~NEW DRUM~~ A-UP
1135		55.0	12.03	20.5	5.01	0.060	>999.0	" " NEW DRUM
1145		3.5	11.72	20.5	5.02	0.068	>999.0	Clearing
1155		10.0	12.68	20.7	4.87	0.062	709.0	"
1205		15.0	12.51	20.8	4.88	0.064	521.0	
1215		20.0	12.28	20.8	4.88	0.063	946.0	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-15-1S
Site: Site 15
Date Installed: NOT KNOWN
Date Developed: 05/16/2000
Dev. Method: Surge&Pump
Pump Type: Submersible

Depth to Bottom (ft.): 15.30
Static Water Level Before (ft.): 7.09
Static Water Level After (ft.): 9.61
Screen Length (ft.): 10
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: C. Waller and A. Pate
Drilling Co.: NOT KNOWN
Project Name: NAS CECIL FIELD
Project Number: 7653

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1225		25.0	12.30	20.5	4.87	0.063	317.0	BROWN
1235		30.0	12.13	20.6	4.85	0.062	265.0	BROWN
1245		35.0	12.08	20.6	4.85	0.062	226.0	BROWN
1255		40.0	11.85	20.8	4.84	0.061	182.0	BROWN
1305		45.0	11.93	20.9	4.85	0.062	163.0	BROWN
1315		48.0	11.83	20.6	4.85	0.062	153.0	Lt. BROWN
1325		53.0	11.65	20.8	4.82	0.062	133.0	Lt. BROWN
1335		2.0	11.56	20.9	4.80	0.062	116.0	Lt. Brown, New Drum
1351		16.0	11.45	21.0	4.83	0.062	107.0	Lt. BROWN,
1405		18.0	11.45	21.0	4.83	0.061	101.0	Lt. Brown
1415		20.0	11.49	20.6	4.82	0.061	103.0	Lt. Brown, clearing
1425		24.0	11.36	21.1	4.83	0.061	83.8	Lt. Brown, clearing
~~1425~~ FOW		29.0	11.36	21.0	4.81	0.061	74.7	Lt. Brown, clearing
1445		34.0	11.19	20.9	4.82	0.061	158.0	Lt. Brown, clearing
1455		37.0	11.10	21.20	4.81	0.061	53.8	Lt. Brown, clearing
1505		41.0	10.55	21.30	4.82	0.061	33.8	Lt. Brown, clearing
1515		45.0	10.43	21.20	4.85	0.062	21.3	Lt. brown, clearing
1525		49.0	10.21	21.30	4.85	0.062	17.0	Lt. brown, clearing
1535		53.0	9.60	21.80	4.80	0.063	15.60	Lt. brown, clearing

B.3 BORING LOGS AND MONITORING WELL SHEETS FOR NEW WELLS

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15 Phase 10
PROJECT NUMBER: N7653
DRILLING COMPANY: Pro Sonic
DRILLING RIG: DT 66 Geoprobe

BORING NUMBER: CEF-015-09S (MW-09S) RID
DATE: 6/26/03
GEOLOGIST: Scott McGuire
DRILLER: Maurice Carpenter

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0-3"			Blk+Gray Fi sa						
				3"-4'			DK Brn Fi sa					0	0
				4-10'			DK Brn Fi sa					0	0
				10-15'			DK Brn Fi sa					0	0
							EOB @ 15' bls						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes X No ____ Well I.D. #: CEF-015-09S

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15, Phase 10
BORING NUMBER: CEF-015-10S (MW-~~02~~ 10S) RFD
PROJECT NUMBER: N7653
DATE: 6/26/03
DRILLING COMPANY: Prosonic
GEOLOGIST: Scott McGuire
DRILLING RIG: Geoprobe DT-66
DRILLER: Maurice Carpenter

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0-1'			Lt Gray Fine Sand						
				1-2'			Very Pale Brown Fi Sand					0	0
				2-3'			Pale Brn to BlK Fi Sa		H_2O 3'				
				3-4'			BlK to Lt Brn Fi Sa					0	0
				4-12'			BlK Fine sand					0	0
							EOB @ 12' bls						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: CEF-015-~~09S~~ 10S

MD

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15, Phase 10
BORING NUMBER: CEF-015-011-S (MW-~~05~~ 115) RFD
PROJECT NUMBER: N7653
DATE: 6/27/03
DRILLING COMPANY: Pro Sonic
GEOLOGIST: Scott McGuire
DRILLING RIG: DT66 Trac
DRILLER: R. Dayton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0-6"			Gray Fine Sand						
				6"-1'			Pale Brn Fi sa					0	0
				1'-1.5'			Blk Fi sa						
				1.5-3'			Lt Brn to Orng Fi sa					0	0
				3-3.5'			Lt Brn Fi sa					0	0
				3.5-12'			Blk sa					0	0
							EOB @ 12' bls.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: CEF-015-115

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15, Phase 10
BORING NUMBER: CEF-015-12S (MW-~~04~~ 12S) RAD
PROJECT NUMBER: N7653
DATE: 6/26/03
DRILLING COMPANY: Prosonic
GEOLOGIST: Scott McGuire
DRILLING RIG: DT66 Trac
DRILLER: Maurice Carpenter

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				6"-12'		BlK	Fine Sand		w/ organics		·	0	0
									H_2O 3'				
							EOB @ 12' bls.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes X No ____ Well I.D. #: CEF-015-12S

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15, Phase 10
BORING NUMBER: CEF-015-135 (MW-~~05~~ 135) RFD
PROJECT NUMBER: N7653
DATE: 6/27/03
DRILLING COMPANY: Pro Sonic
GEOLOGIST: Scott McGuire
DRILLING RIG: DT 66 Trac
DRILLER: R. Dayton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0-4			DK BIK Sa		H_2O 1.5'			0	0
				4-12'			BIK Fine sand					0	0
							EOBe 12' bls						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: CEF-015-135

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 15, PHASE 10
BORING NUMBER: CEF-015-145 (MW-~~DG~~ 145) RFO
PROJECT NUMBER: 7653
DATE: 6/27/03
DRILLING COMPANY: Pro Sonic
GEOLOGIST: SCOTT McGUIRE
DRILLING RIG: ~~DT~~ DT 66
DRILLER: Ray Dayton

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0-1'			DK to LT BRN Fi Sa					0	0
				1-2.5'			LT Brn Fi sa						
				2.5'-3'			Orange/Brn Fi sa						
				3-4'			LT Brn Fi sa		H_2O 4'			0	0
				4-10'			~~DK~~ BLK Fi sa					0	0
				10-12'			BLK Fi sa					0	0
							EOB @ 12' bls						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: CEF-015-145

Tetra Tech NUS, Inc.

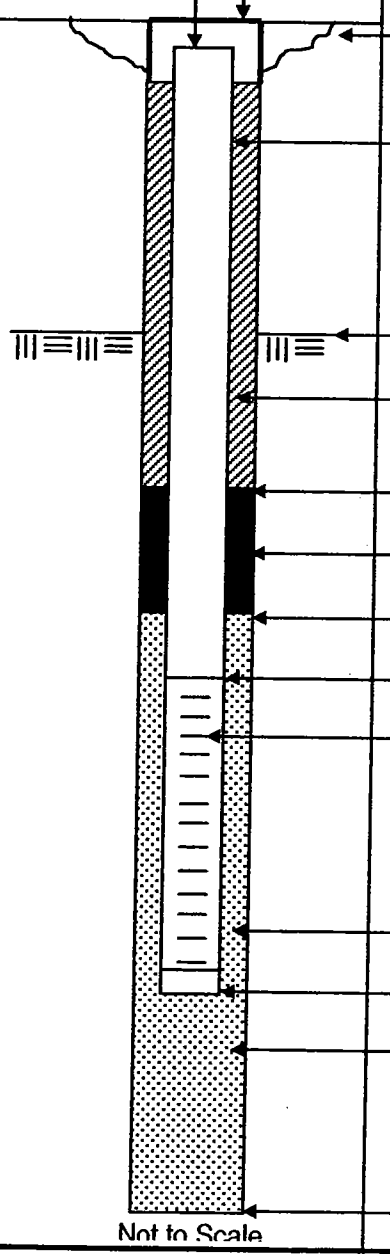
WELL No.: MW-~~07~~ 095 RFD

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-095
PROJECT No.:	~~0039~~ 7653	DRILLER:	Maurice Carpenter	DATE COMPLETED:	6/26/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ Ht. of Top of Riser:	1 31"
Elevation / Height of Top of Surface Casing:	1 4½"
I.D. of Surface Casing:	6 INCH
Type of Surface Casing:	Aluminum, non-hinge, lockable above-grade
Type of Surface Seal:	QUIKRETE CONCRETE
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement, Type I
Elevation / Depth of Seal:	1 1'
Type of Seal:	30/65 sand
Elevation / Depth of Top of Filter Pack:	1 1.5'
Elevation / Depth of Top of Screen:	1 2'
Type of Screen:	PVC
Slot Size x Length:	.010" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 sand
Elevation / Depth of Bottom of Screen:	1 12'
Elevation / Depth of Bottom of Filter Pack:	1 12'
Type of Backfill Below Well:	NATIVE SOIL
Elevation / Total Depth of Borehole:	1 12'

Tetra Tech NUS, Inc.

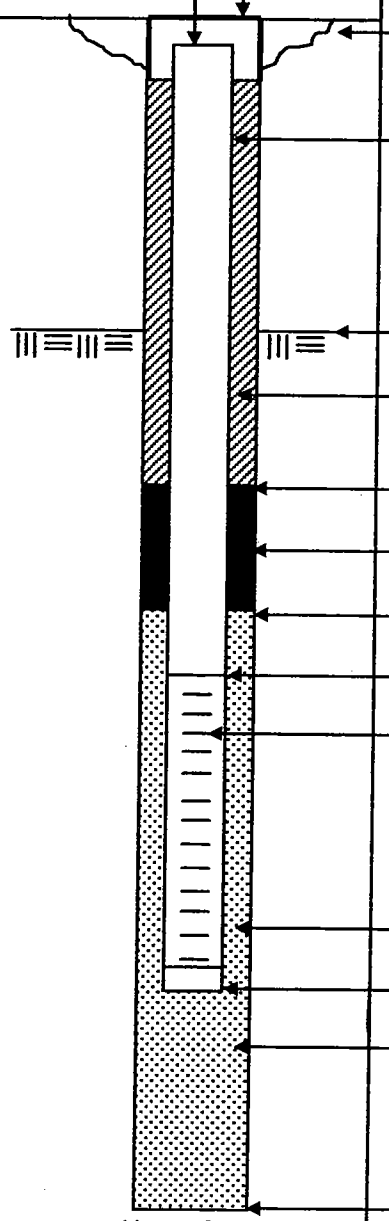
WELL No.: 105 MW-~~02~~ RFO

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-105
PROJECT No.:	~~0039~~ 7653	DRILLER:	M. Carpenter	DATE COMPLETED:	6/26/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ HT. of Top of Riser: 1 30"

Elevation / Height of Top of Surface Casing: 1 50"

I.D. of Surface Casing: 6 inch

Type of Surface Casing: Aluminum, Non-hinge, lockable, above-grade

Type of Surface Seal: QuikRete concrete

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 8"

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement, Type I

Elevation / Depth of Seal: 11.0'

Type of Seal: 30/65 sand

Elevation / Depth of Top of Filter Pack: 11.5'

Elevation / Depth of Top of Screen: 12'

Type of Screen: PVC

Slot Size x Length: .010" x 10'

I.D. of Screen: 2"

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 112'

Elevation / Depth of Bottom of Filter Pack: 112'

Type of Backfill Below Well: NATIVE SOIL

Elevation / Total Depth of Borehole: 112'

Tetra Tech NUS, Inc.

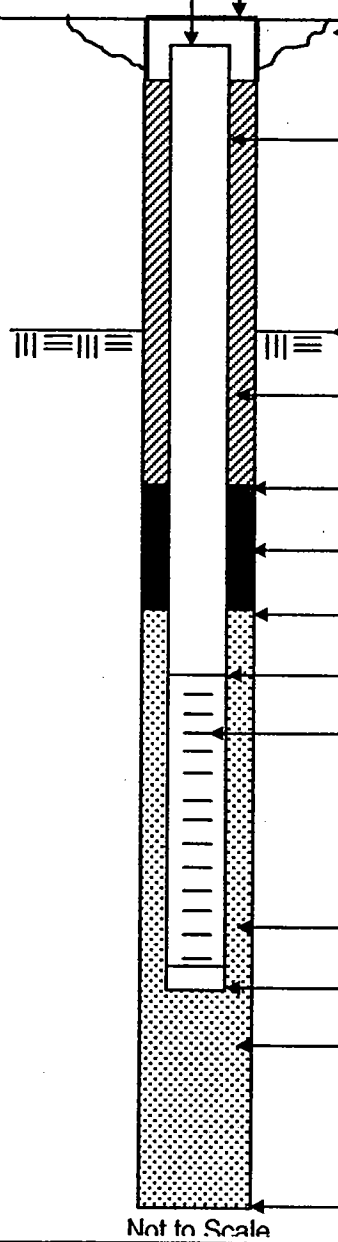
WELL No.: 115 MW-~~03~~ RFO

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-115
PROJECT No.:	~~0039~~ 7653	DRILLER:	R. Dayton	DATE COMPLETED:	6/27/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ HT. of Top of Riser:	1 31"
Elevation / Height of Top of Surface Casing:	1 40"
I.D. of Surface Casing:	6 inch
Type of Surface Casing:	Aluminum, Non-hinge, lockable, Above grade
Type of Surface Seal:	QUIKRETE Concrete
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement, Type I
Elevation / Depth of Seal:	1 1.0'
Type of Seal:	30/65 sand
Elevation / Depth of Top of Filter Pack:	1 1.5
Elevation / Depth of Top of Screen:	1 2'
Type of Screen:	PVC
Slot Size x Length:	.010" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 sand
Elevation / Depth of Bottom of Screen:	1 12'
Elevation / Depth of Bottom of Filter Pack:	1 12'
Type of Backfill Below Well:	~~20/30 sand~~ NATIVE SOIL MD
Elevation / Total Depth of Borehole:	1 12'

Tetra Tech NUS, Inc.

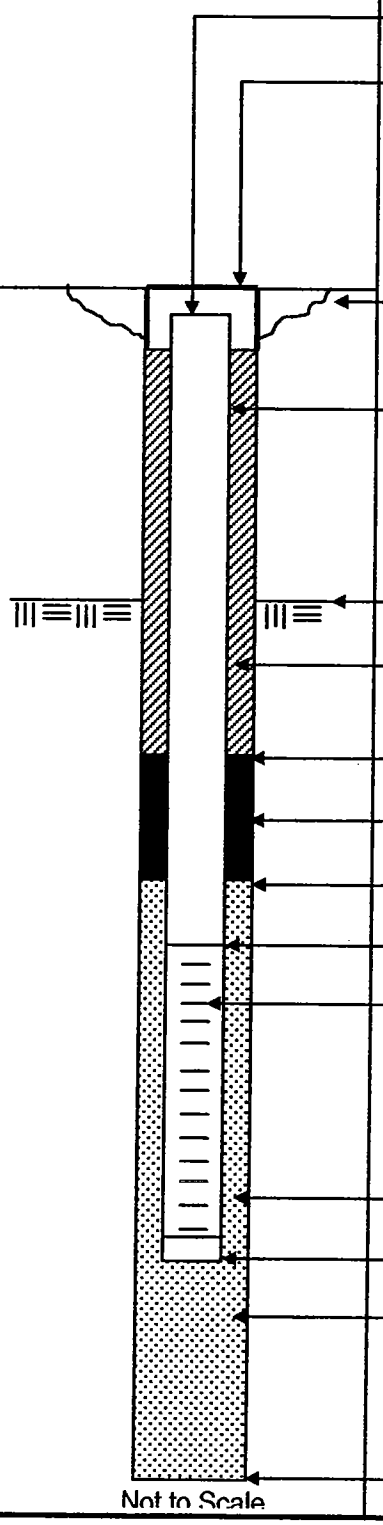
WELL No.: 125 MW-~~04~~ RFO

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-125
PROJECT No.:	~~0039~~ 7653	DRILLER:	M. Carpenter	DATE COMPLETED:	6/26/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ HT. of Top of Riser: 134"

Elevation / Height of Top of Surface Casing: 146"

I.D. of Surface Casing: 6 INCH

Type of Surface Casing: Aluminum, Non-hinge, lockable, Above-grade

Type of Surface Seal: QuikRete Concrete

I.D. of Riser: 2"

Type of Riser: PVC

Borehole Diameter: 8"

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement, Type I

Elevation / Depth of Seal: 16"

Type of Seal: 30/65 sand

Elevation / Depth of Top of Filter Pack: 11'

Elevation / Depth of Top of Screen: 12'

Type of Screen: PVC

Slot Size x Length: .010" x 10'

I.D. of Screen: 2"

Type of Filter Pack: 20/30 sand

Elevation / Depth of Bottom of Screen: 112'

Elevation / Depth of Bottom of Filter Pack: 112'

Type of Backfill Below Well: NATIVE SOIL

Elevation / Total Depth of Borehole: 112'

Tetra Tech NUS, Inc.

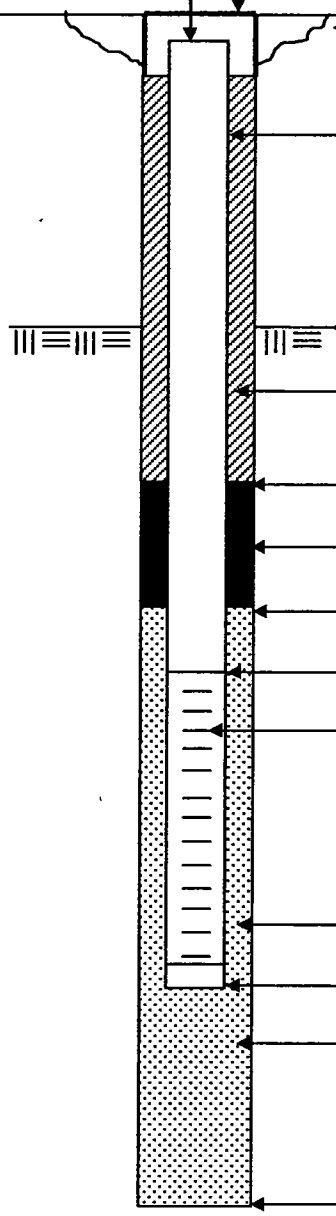
WELL No.: 135 MW-~~05~~ RFO

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-135
PROJECT No.:	~~0039~~ 7653	DRILLER:	R Dayton	DATE COMPLETED:	6/27/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ HT. of Top of Riser:	1 34"
Elevation / Height of Top of Surface Casing:	1 45"
I.D. of Surface Casing:	6 INCH
Type of Surface Casing:	Aluminum, non-hinge, lockable above-grade
Type of Surface Seal:	Quikrete Concrete
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement, Type I
Elevation / Depth of Seal:	1 1'
Type of Seal:	30/65 sand
Elevation / Depth of Top of Filter Pack:	1 1.5
Elevation / Depth of Top of Screen:	1 2'
Type of Screen:	PVC
Slot Size x Length:	.010" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 sand
Elevation / Depth of Bottom of Screen:	1 12'
Elevation / Depth of Bottom of Filter Pack:	1 12'
Type of Backfill Below Well:	NATIVE SOIL
Elevation / Total Depth of Borehole:	1 12'

Tetra Tech NUS, Inc.

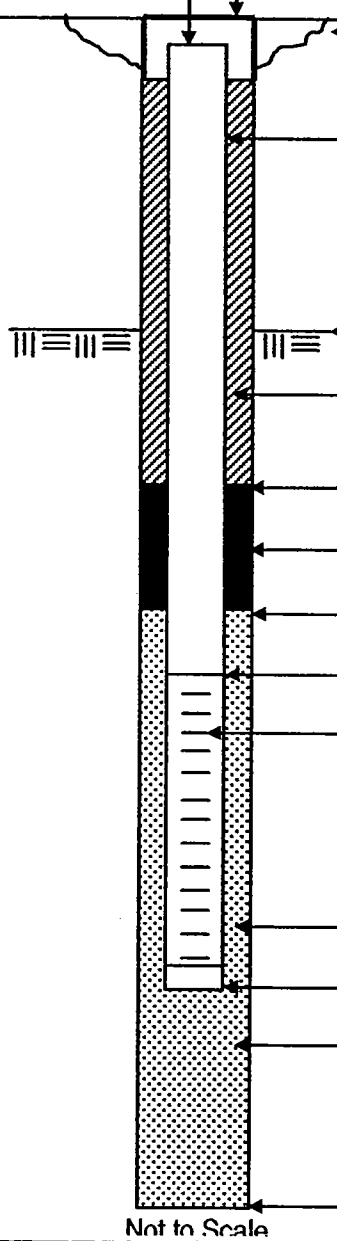
WELL No.: 145 MW-~~DC~~ RFD

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PROSONIC	BORING No.:	CEF-015-145
PROJECT No.:	~~0039~~ 7653	DRILLER:	R. Dayton	DATE COMPLETED:	6/27/03
SITE:	SITE 15	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	S. McGuire	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / ~~Depth~~ HT. of Top of Riser:	1 36"
Elevation / Height of Top of Surface Casing:	1 45"
I.D. of Surface Casing:	6 INCH
Type of Surface Casing:	Aluminum, Non-hinge, lockable, Above-grade
Type of Surface Seal:	QuikRete concrete
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement, Type I
Elevation / Depth of Seal:	1 1.0'
Type of Seal:	30/65 sand
Elevation / Depth of Top of Filter Pack:	1 1.5'
Elevation / Depth of Top of Screen:	1 2'
Type of Screen:	PVC
Slot Size x Length:	.010" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 sand
Elevation / Depth of Bottom of Screen:	1 12'
Elevation / Depth of Bottom of Filter Pack:	1 12'
Type of Backfill Below Well:	~~20/30 sand~~ NATIVE SOIL MD
Elevation / Total Depth of Borehole:	1 12'

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW-~~01~~ 095 RED
Site Name: Site 15 NASCF
Date Installed: 6/26/03
Project Name: PHASE 10, WELL INSTALL

Site Geologist: SCOTT McGuire
Drilling Company: ProSonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply, JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10', 10 Slot	Atlantic Drilling Supply	
End Cap	2" PVC	Atlantic Drilling Supply	
Drilling Fluid	None	—	
Drilling Fluid Additives	None	—	
Backfill Material	None	—	
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	
Bentonite Seal	Standard sand 30/65	Standard sand Co, JAX, FL	
Annular Grout	Portland Cement, Type I	TARMAC MEDLEY, FL	
Surface Cement	QUIKRETE CONCRETE	QUIKRETE ATLANTA, GA	
Protective Casing	ALUMINUM, NON-HINGE, lockable, 6"	ADS, JAX, FL	
Paint	None	—	
Rod Lubricant	None	—	
Compressor Oil	None	—	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW-~~02~~ 10S
Site Name: Site 15, NASCF
Date Installed: 6/26/03
Project Name: PHASE 10, WELL INSTALL

Site Geologist: SCOTT McGuire
Drilling Company: Pro Sonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply, JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10', 10 Slot	Atlantic Drilling Supply, JAX, FL	
End Cap	2" PVC	Atlantic Drilling Supply, JAX, FL	
Drilling Fluid	None	—	
Drilling Fluid Additives	None	—	
Backfill Material	None	—	
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	
Bentonite Seal	Standard sand 30/65	Standard sand Co, JAX, FL	
Annular Grout	PORTLAND Cement Type I	TARMAC, MEDLEY, FL	
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATALANTA, GA	
Protective Casing	Aluminum, Non-hinge, lockable 6"	ADS, JAX, FL	
Paint	None	—	
Rod Lubricant	None	—	
Compressor Oil	None	—	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW ~~03~~ 115 RED
Site Name: Site 15, NASCF
Date Installed: 6/27/03
Project Name: PHASE 10, WELL INSTALL

Site Geologist: SCOTT McGUIRE
Drilling Company: Pro Sonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply, JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10', 10 Slot	Atlantic Drilling Supply	
End Cap	2" PVC	Atlantic Drilling Supply	
Drilling Fluid	None	—	
Drilling Fluid Additives	None	—	
Backfill Material	None	—	
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	
Bentonite Seal	Standard sand 30/65	Standard sand Co, JAX, FL	
Annular Grout	PORTLAND CEMENT Type I	TARMAC MEDLEY, FL	
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	
Protective Casing	Aluminum, Non-hinge, lockable, 6"	ADS, JAX, FL	
Paint	None	—	
Rod Lubricant	None	—	
Compressor Oil	None	—	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW-~~04~~ 125 RFD
Site Name: Site 15, NASCF
Date Installed: 6/26/03
Project Name: PHASE 1D, WELL INSTALL

Site Geologist: SCOTT McGuire
Drilling Company: Pro Sonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply, JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10', 10 Slot	Atlantic Drilling Supply	
End Cap	2" PVC	Atlantic Drilling Supply	
Drilling Fluid	None	—	
Drilling Fluid Additives		—	
Backfill Material		—	
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	
Bentonite Seal	Standard sand 30/65	Standard sand Co, JAX, FL	
Annular Grout	PORTLAND CEMENT, Type I	TARMAC MEDLEY, FL	
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	
Protective Casing	ALUMINUM NON-HINGE, lockable 6"	ADS, JAX, FL.	
Paint	None	—	
Rod Lubricant	None	—	
Compressor Oil	None	—	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW-~~05~~ 135 RED
Site Name: Site 15, NASCF
Date Installed: 6/27/03
Project Name: PHASE 10, WELL INSTALL

Site Geologist: SCOTT McGuire
Drilling Company: ProSonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10' 10 Slot	Atlantic Drilling supply	
End Cap	2" PVC	Atlantic Drilling supply	
Drilling Fluid	None	—	
Drilling Fluid Additives		—	
Backfill Material		—	
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	
Bentonite Seal	Standard sand 30/65	Standard sand co JAX, FL	
Annular Grout	PORTLAND CEMENT, Type I	TARMAC MEDLEY, FL	
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	
Protective Casing	Aluminum Non-hinge, lockable 6"	ADS, JAX, FL	
Paint	None	—	
Rod Lubricant		—	
Compressor Oil		—	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: MW-~~06~~ 14/5 RED
Site Name: Site 15, NASJF
Date Installed: 6/27/03
Project Name: PHASE 10, WELL, INSTALL

Site Geologist: SCOTT McGuire
Drilling Company: Pro Sonic
Driller: M. Carpenter / R. Dayton
Project Number: N7653

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Campbell Monoflex 2" x 10'	Atlantic Drilling Supply, JAX, FL	NO
Well Screen	Campbell Monoflex 2" x 10', 10 Slot	Atlantic Drilling supply	↓
End Cap	2" PVC	Atlantic Drilling supply	↓
Drilling Fluid	None	—	↓
Drilling Fluid Additives	↓	—	↓
Backfill Material	↓	—	↓
Annular Filter Pack	Standard sand 20/30	Standard sand Co, JAX, FL	↓
Bentonite Seal	Standard sand 30/65	Standard sand co, JAX, FL	↓
Annular Grout	Type I PORTLAND Cement	TARMAC, MEDLEY, FL	↓
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	↓
Protective Casing	Aluminum, Non-hinge, lockable, 6"	ADS, JAX, FL	↓
Paint	None	—	↓
Rod Lubricant	↓	—	↓
Compressor Oil	↓	—	↓

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Scott R. McGuire

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-~~070~~ 095 15-MW01A50
Site: ~~North Fuel Farm~~ 15
Date Installed: 6/26/03
Date Developed: 6/30/03
Dev. Method: Pump
Pump Type: Waterra

Depth to Bottom (ft.): 14.6'
Static Water Level Before (ft.): 5.48
Static Water Level After (ft.): 5.93
Screen Length (ft.): 10'
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: PC
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: ~~N3996JG050320~~

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1035		–	5.48	–	–	–	–	START DEV. / DARK BROWN
1040		~~10~~ 9	10.30	22.63	5.06	0.243	>1000	BROWN
1045		~~25~~ 19	10.75	22.20	4.88	0.120	850	BROWN
1050		27	10.80	22.46	4.86	0.118	450	BROWN
1055		37	10.83	22.31	4.62	0.114	105	LT. BROWN
1100		46	10.85	22.17	4.60	0.111	31	CLEAR
1105		55	10.86	22.09	4.54	0.108	19	CLEAR

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-~~070~~ 15-MW~~02~~ 10S RFO
Site: ~~North Fuel Farm~~ 15
Date Installed: 6/26/03
Date Developed: 6/30/03
Dev. Method: Pump
Pump Type: Waterra

Depth to Bottom (ft.): 14.8
Static Water Level Before (ft.): 5.20
Static Water Level After (ft.): 5.72
Screen Length (ft.): 10'
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: PL
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: ~~N3896JG050320~~

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0935		—	5.20	—	—	—	—	START DEV. / DARK BROWN
0945		14	13.85	20.95	4.58	0.238	>1000	DARK BROWN
0955		27	*	20.73	4.36	0.089	190	LT. BROWN
1000		34	*	20.82	4.33	0.076	50	LT. BROWN
1005		40	*	20.48	4.28	0.067	35	CLEAR
1010		47	*	20.55	4.29	0.066	20	CLEAR
1015		55	*	20.49	4.35	0.064	10	CLEAR

* - CANNOT READ DUE TO PUMP IN WELL

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-~~070~~- 15 - MW~~03~~ 115 REO
Site: ~~North Fuel Farm~~ 15
Date Installed: 6/27/03
Date Developed: 6/30/03
Dev. Method: Pump
Pump Type: Grundfos

Depth to Bottom (ft.): 15.15'
Static Water Level Before (ft.): 5.67'
Static Water Level After (ft.): 5.73'
Screen Length (ft.): 10'
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: PL
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: N3996JG050320

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1325		—	5.67	—	—	—	—	START DEV / DARK BROWN
1330		8	12.40	21.83	5.01	0.304	71000	DARK BROWN
1335		16	*	20.93	4.32	0.087	240	BROWN
1340		27	*	20.56	4.19	0.062	60	LT BROWN
1345		35	*	20.43	4.04	0.056	10	CLEAR
1350		42	*	20.37	4.05	0.056	9.2	CLEAR
1355		48	*	20.52	4.07	0.055	8.6	CLEAR
1400		55	*	20.50	4.03	0.055	7.7	CLEAR

* CANNOT TAKE READING DUE TO PUMP IN WELL

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF ~~015~~ 015 MW04 125 RED
Site: ~~North Fuel Farm~~ 15
Date Installed: 6/26/03
Date Developed: 6/27/03
Dev. Method: Pump
Pump Type: Waterra

Depth to Bottom (ft.): 14.95' (TOC)
Static Water Level Before (ft.): 7.37'
Static Water Level After (ft.):
Screen Length (ft.): 10'
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: Pleverette
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: ~~N3996JG050320~~ N7653

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1020		—	7.37'	—	—	—	—	START DEV./DARK BROWN
1025		7	8.33	21.27	5.15	0.281	>1000	DARK BROWN
1030		13	8.40	20.71	4.89	0.134	>1000	DARK BROWN
1035		19	8.50	20.68	4.75	0.101	450	BROWN
1040		25	8.52	20.71	4.67	0.083	140	LT. BROWN
1045		31	8.52	20.85	4.60	0.077	150	LT. BROWN
1050		37	8.50	20.70	4.57	0.073	55	LT. BROWN
1055		43	8.55	20.83	4.55	0.074	80	LT. BROWN
1100		49	8.58	20.74	4.51	0.071	55	LT. BROWN
1105		55	8.60	20.80	4.51	0.069	40	LT. BROWN
								END DEV.

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-~~076~~ 15 - MW~~08~~ 135 RFD
Site: North Fuel Farm
Date Installed: 6/27/03
Date Developed: 6/30/03
Dev. Method: Pump
Pump Type: Waterra
Depth to Bottom (ft.): 15.0'
Static Water Level Before (ft.): 4.60'
Static Water Level After (ft.): 6.43'
Screen Length (ft.): 10'
Specific Capacity: N/A
Casing ID (in.): 2
Responsible Personnel: PL
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: N3996JG050320

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1530		—	4.60	—	—	—	—	START DEV./DARK BROWN
1535		4	14.95	21.44	5.39	0.126	>1000	
1540		8	*	21.57	4.99	0.104	>1000	
1545		11	*	21.21	4.97	0.093	>1000	
1550		15	*	21.27	4.77	0.076	>1000	DARK BROWN/WELL PUMPED DRY
1555		15	7.04	—	—	—	—	RESUME DEV.
1600		18	*	21.23	4.76	0.077	>1000	DARK BROWN/WELL PUMPED DRY
1605		18	7.00	-	-	—	—	RESUME DEV.
1615		22	*	21.17	4.69	0.078	>1000	
1625		25	*	21.24	4.68	0.076	>1000	
								WELL KEEP PUMPING
								DRY. MERV SAID
								SHUT IT DOWN

* CANNOT TAKE READING DUE TO FOAM IN WELL

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: CEF-~~076~~ 15 · MW~~06~~ 145 RPD
Site: ~~North Fuel Farm~~ 15
Date Installed: 6/27/03
Date Developed: 6/30/03
Dev. Method: Pump
Pump Type: Waterra

Depth to Bottom (ft.): 15.15
Static Water Level Before (ft.): 6.12
Static Water Level After (ft.): 6.87
Screen Length (ft.): 10
Specific Capacity: N/A
Casing ID (in.): 2

Responsible Personnel: PL
Drilling Co.: Prosonic
Project Name: NAS CECIL FIELD
Project Number: N3996JG050320

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units: mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1410		—	6.12	—	—	—	—	START DEV. / DARK BROWN
1415			12.6	21.87	4.52	0.118	>1000	DARK BROWN
1420			*	21.34	4.27	0.106	>1000	DARK BROWN
1425			*	21.02	4.16	0.100	>1000	DARK BROWN
1430			*	20.84	4.15	0.097	420	BROWN
1435			*	20.93	4.14	0.096	190	LT. BROWN
1440			*	20.77	4.15	0.095	75	LT. BROWN
1445			*	21.16	4.16	0.095	45	LT. BROWN
1450		55	*	21.23	4.15	0.094	35	LT. BROWN

* CANNOT TAKE READING DUE TO PUMP IN WELL.

B.4 JULY 2003 SAMPLE LOGS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: NAS Cecil Field
Project No.: N7653CA005A440
Location: Site 15
Personnel: Scott McGuire, Pete Leverette
Weather Conditions: PT cloudy
Measuring Device: WLI Heron # 09016
Tidally Influenced: Yes ___ No X
Remarks:

Well or Piezometer Number (CEF-)	Date	Time	Elevation of Reference Point (feet)*	~~Total Well Depth (feet)*~~ WL BGS	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	PID (ppm) BK/BH	
015-01S	8/4/03	1347		0.82	3.42			0/0	
015-02S	8/4/03	1402		1.70	4.23			0/0	
015-03S	8/4/03	1357		2.19	4.70			0/0	
015-04S	8/4/03	1424		2.27	4.89			0/0	
015-05S	8/4/03	1420		1.02	3.26			0/0	
015-06S	8/4/03	1413		0.58	3.23			0/0	
015-07S	8/4/03	1351		2.25	5.09			0/0	
015-08S	8/4/03	1333	75.9	0.64	3.18			0/0	
015-09S	8/4/03	1342		1.13	4.09			0/0	PVC cap
015-10S	8/4/03	1329		1.42	4.11			0/0	PVC cap
015-11S	8/4/03	1406		1.41	4.45			0/0	PVC
015-12S	8/4/03	1323		1.36	4.25			0/0	
015-13S	8/4/03	1339		0.55	3.68			0/0	Needs cap
015-14S	8/4/03	1409		2.44	5.34			0/0	Needs lock
								0/0	PVC cap

ppm=parts per million; BK=background; and BH=borehole of the well.

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-02S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-02S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

Date: 7/16/03 Time: 1220	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Method:	clear	5.87	0.174	22.61	0	0.19	-93.9	

PURGE DATA

Date: 7/16/03
Method: Peristaltic
Monitor Reading (ppm): 1.0
Well Casing Diameter:
Well Casing Material: 2" PVC
Total Well Depth (TD in feet): 15.7'
Static Water Level (WL in feet): 4.02
One Casing Volume(gal/L): 6.3
Start Purge (hrs): 1125
End Purge (hrs): 1215
Total Purge Time (min): 50
Total Vol. Purged (gal/L): 20

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	✓

OBSERVATIONS / NOTES

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327
LAB:
COC #:

Check if Collected:

☐ MS / MSD ☐ DUPLICATE / ID No.: None

Signature(s): Scott R. McG.

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-025
PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/16/02

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1125	4.02		400							
1130	4.24	2.0	400	5.87	0.175	73.3	0.85	22.84	-63.2	Suspended Solids
1135	4.24	4.0	400	5.75	0.171	55.3	0.55	22.70	-60.4	
1140	4.24	6.0	400	5.73	0.167	45.0	0.24	22.68	-75.0	
1145	4.24	8.0	400	5.75	0.168	35.4	0.18	22.55	-73.9	
1150	4.24	10.0	400	5.76	0.174	5.32	0.32	22.69	-82.0	Turbidity taken before
1155	4.24	12.0	400	5.79	0.176	1.04	0.36	22.91	-84.1	entering YSI Flow Thru
1200	4.24	14.0	400	5.82	0.174	0.16	0.30	23.39	-87.4	cell.
1205	4.24	16.0	400	5.86	0.173	0	0.22	23.16	-92.6	
1210	4.24	18.0	400	5.88	0.172	0	0.15	22.78	-95.1	
1215	4.24	20.0	400	5.87	0.174	0	0.19	22.61	-93.9	
1220	Sample collected									

SIGNATURE(S): Scott R. McGee

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-09S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-09S
[X] Monitoring Well		Sampler:	S. McGuire
[ ] Domestic Well			
[ ] Other:			

SAMPLING DATA

Date: 7/15/03	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Time: 1225								
Method:	Clear	5.56	0.101	23.24	0	0.57	131.4	

PURGE DATA

Date: 7/15/03	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Peristaltic	
Monitor Reading (ppm): 0	
Well Casing Diameter:	
Well Casing Material: 2" PVC	
Total Well Depth (TD in feet): 12.0	
Static Water Level (WL in feet): 3.59	
One Casing Volume(gal/L): 6.3	
Start Purge (hrs): ~~1030~~ 1130	
End Purge (hrs): 1220	
Total Purge Time (min): 40	
Total Vol. Purged (gal/L): 20	

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs	SW846 8310	none	2-1 liter bottles	Accutest	✓

OBSERVATIONS / NOTES

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327

LAB:

COC #:

Check if Collected:

☐ MS / MSD ☐ DUPLICATE / ID No.: None

Signature(s): Scott R. McGuire

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-095

PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/15/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1030	3.59		400							
1035	3.74	2.0	400	5.60	0.108	21	1.72	24.18	131.5	
1040	3.74	4.0	400	5.57	0.107	17	1.39	24.00	133.8	
1045	3.74	6.0	400	5.59	0.109	11	1.16	23.67	134.7	
1050	3.74	8.0	400	5.58	0.104	8.4	1.12	23.74	133.9	
~~1055~~	3.74	10.0	400	5.56	0.102	6.1	1.09	23.87	132.7	
1200	3.74	12.0	400	5.53	0.105	5.2	0.96	23.33	134.8	
1205	3.74	14.0	400	5.54	0.103	3.7	0.88	23.31	135.2	
1210	3.74	16.0	400	5.52	0.104	1.2	0.79	23.27	135.3	
1215	3.74	18.0	400	5.55	0.103	0	0.65	23.21	134.6	
1220	3.74	20.0	400	5.56	0.101	0	0.57	23.24	131.4	
1225	Sample collected									

SIGNATURE(S): Scott R. McGuire

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-10S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-10S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 7/15/03 Time: 1120 Method:	Clear	5.14	0.072	21.93	0	0.50	107.9	

PURGE DATA

Date: 7/15/03
Method: Peristaltic
Monitor Reading (ppm): 0
Well Casing Diameter:
Well Casing Material: 2" PVC
Total Well Depth (TD in feet): 12.0
Static Water Level (WL in feet): 3.74
One Casing Volume(~~gal~~/L): 6.3
Start Purge (hrs): 1010
End Purge (hrs): 1115
Total Purge Time (min): 65
Total Vol. Purged (~~gal~~/L): 19.5

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Laboratory	Collected
TOTAL LEAD SW846 6010B	HNO3	1-500 ml bottle	Accutest	✓

OBSERVATIONS / NOTES

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327
LAB:
COC #:

Check if Collected:

☐ MS / MSD ☐ DUPLICATE / ID No.: NONE

Signature(s): Scott R. McGuire

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-105
PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/15/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1010	3.74									
1015	3.97	1.5	300	5.15	0.066	60	2.30	22.45	199.7	
1020	SRW ~~3.99~~ 4.01	3.0	300	5.14	0.069	39	1.27	22.04	215.2	
1025	4.01	4.5	300	5.22	0.071	28	1.09	21.98	213.9	
1030	4.01	6.0	300	5.15	0.072	14	0.80	21.98	214.6	
1035	4.01	7.5	300	5.18	0.070	11.6	0.65	22.01	203.2	
1040	4.01	9.0	300	5.13	0.074	5.9	0.64	21.94	179.0	
1045	4.01	10.5	300	5.14	0.074	3.6	0.59	21.93	149.4	
1050	4.01	12.0	300	5.11	0.073	1.7	0.53	21.92	137.3	
1055	4.01	13.5	300	5.16	0.074	0	0.51	21.94	128.1	
1100	4.01	15.0	300	5.13	0.072	0	0.52	21.93	14.2	
1105	4.01	16.5	300	5.10	0.073	0	0.50	21.91	109.0	
1110	4.01	18.0	300	5.13	0.073	0	0.50	21.92	108.0	
1115	4.01	19.5	300	5.14	0.072	0	0.50	21.93	107.9	
1120	SRW ~~4.01~~ Sample collected									

SIGNATURE(S): Scott R. McGuire

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-11S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-11S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 7/16/03								
Time: 0840								
Method:	Clear	5.48	0.092	22.00	6.2	0.85	91.4	

PURGE DATA

Date: 7/16/03
Method: Peristaltic
Monitor Reading (ppm): 0
Well Casing Diameter:
Well Casing Material: 2" PVC
Total Well Depth (TD in feet): 12.0
Static Water Level (WL in feet): 4.19
One Casing Volume(~~gal~~/L): 6.3
Start Purge (hrs): 0745
End Purge (hrs): 0835
Total Purge Time (min): ~~40~~ 50
Total Vol. Purged (~~gal~~/L): 20.0

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
PAHs*	SW846 8310	none	2-1 liter bottles	Accutest	✓
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	✓

OBSERVATIONS / NOTES

* INCLUDES ANALYSES FOR CARBAZOLE.

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327
LAB:
COC #:

Check if Collected:

☐ MS / MSD ☒ DUPLICATE / ID No.: CEF-015-GW-DUP-02

Signature(s): Scott R. McG

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-115
PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/16/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0745	4.19									
0750	4.33	2.0	400	5.33	0.087	95	0.36	21.78	171.8	
0755	4.33	4.0	400	5.30	0.081	81	0.32	21.83	179.5	
0800	4.33	6.0	400	5.33	0.080	65	0.34	21.84	180.2	
0805	4.33	8.0	400	5.38	0.085	51	0.81	21.89	162.9	
0810	4.33	10.0	400	5.42	0.089	39	1.15	21.95	153.4	
0815	4.33	12.0	400	5.45	0.091	25	1.11	21.96	139.6	
0820	4.33	14.0	400	5.46	0.093	14.8	1.07	21.97	107.7	
0825	4.33	16.0	400	5.44	0.096	11.4	0.97	21.97	105.3	
0830	4.33	18.0	400	5.47	0.093	9.4	0.91	21.99	99.6	
0835	4.33	20.0	400	5.48	0.092	6.2	0.85	22.00	91.4	
0840	Sample collected									

SIGNATURE(S): Scott R. Mc[illegible]

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-12S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-12S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 7/15/03								
Time: 0945								
Method:	clear	5.49	0.080	21.64	0	0.35	61.9	

PURGE DATA

Date: 7/15/03	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Peristaltic	
Monitor Reading (ppm): 0	
Well Casing Diameter:	
Well Casing Material: 2" PVC	
Total Well Depth (TD in feet): 12.0	
Static Water Level (WL in feet): 3.84	
One Casing Volume(gal/L): 6.3	
Start Purge (hrs): 0835	
End Purge (hrs): 0940	
Total Purge Time (min): 65	
Total Vol. Purged (gal/L): 19.5	

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Laboratory	Collected
Energetics SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	✓

OBSERVATIONS / NOTES

use same name as sample I.D.

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327

LAB:
COC #:

Check if Collected:

[X] MS / MSD [ ] DUPLICATE / ID No.:

Signature(s): Scott R. McGuire

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-125

PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/15/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0835	3.84		300	7.-						
0840	3.98	1.5	300	7.23	0.095	22	3.40	21.76	78.3	
0845	3.99	3.0	300	5.78	0.081	14	0.92	21.55	62.8	
0850	3.99	4.5	300	5.53	0.086	10	0.83	21.45	60.8	
0855	3.99	6.0	300	5.65	0.087	10	0.78	21.46	52.3	
0900	3.99	7.5	300	5.59	0.085	8	1.13	21.47	46.7	
0905	3.99	9.0	300	5.55	0.084	2.3	0.89	21.46	51.4	
0910	3.99	10.5	300	5.53	0.087	2.1	0.77	21.48	54.2	
0915	3.99	12.0	300	5.51	0.086	1.4	0.72	21.48	54.1	
0920	3.99	13.5	300	5.49	0.088	0	0.62	21.52	58.5	
0925	3.99	15.0	300	5.53	0.084	0	0.53	21.53	58.6	
0930	3.99	16.5	300	5.49	0.082	0	0.49	21.55	59.9	
0935	3.99	18.0	300	5.52	0.083	0	0.46	21.59	60.4	
0940	3.99	19.5	300	5.49	0.080	0	0.35	21.64	61.9	
0945	Sample collected MS/MSD									

SIGNATURE(S): Scott R. McGuire

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-13S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-13S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Date: 7/15/03								
Time: 1455								
Method:	DK BRN	5.11	0.061	23.00	> 1000	0.14	55.2	

PURGE DATA

Date: 7/15/03
Method: Peristaltic
Monitor Reading (ppm): 0
Well Casing Diameter:
Well Casing Material: 2" PVC
Total Well Depth (TD in feet): 12.0
Static Water Level (WL in feet): 3.49
One Casing Volume(gal/L): 6.3
Start Purge (hrs): 1325
End Purge (hrs): 1450
Total Purge Time (min): 85
Total Vol. Purged (gal/L): 34.0

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Laboratory	Collected
Total Arsenic SW846 6010B	HNO3	1-500 ml bottle	Accutest	✓

OBSERVATIONS / NOTES

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327
LAB:
COC #:

Check if Collected:

☐ MS / MSD ☐ DUPLICATE / ID No.: NONE

Signature(s): Scott R. McGuire

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-135
PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/15/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1325	3.49		400							
1330	3.71	2.0	400	5.44	0.063	Er3	0.51	22.72	55.2	Turbidity Er3 > 1000
1335	3.71	4.0	400	5.31	0.062	Er3	0.38	22.71	54.2	
1340	3.71	6.0	400	5.26	0.061	Er3	0.27	22.68	53.6	
1345		8.0	400	5.21	0.062	Er3	0.23	22.71	56.4	
1350		10.0	400	5.19	0.061	Er3	0.19	22.79	58.2	
1355		12.0	400	5.10	0.060	Er3	0.11	22.86	60.1	
1400		14.0	400	5.09	0.060	Er3	0.09	22.92	60.9	
1405		16.0	400	5.00	0.059	Er3	0.08	22.93	62.1	
1410		18.0	400	5.02	0.061	Er3	0.09	22.89	60.4	
1415		20.0	400	5.03	0.062	Er3	0.10	22.78	59.9	
1420		24.0	400	5.05	0.060	Er3	0.09	27.64	58.6	
1430		~~25.0~~ 28.0	400	5.07	0.059	Er3	0.11	22.41	57.9	
1440		30.0	400	5.08	0.060	Er3	0.12	22.19	57.1	
1450		34.0	400	5.11	0.061	Er3	0.14	23.00	55.2	
1455	Sample collected									

SIGNATURE(S): Scott R. McG

Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site:	Cecil Field Site 15	Sample ID No.:	CEF-015-GW-14S-02
Project No.:	N7653.CA0.05A.440	Sample Location:	CEF-015-14S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: S. McGuire

SAMPLING DATA

Date: 7/16/03	Color	pH S.U.	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	ORP mV	
Time: 1005								
Method:	Clear	5.08	0.082	22.48	0	0.54	178.0	

PURGE DATA

Date: 7/16/03	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Peristaltic	
Monitor Reading (ppm): 0	
Well Casing Diameter:	
Well Casing Material: 2" PVC	
Total Well Depth (TD in feet): 12.0	
Static Water Level (WL in feet): 4.67	
One Casing Volume(gal/L): 6.3	
Start Purge (hrs): 0910	
End Purge (hrs): 1000	
Total Purge Time (min): 50	
Total Vol. Purged (gal/L): 20.0	

SAMPLE COLLECTION INFORMATION

Analysis		Preservative	Container Requirements	Laboratory	Collected
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle	Accutest	✓

OBSERVATIONS / NOTES

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 2327
LAB:
COC #:

Check if Collected:

☐ MS / MSD ☐ DUPLICATE / ID No.: None

Signature(s): Scott R. McG.

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS CECIL FIELD SITE 15 WELL ID.: CEF-015-145
PROJECT NUMBER: 7653.CA0.05A.440 DATE: 7/16/03

Time (Hrs.)	Water Level (Ft. below TOC)	Cum. Vol. (liters)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0910	4.67		400							
0915	4.84	2.0	400	5.20	0.079	7.97	3.55	22.27	165.5	
0920	4.85	4.0	400	5.04	0.078	4.21	0.47	22.25	187.2	
0925	4.85	6.0	400	5.06	0.079	1.9	0.49	22.29	180.4	
0930	4.85	8.0	400	5.07	0.080	0.97	0.50	22.34	172.5	
0935	4.85	10.0	400	5.08	0.081	0	0.47	22.40	169.9	
0940	4.85	12.0	400	5.09	0.082	0	0.46	22.52	167.8	
0945	4.85	14.0	400	4.99	0.083	0	0.51	22.48	189.8	
0950	4.85	16.0	400	5.05	0.083	0	0.53	22.49	183.4	
0955	4.85	18.0	400	5.07	0.081	0	0.52	22.51	180.5	
1000	4.85	20.0	400	5.08	0.082	0	0.54	22.48	178.0	
1005	Sample collected									

SIGNATURE(S): Scott R. McGi

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** 2327 | **PAGE** 1 **OF** 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7653, CTL 39	SITE 15, NASCF	MARK SPERANZA	412 721 ~~408~~ 7116	ACCUTEST SUE BELL
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
Scott R. McGuire		MEER DARK	904 636 6125	4405 Vineland Rd. C-15
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
				ORLANDO, FL 32811

STANDARD TAT ☐
RUSH TAT ☒
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G P P

PRESERVATIVE USED: None, None, None, HNO3, HNO3

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHS SW846 8310	PAHS with carbazole SW846 8310	NITRO AROMATICS SW846 8330	TOTAL LEAD SW846 6010B	TOTAL ARSENIC SW846 6010B				COMMENTS
7/15	0945	CEF-015-GW-125-02				GW	G	6			6						Cool to 4°C
7/15	1120	CEF-015-GW-105-02				GW	G	1				1					
7/15	1225	CEF-015-GW-095-02				GW	G	2	2								Work Release
7/15	1455	CEF-015-GW-135-02				GW	G	1					1				NOC39-WR365
7/16	0240	CEF-015-GW-115-02				GW	G	4	~~2~~	2	2						
7/16	0100	CEF-015-GW-Dup-02				GW	G	4	~~2~~	2	2						
7/16	1005	CEF-015-GW-145-02				GW	G	2			2						
7/16	1020	CEF-015-GW-025-02				GW	G	2	2								

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Scott R. McGuire	7/16/03	1500			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

APPENDIX C

ANALYTICAL LABORATORY RESULTS

C.1 APRIL 2000 SAMPLING ANALYTICAL LABORATORY RESULTS

C.2 MAY 2000 RE-SAMPLING ANALYTICAL LABORATORY RESULTS

C.3 JULY 2003 SAMPLING ANALYTICAL LABORATORY RESULTS

C.1 APRIL 2000 SAMPLING ANALYTICAL LABORATORY RESULTS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-05-0-044

TO: **MARK SPERANZA** **DATE: MAY 25, 2000**

FROM: **JUSTIN ORBICH** **CC: DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – PAH/EXP**
CTO 039 – NAS CECIL FIELD
SDG F6312

SAMPLES: 7/Aqueous

CEF-15-GW-1S-01
CEF-15-GW-3S-01
CEF-15-GW-7S-01
CEF-15-GW-DUP-01
CEF-15-GW-2S-01
CEF-15-GW-6S-01
CEF-15-GW-8S-01

OVERVIEW

The sample set for CTO 039, SDG F6312 Naval Air Station (NAS) Cecil Field; Florida consists of seven (7) aqueous environmental samples. The samples were analyzed for Polynuclear Aromatic Hydrocarbon (PAH) and select explosive organic compounds. One (1) field duplicate pair (CEF-15-GW-1S-01/CEF-15-GW-DUP-01) was included within this SDG.

The sample was collected by Tetra Tech, NUS on April 18th and 19th, 2000 and analyzed by Accutest Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW 846 Method 8310 and 8330 analytical and reporting protocols. The data in this SDG was validated with regard to the following parameters:

- Data Completeness
- * Holding Times
- * Initial/continuing calibrations
- * Laboratory method/field quality control blank results
- * Field Duplicate Precision
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

PAH FRACTION

All quality control parameters were met for this fraction.

EXP FRACTION

It should be noted that the laboratory analyzed for the full explosive list of compounds, however, the Chain Of Custody (COC) requested 3-nitrotoluene, 2,4,6-trinitrotoluene, and 4-nitrotoluene.

MEMO TO: MARK SPERANZA
DATE: MAY 25, 2000 – PAGE 2

It should be noted that 3-nitrotoluene was labeled incorrectly as 3-nitroaniline on the electronic deliverables. The Validator corrected 3-nitroaniline to correctly read 3-nitrotoluene.

EXECUTIVE SUMMARY

Laboratory performance: The laboratory analyzed for the full explosive list, however only selected compounds were to be analyzed.

Other Factors Affecting Data Quality: None.

MEMO TO: MARK SPERANZA
DATE: MAY 25, 2000 – PAGE 3

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (October, 1999), and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein was validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-05-0-043

TO: **MARK SPERANZA** **DATE: MAY 25, 2000**

FROM: **JUSTIN ORBICH** **CC: DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – PAH/EXP**
CTO 039 – NAS CECIL FIELD
SDG F6306

SAMPLES: 2/Aqueous

CEF-15-GW-4S-01 CEF-15-GW-5S-01

OVERVIEW

The sample set for CTO 039, SDG F6306 Naval Air Station (NAS) Cecil Field; Florida consists of two (2) aqueous environmental samples. The samples were analyzed for Polynuclear Aromatic Hydrocarbon (PAH) and explosive organic compounds. No field duplicate pairs were included within this SDG.

The sample was collected by Tetra Tech, NUS on April 17th, 2000 and analyzed by Accutest Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW 846 Method 8310 and 8330 analytical and reporting protocols. The data in this SDG was validated with regard to the following parameters:

* • Data Completeness
* • Holding Times
* • Initial/continuing calibrations
* • Laboratory method/field quality control blank results
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

PAH FRACTION

All quality control parameters were met for this fraction.

EXP FRACTION

It should be noted that the laboratory analyzed for the full explosive list of compounds, however, the Chain Of Custody (COC) requested 3-nitrotoluene, 2,4,6-trinitrotoluene, and 4-nitrotoluene.

It should be noted that 3-nitrotoluene was labeled incorrectly as 3-nitroaniline on the electronic deliverables. The Validator corrected 3-nitroaniline to correctly read 3-nitrotoluene.

MEMO TO: MARK SPERANZA
DATE: MAY 25, 2000 – PAGE 2

EXECUTIVE SUMMARY

Laboratory performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (October, 1999), and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein was validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

DATA QUALIFIER DEFINITIONS:

U - Value is a nondetected result as reported by the laboratory and should not be considered present.

J - Positive result is estimated as a result of a value below the CRQL or a technical noncompliance.

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-1S-01			CEF-15-GW-2S-01			CEF-15-GW-3S-01			CEF-15-GW-6S-01		
SAMPLE DATE:	04/18/00			04/18/00			04/18/00			04/18/00		
LABORATORY ID:	F6312-1			F6312-3			F6312-5			F6312-7		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
EXPLOSIVES												
2,4,6-TRINITROTOLUENE	3.9	U		5.0	U		5.0	U		5.0	U	
3-NITROTOLUENE	3.9	U		5.0	U		5.0	U		5.0	U	
4-NITROTOLUENE	3.9	U		5.0	U		5.0	U		5.0	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-7S-01			CEF-15-GW-8S-01			CEF-15-GW-DUP-01					
SAMPLE DATE:	04/18/00			04/19/00			04/19/00			/ /		
LABORATORY ID:	F6312-9			F6312-11			F6312-13					
QC_TYPE:	NORMAL			NORMAL			NORMAL					
% SOLIDS:	0.0 %			0.0 %			0.0 %			100.0 %		
UNITS:	UG/L			UG/L			UG/L					
FIELD DUPLICATE OF:							CEF-15-GW-1S-01					
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
EXPLOSIVES												
2,4,6-TRINITROTOLUENE	18	U		6.5	U		3.9	U				
3-NITROTOLUENE	18	U		6.5	U		3.9	U				
4-NITROTOLUENE	18	U		6.5	U		3.9	U				

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-1S-01			CEF-15-GW-2S-01			CEF-15-GW-3S-01			CEF-15-GW-6S-01		
SAMPLE DATE:	04/18/00			04/18/00			04/18/00			04/18/00		
LABORATORY ID:	F6312-1			F6312-3			F6312-5			F6312-7		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2	U		2.2	U		2.2	U		2.2	U	
2-METHYLNAPHTHALENE	2	U		2.2	U		2.2	U		2.2	U	
ACENAPHTHENE	2	U		2.2	U		2.2	U		2.2	U	
ACENAPHTHYLENE	2	U		2.2	U		2.2	U		2.2	U	
ANTHRACENE	2	U		2.2	U		2.2	U		2.2	U	
BENZO(A)ANTHRACENE	0.2	U		0.22	U		0.22	U		0.22	U	
BENZO(A)PYRENE	0.2	U		0.22	U		0.22	U		0.22	U	
BENZO(B)FLUORANTHENE	0.2	U		0.22	U		0.22	U		0.22	U	
BENZO(G,H,I)PERYLENE	0.2	U		0.22	U		0.22	U		0.22	U	
BENZO(K)FLUORANTHENE	0.2	U		0.22	U		0.22	U		0.22	U	
CHRYSENE	0.2	U		0.22	U		0.22	U		0.22	U	
DIBENZO(A,H)ANTHRACENE	0.2	U		0.22	U		0.22	U		0.22	U	
FLUORANTHENE	2	U		2.2	U		2.2	U		2.2	U	
FLUORENE	2	U		2.2	U		2.2	U		2.2	U	
INDENO(1,2,3-CD)PYRENE	0.2	U		0.22	U		0.22	U		0.22	U	
NAPHTHALENE	2	U		2.2	U		2.2	U		2.2	U	
PHENANTHRENE	2	U		2.2	U		2.2	U		2.2	U	
PYRENE	2	U		2.2	U		2.2	U		2.2	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-7S-01			CEF-15-GW-8S-01			CEF-15-GW-DUP-01					
SAMPLE DATE:	04/18/00			04/19/00			04/19/00			/ /		
LABORATORY ID:	F6312-9			F6312-11			F6312-13					
QC_TYPE:	NORMAL			NORMAL			NORMAL					
% SOLIDS:	0.0 %			0.0 %			0.0 %			100.0 %		
UNITS:	UG/L			UG/L			UG/L					
FIELD DUPLICATE OF:							CEF-15-GW-1S-01					
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2.2	U		2	U		2	U				
2-METHYLNAPHTHALENE	2.2	U		2	U		2	U				
ACENAPHTHENE	2.2	U		2	U		2	U				
ACENAPHTHYLENE	2.2	U		2	U		2	U				
ANTHRACENE	2.2	U		2	U		2	U				
BENZO(A)ANTHRACENE	0.22	U		0.2	U		0.2	U				
BENZO(A)PYRENE	0.22	U		0.2	U		0.2	U				
BENZO(B)FLUORANTHENE	0.22	U		0.2	U		0.2	U				
BENZO(G,H,I)PERYLENE	0.22	U		0.2	U		0.2	U				
BENZO(K)FLUORANTHENE	0.22	U		0.2	U		0.2	U				
CHRYSENE	0.22	U		0.2	U		0.2	U				
DIBENZO(A,H)ANTHRACENE	0.22	U		0.2	U		0.2	U				
FLUORANTHENE	2.2	U		2	U		2	U				
FLUORENE	2.2	U		2	U		2	U				
INDENO(1,2,3-CD)PYRENE	0.22	U		0.2	U		0.2	U				
NAPHTHALENE	2.2	U		2	U		2	U				
PHENANTHRENE	2.2	U		2	U		2	U				
PYRENE	2.2	U		2	U		2	U				

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6306

SAMPLE NUMBER:	CEF-15-GW-4S-01	CEF-15-GW-5S-01		
SAMPLE DATE:	04/17/00	04/17/00	/ /	/ /
LABORATORY ID:	F6306-1	F6306-3		
QC_TYPE:	NORMAL	NORMAL		
% SOLIDS:	0.0 %	0.0 %	100.0 %	100.0 %
UNITS:	UG/L	UG/L		
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2.2	U		2	U							
2-METHYLNAPHTHALENE	2.2	U		2	U							
ACENAPHTHENE	2.2	U		2	U							
ACENAPHTHYLENE	2.2	U		2	U							
ANTHRACENE	2.2	U		2	U							
BENZO(A)ANTHRACENE	0.22	U		0.2	U							
BENZO(A)PYRENE	0.22	U		0.2	U							
BENZO(B)FLUORANTHENE	0.22	U		0.2	U							
BENZO(G,H,I)PERYLENE	0.22	U		0.2	U							
BENZO(K)FLUORANTHENE	0.22	U		0.2	U							
CHRYSENE	0.22	U		0.2	U							
DIBENZO(A,H)ANTHRACENE	0.22	U		0.2	U							
FLUORANTHENE	2.2	U		2	U							
FLUORENE	2.2	U		2	U							
INDENO(1,2,3-CD)PYRENE	0.22	U		0.2	U							
NAPHTHALENE	2.2	U		2	U							
PHENANTHRENE	2.2	U		2	U							
PYRENE	2.2	U		2	U							

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6306

SAMPLE NUMBER:	CEF-15-GW-4S-01	CEF-15-GW-5S-01		
SAMPLE DATE:	04/17/00	04/17/00	/ /	/ /
LABORATORY ID:	F6306-1	F6306-3		
QC_TYPE:	NORMAL	NORMAL		
% SOLIDS:	0.0 %	0.0 %	100.0 %	100.0 %
UNITS:	UG/L	UG/L		
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
EXPLOSIVES												
2,4,6-TRINITROTOLUENE	5.2	U		5.2	U							
3-NITROTOLUENE	5.2	U		5.2	U							
4-NITROTOLUENE	5.2	U		5.2	U							

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**MAY 16, 2000**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TOTAL AND FILTERED ANTIMONY, ARSENIC AND LEAD**
CTO 039 - CECIL FIELD
SDGs – F6306 AND F6312

SAMPLES: 18/Aqueous/

CEF-15-GW-4S-01	CEF-15-GW-4S-01-F
CEF-15-GW-5S-01	CEF-15-GW-5S-01-F
CEF-15-GW-1S-01	CEF-15-GW-1S-01-F
CEF-15-GW-2S-01	CEF-15-GW-2S-01-F
CEF-15-GW-3S-01	CEF-15-GW-3S-01-F
CEF-15-GW-6S-01	CEF-15-GW-6S-01-F
CEF-15-GW-7S-01	CEF-15-GW-7S-01-F
CEF-15-GW-8S-01	CEF-15-GW-8S-01-F
CEF-15-GW-DUP-01	CEF-15-GW-DUP-01-F

Overview

The sample set for CTO 039, Cecil Field, SDGs F6306 and F6312 consists of eighteen (18) aqueous environmental samples. Two (2) field duplicate pairs (CEF-15-GW-1S-01 / CEF-15-GW-DUP-01 and CEF-15-GW-1S-01-F / CEF-15-GW-DUP-01-F) were included within these SDGs.

All samples, with exception to those designated –F, were analyzed for antimony, arsenic and lead. The samples designated –F were analyzed for dissolved antimony, dissolved arsenic and dissolved lead. The samples were collected by Tetra Tech NUS on April 17 and 18, 2000 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA / QC) criteria. Metals analyses were analyzed using SW 846 method 6010B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were present in a laboratory method / preparation blanks at the following maximum concentrations:

Affected samples: All

Analyte	Maximum Concentration	Action Level (aqueous)
Antimony	5.0 µg/L	25.0 µg/L
Lead	1.7 µg/L	8.5 µg/L

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when determining blank contamination. Positive results less than the blank action level for antimony and lead were qualified, "U", as a result of blank contamination.

Executive Summary

Laboratory Performance: Antimony and lead were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6306

SAMPLE NUMBER:	CEF-15-GW-4S-01			CEF-15-GW-4S-01-F			CEF-15-GW-5S-01			CEF-15-GW-5S-01-F		
SAMPLE DATE:	04/17/00			04/17/00			04/17/00			04/17/00		
LABORATORY ID:	F6306-1			F6306-2			F6306-3			F6306-4		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ANTIMONY	2.4	U		2.4	U		3.3	U	A	2.4	U	
ARSENIC	3.4	U		3.4	U		3.9			3.4	U	
LEAD	1.6	U		1.6	U		1.6	U		1.6	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-1S-01			CEF-15-GW-1S-01-F			CEF-15-GW-2S-01			CEF-15-GW-2S-01-F		
SAMPLE DATE:	04/18/00			04/18/00			04/18/00			04/18/00		
LABORATORY ID:	F6312-1			F6312-2			F6312-3			F6312-4		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ANTIMONY	2.4	U		2.4	U		2.4	U		2.9	U	A
ARSENIC	3.4	U		3.4	U		3.4	U		3.4	U	
LEAD	19.8			1.6	U		1.6	U		1.6	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-3S-01			CEF-15-GW-3S-01-F			CEF-15-GW-6S-01			CEF-15-GW-6S-01-F		
SAMPLE DATE:	04/18/00			04/18/00			04/18/00			04/18/00		
LABORATORY ID:	F6312-5			F6312-6			F6312-7			F6312-8		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ANTIMONY	2.9	U	A	2.4	U		2.4	U		2.4	U	
ARSENIC	3.4	U		3.4	U		3.4	U		3.4	U	
LEAD	2.1	U	A	1.6	U		1.6	U		1.6	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-7S-01			CEF-15-GW-7S-01-F			CEF-15-GW-8S-01			CEF-15-GW-8S-01-F		
SAMPLE DATE:	04/18/00			04/18/00			04/19/00			04/19/00		
LABORATORY ID:	F6312-9			F6312-10			F6312-11			F6312-12		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ANTIMONY	2.4	U		2.4	U		42.9			46.2		
ARSENIC	3.4	U		3.4	U		3.4	U		3.4	U	
LEAD	1.6	U		1.6	U		2.3	U	A	1.6	U	

CTO039-NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6312

SAMPLE NUMBER:	CEF-15-GW-DUP-01	CEF-15-GW-DUP-01-F		
SAMPLE DATE:	04/19/00	04/19/00	/ /	/ /
LABORATORY ID:	F6312-13	F6312-14		
QC_TYPE:	NORMAL	NORMAL		
% SOLIDS:	0.0 %	0.0 %	100.0 %	100.0 %
UNITS:	UG/L	UG/L		
FIELD DUPLICATE OF:	CEF-15-GW-1S-01	CEF-15-GW-1S-01-F		

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ANTIMONY	2.4	U		2.4	U							
ARSENIC	3.4	U		3.4	U							
LEAD	21.7			1.6	U							

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

Sample Summary

Tetra Tech, NUS

Job No: F6312

NAS Cecil Field-Site 15
Project No: WORK RELEASE# 13

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F6312-1	04/18/00	16:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-1S-01
F6312-2	04/18/00	16:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-1S-01-F
F6312-3	04/18/00	14:28	LK	04/20/00	AQ	Ground Water	CEF-15-GW-2S-01
F6312-4	04/18/00	14:28	LK	04/20/00	AQ	Ground Water	CEF-15-GW-2S-01-F
F6312-5	04/18/00	11:15	LK	04/20/00	AQ	Ground Water	CEF-15-GW-3S-01
F6312-6	04/18/00	11:15	LK	04/20/00	AQ	Ground Water	CEF-15-GW-3S-01-F
F6312-7	04/18/00	12:08	LK	04/20/00	AQ	Ground Water	CEF-15-GW-6S-01
F6312-8	04/18/00	12:08	LK	04/20/00	AQ	Ground Water	CEF-15-GW-6S-01-F
F6312-9	04/18/00	16:45	LK	04/20/00	AQ	Ground Water	CEF-15-GW-7S-01
F6312-10	04/18/00	16:45	LK	04/20/00	AQ	Ground Water	CEF-15-GW-7S-01-F
F6312-11	04/19/00	13:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-8S-01
F6312-12	04/19/00	13:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-8S-01-F
F6312-13	04/19/00	00:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-DUP-01

Sample Summary
(continued)

Tetra Tech, NUS

Job No: F6312

NAS Cecil Field-Site 15
Project No: WORK RELEASE# 13

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
F6312-14	04/19/00	00:00	LK	04/20/00	AQ	Ground Water	CEF-15-GW-DUP-01-F

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-01		
Lab Sample ID:	F6312-1	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000931.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.0	ug/l	
208-96-8	Acenaphthylene	ND	2.0	ug/l	
120-12-7	Anthracene	ND	2.0	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	ug/l	
218-01-9	Chrysene	ND	0.20	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	ug/l	
206-44-0	Fluoranthene	ND	2.0	ug/l	
86-73-7	Fluorene	ND	2.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	ug/l	
91-20-3	Naphthalene	ND	2.0	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	ug/l	
85-01-8	Phenanthrene	ND	2.0	ug/l	
129-00-0	Pyrene	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	87%		45-130%
92-94-4	p-Terphenyl	90%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-01		
Lab Sample ID:	F6312-1	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	3.9	ug/l	
121-82-4	RDX	ND	3.9	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	3.9	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	3.9	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	3.9	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	3.9	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	3.9	ug/l	
78-11-5	PETN	ND	3.9	ug/l	
98-95-3	Nitrobenzene	ND	3.9	ug/l	
88-72-2	o-Nitrotoluene	ND	3.9	ug/l	
99-08-1	m-Nitrotoluene	ND	3.9	ug/l	
99-99-0	p-Nitrotoluene	ND	3.9	ug/l	
479-45-8	Tetryl	ND	3.9	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	3.9	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	3.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	59%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-01		
Lab Sample ID:	F6312-1	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	19.8	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-01-F		
Lab Sample ID:	F6312-2	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-2S-01		
Lab Sample ID:	F6312-3	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000932.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.2	ug/l	
208-96-8	Acenaphthylene	ND	2.2	ug/l	
120-12-7	Anthracene	ND	2.2	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	ug/l	
218-01-9	Chrysene	ND	0.22	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	ug/l	
206-44-0	Fluoranthene	ND	2.2	ug/l	
86-73-7	Fluorene	ND	2.2	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	ug/l	
91-20-3	Naphthalene	ND	2.2	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.2	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	ug/l	
85-01-8	Phenanthrene	ND	2.2	ug/l	
129-00-0	Pyrene	ND	2.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		45-130%
92-94-4	p-Terphenyl	96%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-2S-01		
Lab Sample ID:	F6312-3	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	5.0	ug/l	
121-82-4	RDX	ND	5.0	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	5.0	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	5.0	ug/l	
78-11-5	PETN	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
88-72-2	o-Nitrotoluene	ND	5.0	ug/l	
99-08-1	m-Nitrotoluene	ND	5.0	ug/l	
99-99-0	p-Nitrotoluene	ND	5.0	ug/l	
479-45-8	Tetryl	ND	5.0	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	5.0	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	61%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-2S-01		
Lab Sample ID:	F6312-3	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-2S-01-F		
Lab Sample ID:	F6312-4	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.9 B	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-3S-01		
Lab Sample ID:	F6312-5	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000933.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.2	ug/l	
208-96-8	Acenaphthylene	ND	2.2	ug/l	
120-12-7	Anthracene	ND	2.2	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	ug/l	
218-01-9	Chrysene	ND	0.22	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	ug/l	
206-44-0	Fluoranthene	ND	2.2	ug/l	
86-73-7	Fluorene	ND	2.2	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	ug/l	
91-20-3	Naphthalene	ND	2.2	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.2	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	ug/l	
85-01-8	Phenanthrene	ND	2.2	ug/l	
129-00-0	Pyrene	ND	2.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	87%		45-130%
92-94-4	p-Terphenyl	94%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-3S-01		
Lab Sample ID:	F6312-5	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	5.0	ug/l	
121-82-4	RDX	ND	5.0	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	5.0	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	5.0	ug/l	
78-11-5	PETN	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
88-72-2	o-Nitrotoluene	ND	5.0	ug/l	
99-08-1	m-Nitrotoluene	ND	5.0	ug/l	
99-99-0	p-Nitrotoluene	ND	5.0	ug/l	
479-45-8	Tetryl	ND	5.0	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	5.0	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	52%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-3S-01		
Lab Sample ID:	F6312-5	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.9 B	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	2.1 B	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-3S-01-F		
Lab Sample ID:	F6312-6	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-6S-01		
Lab Sample ID:	F6312-7	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000934.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.2	ug/l	
208-96-8	Acenaphthylene	ND	2.2	ug/l	
120-12-7	Anthracene	ND	2.2	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	ug/l	
218-01-9	Chrysene	ND	0.22	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	ug/l	
206-44-0	Fluoranthene	ND	2.2	ug/l	
86-73-7	Fluorene	ND	2.2	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	ug/l	
91-20-3	Naphthalene	ND	2.2	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.2	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	ug/l	
85-01-8	Phenanthrene	ND	2.2	ug/l	
129-00-0	Pyrene	ND	2.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		45-130%
92-94-4	p-Terphenyl	98%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-6S-01		
Lab Sample ID:	F6312-7	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	5.0	ug/l	
121-82-4	RDX	ND	5.0	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	5.0	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.0	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.0	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	5.0	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	5.0	ug/l	
78-11-5	PETN	ND	5.0	ug/l	
98-95-3	Nitrobenzene	ND	5.0	ug/l	
88-72-2	o-Nitrotoluene	ND	5.0	ug/l	
99-08-1	m-Nitrotoluene	ND	5.0	ug/l	
99-99-0	p-Nitrotoluene	ND	5.0	ug/l	
479-45-8	Tetryl	ND	5.0	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	5.0	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	5.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	69%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-6S-01		
Lab Sample ID:	F6312-7	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-6S-01-F		
Lab Sample ID:	F6312-8	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-7S-01		
Lab Sample ID:	F6312-9	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000936.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.2	ug/l	
208-96-8	Acenaphthylene	ND	2.2	ug/l	
120-12-7	Anthracene	ND	2.2	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	ug/l	
218-01-9	Chrysene	ND	0.22	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	ug/l	
206-44-0	Fluoranthene	ND	2.2	ug/l	
86-73-7	Fluorene	ND	2.2	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	ug/l	
91-20-3	Naphthalene	ND	2.2	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.2	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	ug/l	
85-01-8	Phenanthrene	ND	2.2	ug/l	
129-00-0	Pyrene	ND	2.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		45-130%
92-94-4	p-Terphenyl	92%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-7S-01		
Lab Sample ID:	F6312-9	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	18	ug/l	
121-82-4	RDX	ND	18	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	18	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	18	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	18	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	18	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	18	ug/l	
78-11-5	PETN	ND	18	ug/l	
98-95-3	Nitrobenzene	ND	18	ug/l	
88-72-2	o-Nitrotoluene	ND	18	ug/l	
99-08-1	m-Nitrotoluene	ND	18	ug/l	
99-99-0	p-Nitrotoluene	ND	18	ug/l	
479-45-8	Tetryl	ND	18	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	18	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	18	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	76%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-7S-01		
Lab Sample ID:	F6312-9	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-7S-01-F		
Lab Sample ID:	F6312-10	Date Sampled:	04/18/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-8S-01		
Lab Sample ID:	F6312-11	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000937.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.0	ug/l	
208-96-8	Acenaphthylene	ND	2.0	ug/l	
120-12-7	Anthracene	ND	2.0	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	ug/l	
218-01-9	Chrysene	ND	0.20	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	ug/l	
206-44-0	Fluoranthene	ND	2.0	ug/l	
86-73-7	Fluorene	ND	2.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	ug/l	
91-20-3	Naphthalene	ND	2.0	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	ug/l	
85-01-8	Phenanthrene	ND	2.0	ug/l	
129-00-0	Pyrene	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		45-130%
92-94-4	p-Terphenyl	96%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-8S-01		
Lab Sample ID:	F6312-11	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	6.5	ug/l	
121-82-4	RDX	ND	6.5	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	6.5	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	6.5	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	6.5	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	6.5	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	6.5	ug/l	
78-11-5	PETN	ND	6.5	ug/l	
98-95-3	Nitrobenzene	ND	6.5	ug/l	
88-72-2	o-Nitrotoluene	ND	6.5	ug/l	
99-08-1	m-Nitrotoluene	ND	6.5	ug/l	
99-99-0	p-Nitrotoluene	ND	6.5	ug/l	
479-45-8	Tetryl	ND	6.5	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	6.5	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	6.5	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	44%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-8S-01		
Lab Sample ID:	F6312-11	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	42.9	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	2.3 B	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-8S-01-F		
Lab Sample ID:	F6312-12	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	46.2	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-DUP-01		
Lab Sample ID:	F6312-13	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000938.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.0	ug/l	
208-96-8	Acenaphthylene	ND	2.0	ug/l	
120-12-7	Anthracene	ND	2.0	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	ug/l	
218-01-9	Chrysene	ND	0.20	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	ug/l	
206-44-0	Fluoranthene	ND	2.0	ug/l	
86-73-7	Fluorene	ND	2.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	ug/l	
91-20-3	Naphthalene	ND	2.0	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	ug/l	
85-01-8	Phenanthrene	ND	2.0	ug/l	
129-00-0	Pyrene	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	81%		45-130%
92-94-4	p-Terphenyl	87%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-DUP-01		
Lab Sample ID:	F6312-13	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	3.9	ug/l	
121-82-4	RDX	ND	3.9	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	3.9	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	3.9	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	3.9	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	3.9	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	3.9	ug/l	
78-11-5	PETN	ND	3.9	ug/l	
98-95-3	Nitrobenzene	ND	3.9	ug/l	
88-72-2	o-Nitrotoluene	ND	3.9	ug/l	
99-08-1	m-Nitrotoluene	ND	3.9	ug/l	
99-99-0	p-Nitrotoluene	ND	3.9	ug/l	
479-45-8	Tetryl	ND	3.9	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	3.9	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	3.9	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	30%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-DUP-01		
Lab Sample ID:	F6312-13	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	21.7	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-DUP-01-F		
Lab Sample ID:	F6312-14	Date Sampled:	04/19/00
Matrix:	AQ - Ground Water	Date Received:	04/20/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/24/00	04/25/00	JK	SW846 6010A

RL = Reporting Limit

Sample Summary

Tetra Tech, NUS

Job No: F6306

NAS Cecil Field-Site 15
Project No: WORK RELEASE# CF-13

Sample Number	Collected Date	Time By	Received	Matrix Code	Matrix Type	Client Sample ID
F6306-1	04/17/00	17:30 MD	04/19/00	AQ	Ground Water	CEF-15-GW-4S-01
F6306-2	04/17/00	17:30 MD	04/19/00	AQ	Ground Water	CEF-15-GW-4S-01-F
F6306-3	04/17/00	15:50 MD	04/19/00	AQ	Ground Water	CEF-15-GW-5S-01
F6306-4	04/17/00	15:50 MD	04/19/00	AQ	Ground Water	CEF-15-GW-5S-01-F

Report of Analysis

Client Sample ID:	CEF-15-GW-4S-01		
Lab Sample ID:	F6306-1	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000939.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.2	ug/l	
208-96-8	Acenaphthylene	ND	2.2	ug/l	
120-12-7	Anthracene	ND	2.2	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.22	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.22	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.22	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.22	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.22	ug/l	
218-01-9	Chrysene	ND	0.22	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.22	ug/l	
206-44-0	Fluoranthene	ND	2.2	ug/l	
86-73-7	Fluorene	ND	2.2	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.22	ug/l	
91-20-3	Naphthalene	ND	2.2	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.2	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.2	ug/l	
85-01-8	Phenanthrene	ND	2.2	ug/l	
129-00-0	Pyrene	ND	2.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		45-130%
92-94-4	p-Terphenyl	106%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-4S-01		
Lab Sample ID:	F6306-1	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	5.2	ug/l	
121-82-4	RDX	ND	5.2	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	5.2	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.2	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.2	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	5.2	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	5.2	ug/l	
78-11-5	PETN	ND	5.2	ug/l	
98-95-3	Nitrobenzene	ND	5.2	ug/l	
88-72-2	o-Nitrotoluene	ND	5.2	ug/l	
99-08-1	m-Nitrotoluene	ND	5.2	ug/l	
99-99-0	p-Nitrotoluene	ND	5.2	ug/l	
479-45-8	Tetryl	ND	5.2	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	5.2	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	5.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	56%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-4S-01		
Lab Sample ID:	F6306-1	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-4S-01-F		
Lab Sample ID:	F6306-2	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-5S-01		
Lab Sample ID:	F6306-3	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
Method:	EPA 8310	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA000940.D	1	04/27/00	CCJ	04/21/00	OP1471	GAA45
Run #2							

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	2.0	ug/l	
208-96-8	Acenaphthylene	ND	2.0	ug/l	
120-12-7	Anthracene	ND	2.0	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.20	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.20	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.20	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.20	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.20	ug/l	
218-01-9	Chrysene	ND	0.20	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.20	ug/l	
206-44-0	Fluoranthene	ND	2.0	ug/l	
86-73-7	Fluorene	ND	2.0	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.20	ug/l	
91-20-3	Naphthalene	ND	2.0	ug/l	
90-12-0	1-Methylnaphthalene	ND	2.0	ug/l	
91-57-6	2-Methylnaphthalene	ND	2.0	ug/l	
85-01-8	Phenanthrene	ND	2.0	ug/l	
129-00-0	Pyrene	ND	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	95%		45-130%
92-94-4	p-Terphenyl	90%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-5S-01		
Lab Sample ID:	F6306-3	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
Method:	SW846 8330	Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1		1	04/25/00	AMA	04/24/00	M:OP1897	M:GC1749
Run #2							

CAS No.	Compound	Result	RL	Units	Q
2691-41-0	HMX	ND	5.2	ug/l	
121-82-4	RDX	ND	5.2	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	5.2	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	5.2	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	5.2	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	5.2	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	5.2	ug/l	
78-11-5	PETN	ND	5.2	ug/l	
98-95-3	Nitrobenzene	ND	5.2	ug/l	
88-72-2	o-Nitrotoluene	ND	5.2	ug/l	
99-08-1	m-Nitrotoluene	ND	5.2	ug/l	
99-99-0	p-Nitrotoluene	ND	5.2	ug/l	
479-45-8	Tetryl	ND	5.2	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	5.2	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	5.2	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
528-29-0	o-Dinitrobenzene	54%		50-150%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CEF-15-GW-5S-01		
Lab Sample ID:	F6306-3	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	3.3 B	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.9 B	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-5S-01-F		
Lab Sample ID:	F6306-4	Date Sampled:	04/17/00
Matrix:	AQ - Ground Water	Date Received:	04/19/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Antimony	2.4 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Arsenic	3.4 U	10.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	04/21/00	04/24/00	JK	SW846 6010A

RL = Reporting Limit

C.2 MAY 2000 RE-SAMPLING ANALYTICAL LABORATORY RESULTS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**JUNE 9, 2000**
FROM:	**JENNIFER M. MALLE**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION –FILTERED AND UNFILTERED LEAD**
CTO-039 NAS CECIL FIELD
SDG- F6607

SAMPLES: 1/Aqueous/

CEF-15-GW-1S-02

Overview

The sample set for CTO 039, NAS Cecil Field SDG F6607 includes one (1) aqueous environmental sample. There were no field duplicate pairs included within this SDG.

Sample CEF-15-GW-1S-02 was anlayzed for filtered and unfiltered lead. The sample was collected by Tetra Tech NUS on May 22, 2000 and analyzed by Accutest Laboratories in accordance with Naval Facilities Engineering Service Center (NFESC) Navy Installation Restoration Laboratory Quality Assurance Guide, (February 1996). Lead analysis was conducted under SW846 method 6010B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Verifications
• Laboratory Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminant was detected in the laboratory method/preparation blanks at the following maximum concentration:

Affected samples : All

Analyte	Maximum Concentration	Action Level (aqueous)
Lead	2.0 ug/L	10.0 ug/L

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration in evaluation for blank contamination. The positive result less than the action level for lead was qualified as nondetected, "U", for laboratory blank contamination.

Notes

The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for lead was greater than the 120% quality control limit. However, validation action was not required as per regional guidelines.

Executive Summary

Laboratory Performance: Lead was present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Jennifer M. Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

Qualified Analytical Results

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO(NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F6607

SAMPLE NUMBER:	CEF-15-GW-1S-02			CEF-15-GW-1S-02-F								
SAMPLE DATE:	05/22/00			05/22/00			/ /			/ /		
LABORATORY ID:	F6607-1			F6607-2								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	0.0 %			0.0 %			100.0 %			100.0 %		
UNITS:	UG/L			UG/L								
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	9.0	U	A	1.6	U							

APPENDIX B

Results as Reported by the Laboratory

Sample Summary

Tetra Tech, NUS

Job No: F6607

NAS Cecil Field-Site 15
Project No: WORK RELEASE# 13

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
F6607-1	05/22/00	18:16 LK	05/24/00	AQ	Ground Water	CEF-15-GW-1S-02
F6607-2	05/22/00	18:16 LK	05/24/00	AQ	Groundwater Filtered	CEF-15-GW-1S-02F

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-02		
Lab Sample ID:	F6607-1	Date Sampled:	05/22/00
Matrix:	AQ - Ground Water	Date Received:	05/24/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Lead	9.0	5.0	ug/l	1	05/25/00	05/31/00	JK	SW846 6010A

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CEF-15-GW-1S-02F		
Lab Sample ID:	F6607-2	Date Sampled:	05/22/00
Matrix:	AQ - Groundwater Filtered	Date Received:	05/24/00
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Lead	1.6 U	5.0	ug/l	1	05/25/00	05/31/00	JK	SW846 6010A

RL = Reporting Limit

C.3 JULY 2003 SAMPLING ANALYTICAL LABORATORY RESULTS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**SEPTEMBER 5, 2003**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- SVOC/PAH/EXP**
CTO 039, NAS CECIL FIELD
SDG F18605/F18801

SAMPLES: 6/Aqueous

CEF-015-GW-02S-02*	CEF-015-GW-09S-02*	CEF-015-GW-11S-02*#
CEF-015-GW-12S-02#	CEF-015-GW-14S-02#	CEF-015-GW-DUP-02*#

2/Soil

CEF-015-SS-DU22	CEF-015-SU-904-03

OVERVIEW

The sample set for CTO 039, NAS Cecil Field, SDG F18605/F18801 consists of five (5) environmental aqueous samples, one (1) environmental soil sample, and two (2) field duplicates. The soil samples were analyzed for total petroleum hydrocarbons (TPH). The samples denoted with an asterisk (*) were analyzed for polynuclear aromatic hydrocarbons (PAH). The samples denoted with a pound sign (#) were analyzed for explosives (EXP). Samples CEF-015-GW-11S-02 and CEF-015-GW-DUP-02 were also analyzed for carbazole. The field duplicate pairs included in this SDG are (CEF-015-GW-DUP-02 / CEF-015-GW-11S-02) and (CEF-015-SS-DU22 / CEF-015-SU-904-03).

The samples were collected by TetraTech NUS on July 15, 16, and 29, 2003 and analyzed by Accutest Laboratories. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Methods 8270C, 8270 SIM, and 8330 and Florida-PRO analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
* • Initial and continuing calibration
* • Laboratory method and field quality control blank results
* • Field Duplicate Precision
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

SVOC

No qualifications were assigned to this fraction.

PAH

No qualifications were assigned to this fraction.

EXP

No qualifications were assigned to this fraction.

TPH

The percent solids were <30% in the EDD for both samples. The percent solids listed on the Form I's were entered into the database and used for validadion.

EXECUTIVE SUMMARY

Laboratory Performance Issues: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the NFESC guidelines (September, 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: OS

nsample	CEF-015-GW-11S-02	nsample	CEF-015-GW-DUP-02
samp_date	7/16/2003	samp_date	7/16/2003
lab_id	F18605-5	lab_id	F18605-6
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	CEF-015-GW-11S-02

Parameter	Result	Val Qual	Qual Code
CARBAZOLE	1.1	U	

Parameter	Result	Val Qual	Qual Code
CARBAZOLE	1.1	U	

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: PAH

nsample	CEF-015-GW-02S-02	nsample	CEF-015-GW-09S-02	nsample	CEF-015-GW-11S-02
samp_date	7/16/2003	samp_date	7/15/2003	samp_date	7/16/2003
lab_id	F18605-8	lab_id	F18605-3	lab_id	F18605-5
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
1-METHYLNAPHTHALENE	0.27	U	
2-METHYLNAPHTHALENE	0.27	U	
ACENAPHTHENE	0.53	U	
ACENAPHTHYLENE	0.53	U	
ANTHRACENE	0.27	U	
BENZO(A)ANTHRACENE	0.11	U	
BENZO(A)PYRENE	0.11	U	
BENZO(B)FLUORANTHENE	0.11	U	
BENZO(G,H,I)PERYLENE	0.11	U	
BENZO(K)FLUORANTHENE	0.11	U	
CHRYSENE	0.11	U	
DIBENZO(A,H)ANTHRACENE	0.11	U	
FLUORANTHENE	0.27	U	
FLUORENE	0.27	U	
INDENO(1,2,3-CD)PYRENE	0.11	U	
NAPHTHALENE	0.27	U	
PHENANTHRENE	0.27	U	
PYRENE	0.27	U	

Parameter	Result	Val Qual	Qual Code
1-METHYLNAPHTHALENE	0.26	U	
2-METHYLNAPHTHALENE	0.26	U	
ACENAPHTHENE	0.52	U	
ACENAPHTHYLENE	0.52	U	
ANTHRACENE	0.26	U	
BENZO(A)ANTHRACENE	0.1	U	
BENZO(A)PYRENE	0.1	U	
BENZO(B)FLUORANTHENE	0.1	U	
BENZO(G,H,I)PERYLENE	0.1	U	
BENZO(K)FLUORANTHENE	0.1	U	
CHRYSENE	0.1	U	
DIBENZO(A,H)ANTHRACENE	0.1	U	
FLUORANTHENE	0.26	U	
FLUORENE	0.26	U	
INDENO(1,2,3-CD)PYRENE	0.1	U	
NAPHTHALENE	0.26	U	
PHENANTHRENE	0.26	U	
PYRENE	0.26	U	

Parameter	Result	Val Qual	Qual Code
1-METHYLNAPHTHALENE	0.26	U	
2-METHYLNAPHTHALENE	0.26	U	
ACENAPHTHENE	0.53	U	
ACENAPHTHYLENE	0.53	U	
ANTHRACENE	0.26	U	
BENZO(A)ANTHRACENE	0.11	U	
BENZO(A)PYRENE	0.11	U	
BENZO(B)FLUORANTHENE	0.11	U	
BENZO(G,H,I)PERYLENE	0.11	U	
BENZO(K)FLUORANTHENE	0.11	U	
CHRYSENE	0.11	U	
DIBENZO(A,H)ANTHRACENE	0.11	U	
FLUORANTHENE	0.26	U	
FLUORENE	0.26	U	
INDENO(1,2,3-CD)PYRENE	0.11	U	
NAPHTHALENE	0.26	U	
PHENANTHRENE	0.26	U	
PYRENE	0.26	U	

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: PAH

nsample	CEF-015-GW-DUP-02
samp_date	7/16/2003
lab_id	F18605-6
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	CEF-015-GW-11S-02

Parameter	Result	Val Qual	Qual Code
1-METHYLNAPHTHALENE	0.27	U	
2-METHYLNAPHTHALENE	0.27	U	
ACENAPHTHENE	0.53	U	
ACENAPHTHYLENE	0.53	U	
ANTHRACENE	0.27	U	
BENZO(A)ANTHRACENE	0.11	U	
BENZO(A)PYRENE	0.11	U	
BENZO(B)FLUORANTHENE	0.11	U	
BENZO(G,H,I)PERYLENE	0.11	U	
BENZO(K)FLUORANTHENE	0.11	U	
CHRYSENE	0.11	U	
DIBENZO(A,H)ANTHRACENE	0.11	U	
FLUORANTHENE	0.27	U	
FLUORENE	0.27	U	
INDENO(1,2,3-CD)PYRENE	0.11	U	
NAPHTHALENE	0.27	U	
PHENANTHRENE	0.27	U	
PYRENE	0.27	U	

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: EXP

nsample	CEF-015-GW-11S-02	nsample	CEF-015-GW-12S-02	nsample	CEF-015-GW-14S-02
samp_date	7/16/2003	samp_date	7/15/2003	samp_date	7/16/2003
lab_id	F18605-5	lab_id	F18605-1	lab_id	F18605-7
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
1,3,5-TRINITROBENZENE	0.054	U	
1,3-DINITROBENZENE	0.054	U	
2,4,6-TRINITROTOLUENE	0.054	U	
2,4-DINITROTOLUENE	0.054	U	
2,6-DINITROTOLUENE	0.054	U	
2-AMINO-4,6-DINITROTOLUENE	0.054	U	
2-NITROTOLUENE	0.054	U	
3-NITROTOLUENE	0.054	U	
4-AMINO-2,6-DINITROTOLUENE	0.054	U	
4-NITROTOLUENE	0.081	U	
HMX	0.081	U	
NITROBENZENE	0.054	U	
RDX	0.081	U	
TETRYL	0.081	U	

Parameter	Result	Val Qual	Qual Code
1,3,5-TRINITROBENZENE	0.054	U	
1,3-DINITROBENZENE	0.054	U	
2,4,6-TRINITROTOLUENE	0.054	U	
2,4-DINITROTOLUENE	0.054	U	
2,6-DINITROTOLUENE	0.054	U	
2-AMINO-4,6-DINITROTOLUENE	0.054	U	
2-NITROTOLUENE	0.054	U	
3-NITROTOLUENE	0.054	U	
4-AMINO-2,6-DINITROTOLUENE	0.054	U	
4-NITROTOLUENE	0.081	U	
HMX	0.081	U	
NITROBENZENE	0.054	U	
RDX	0.081	U	
TETRYL	0.081	U	

Parameter	Result	Val Qual	Qual Code
1,3,5-TRINITROBENZENE	0.054	U	
1,3-DINITROBENZENE	0.054	U	
2,4,6-TRINITROTOLUENE	0.054	U	
2,4-DINITROTOLUENE	0.054	U	
2,6-DINITROTOLUENE	0.054	U	
2-AMINO-4,6-DINITROTOLUENE	0.054	U	
2-NITROTOLUENE	0.054	U	
3-NITROTOLUENE	0.054	U	
4-AMINO-2,6-DINITROTOLUENE	0.054	U	
4-NITROTOLUENE	0.081	U	
HMX	0.081	U	
NITROBENZENE	0.054	U	
RDX	0.081	U	
TETRYL	0.081	U	

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: EXP

nsample	CEF-015-GW-DUP-02
samp_date	7/16/2003
lab_id	F18605-6
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	CEF-015-GW-11S-02

Parameter	Result	Val Qual	Qual Code
1,3,5-TRINITROBENZENE	0.053	U	
1,3-DINITROBENZENE	0.053	U	
2,4,6-TRINITROTOLUENE	0.053	U	
2,4-DINITROTOLUENE	0.053	U	
2,6-DINITROTOLUENE	0.053	U	
2-AMINO-4,6-DINITROTOLUENE	0.053	U	
2-NITROTOLUENE	0.053	U	
3-NITROTOLUENE	0.053	U	
4-AMINO-2,6-DINITROTOLUENE	0.053	U	
4-NITROTOLUENE	0.08	U	
HMX	0.08	U	
NITROBENZENE	0.053	U	
RDX	0.08	U	
TETRYL	0.08	U	

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-11S-02		
Lab Sample ID:	F18605-5	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L018120.D	1	07/29/03	ME	07/23/03	OP8049	SL980
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
86-74-8	Carbazole	ND	5.3	1.1	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	65%		49-119%
321-60-8	2-Fluorobiphenyl	67%		45-118%
1718-51-0	Terphenyl-d14	71%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-DUP-02		
Lab Sample ID:	F18605-6	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L018121.D	1	07/29/03	ME	07/23/03	OP8049	SL980
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
86-74-8	Carbazole	ND	5.4	1.1	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	77%		49-119%
321-60-8	2-Fluorobiphenyl	81%		45-118%
1718-51-0	Terphenyl-d14	76%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-02S-02		
Lab Sample ID:	F18605-8	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W016250.D	1	07/18/03	SKW	07/18/03	OP8006	SW850
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.53	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.53	ug/l	
120-12-7	Anthracene	ND	1.1	0.27	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.11	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.11	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.11	ug/l	
218-01-9	Chrysene	ND	0.21	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.11	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.27	ug/l	
86-73-7	Fluorene	ND	1.1	0.27	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.11	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-20-3	Naphthalene	ND	1.1	0.27	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.27	ug/l	
129-00-0	Pyrene	ND	1.1	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	62%		49-119%
321-60-8	2-Fluorobiphenyl	68%		45-118%
1718-51-0	Terphenyl-d14	85%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-09S-02		
Lab Sample ID:	F18605-3	**Date Sampled:**	07/15/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W016245.D	1	07/18/03	SKW	07/18/03	OP8006	SW850
Run #2							

	Initial Volume	Final Volume
Run #1	970 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.0	0.52	ug/l	
208-96-8	Acenaphthylene	ND	1.0	0.52	ug/l	
120-12-7	Anthracene	ND	1.0	0.26	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.10	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.10	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.10	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.10	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.10	ug/l	
218-01-9	Chrysene	ND	0.21	0.10	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.10	ug/l	
206-44-0	Fluoranthene	ND	1.0	0.26	ug/l	
86-73-7	Fluorene	ND	1.0	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.10	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.0	0.26	ug/l	
91-20-3	Naphthalene	ND	1.0	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.0	0.26	ug/l	
129-00-0	Pyrene	ND	1.0	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	75%		49-119%
321-60-8	2-Fluorobiphenyl	81%		45-118%
1718-51-0	Terphenyl-d14	86%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-11S-02		
Lab Sample ID:	F18605-5	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W016248.D	1	07/18/03	SKW	07/18/03	OP8006	SW850
Run #2							

	Initial Volume	Final Volume
Run #1	950 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.53	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.53	ug/l	
120-12-7	Anthracene	ND	1.1	0.26	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.11	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.11	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.11	ug/l	
218-01-9	Chrysene	ND	0.21	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.11	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.26	ug/l	
86-73-7	Fluorene	ND	1.1	0.26	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.11	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.26	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.26	ug/l	
91-20-3	Naphthalene	ND	1.1	0.26	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.26	ug/l	
129-00-0	Pyrene	ND	1.1	0.26	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	94%		49-119%
321-60-8	2-Fluorobiphenyl	84%		45-118%
1718-51-0	Terphenyl-d14	95%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-DUP-02		
Lab Sample ID:	F18605-6	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8270C BY SIM SW846 3510C	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W016249.D	1	07/18/03	SKW	07/18/03	OP8006	SW850
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	1.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	1.1	0.53	ug/l	
208-96-8	Acenaphthylene	ND	1.1	0.53	ug/l	
120-12-7	Anthracene	ND	1.1	0.27	ug/l	
56-55-3	Benzo(a)anthracene	ND	0.21	0.11	ug/l	
50-32-8	Benzo(a)pyrene	ND	0.21	0.11	ug/l	
205-99-2	Benzo(b)fluoranthene	ND	0.21	0.11	ug/l	
191-24-2	Benzo(g,h,i)perylene	ND	0.21	0.11	ug/l	
207-08-9	Benzo(k)fluoranthene	ND	0.21	0.11	ug/l	
218-01-9	Chrysene	ND	0.21	0.11	ug/l	
53-70-3	Dibenzo(a,h)anthracene	ND	0.21	0.11	ug/l	
206-44-0	Fluoranthene	ND	1.1	0.27	ug/l	
86-73-7	Fluorene	ND	1.1	0.27	ug/l	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.21	0.11	ug/l	
90-12-0	1-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-57-6	2-Methylnaphthalene	ND	1.1	0.27	ug/l	
91-20-3	Naphthalene	ND	1.1	0.27	ug/l	
85-01-8	Phenanthrene	ND	1.1	0.27	ug/l	
129-00-0	Pyrene	ND	1.1	0.27	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	100%		49-119%
321-60-8	2-Fluorobiphenyl	91%		45-118%
1718-51-0	Terphenyl-d14	99%		46-135%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-11S-02		
Lab Sample ID:	F18605-5	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG007070.D	1	07/24/03	NJ	07/22/03	OP8038	GGG349
Run #2							

	Initial Volume	Final Volume
Run #1	930 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.081	ug/l	
121-82-4	RDX	ND	0.22	0.081	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.054	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.054	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.054	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.054	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.054	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.081	ug/l	
479-45-8	Tetryl	ND	0.22	0.081	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.054	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.054	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	94%		51-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-12S-02		
Lab Sample ID:	F18605-1	**Date Sampled:**	07/15/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG007069.D	1	07/24/03	NJ	07/22/03	OP8038	GGG349
Run #2							

	Initial Volume	Final Volume
Run #1	930 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.081	ug/l	
121-82-4	RDX	ND	0.22	0.081	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.054	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.054	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.054	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.054	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.054	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.081	ug/l	
479-45-8	Tetryl	ND	0.22	0.081	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.054	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.054	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	96%		51-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-14S-02		
Lab Sample ID:	F18605-7	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG007072.D	1	07/24/03	NJ	07/22/03	OP8038	GGG349
Run #2							

	Initial Volume	Final Volume
Run #1	930 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.22	0.081	ug/l	
121-82-4	RDX	ND	0.22	0.081	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.22	0.054	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.22	0.054	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.22	0.054	ug/l	
98-95-3	Nitrobenzene	ND	0.22	0.054	ug/l	
88-72-2	o-Nitrotoluene	ND	0.22	0.054	ug/l	
99-08-1	m-Nitrotoluene	ND	0.22	0.054	ug/l	
99-99-0	p-Nitrotoluene	ND	0.22	0.081	ug/l	
479-45-8	Tetryl	ND	0.22	0.081	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.22	0.054	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.22	0.054	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	96%		51-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-DUP-02		
Lab Sample ID:	F18605-6	**Date Sampled:**	07/16/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
Method:	SW846 8330A SW846 3535A	**Percent Solids:**	n/a
Project:	NAS Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GG007071.D	1	07/24/03	NJ	07/22/03	OP8038	GGG349
Run #2							

	Initial Volume	Final Volume
Run #1	940 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
2691-41-0	HMX	ND	0.21	0.080	ug/l	
121-82-4	RDX	ND	0.21	0.080	ug/l	
99-65-0	1,3-Dinitrobenzene	ND	0.21	0.053	ug/l	
606-20-2	2,6-Dinitrotoluene	ND	0.21	0.053	ug/l	
121-14-2	2,4-Dinitrotoluene	ND	0.21	0.053	ug/l	
35572-78-2	2-amino-4,6-Dinitrotoluene	ND	0.21	0.053	ug/l	
19406-51-0	4-amino-2,6-Dinitrotoluene	ND	0.21	0.053	ug/l	
98-95-3	Nitrobenzene	ND	0.21	0.053	ug/l	
88-72-2	o-Nitrotoluene	ND	0.21	0.053	ug/l	
99-08-1	m-Nitrotoluene	ND	0.21	0.053	ug/l	
99-99-0	p-Nitrotoluene	ND	0.21	0.080	ug/l	
479-45-8	Tetryl	ND	0.21	0.080	ug/l	
99-35-4	1,3,5-Trinitrobenzene	ND	0.21	0.053	ug/l	
118-96-7	2,4,6-Trinitrotoluene	ND	0.21	0.053	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
610-39-9	3,4-Dinitrotoluene	94%		51-137%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**SEPTEMBER 5, 2003**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – METALS PARAMETERS**
CTO-039 NAS CECIL FIELD
SAMPLE DELIVERY GROUP (SDG) – F18605

SAMPLES: 2/Aqueous

CEF-015-GW-10S-02 CEF-015-GW-13S-02

Overview

The sample set for CTO 039, NAS Cecil Field, SDG F18605, consists of two (2) environmental aqueous samples.

Sample CEF-015-GW-10S-02 was analyzed for lead and sample CEF-015-GW-13S-02 was analyzed for arsenic. The samples were collected by TetraTech NUS on July 15, 2003 and analyzed Katahdin Analytical Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals analyses were conducted using SW 846 method 6010B.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Holding Times

All holding times were met.

Laboratory Blank Analyses

The following contaminant was detected in the laboratory method blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Lead	4.5 µg/L	22.5 µg/L

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive result less than the action level for lead was qualified "U" as a result of blank contamination.

Executive Summary

Laboratory Performance: Qualification was made based on method blank contamination.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", July 2002 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F. Spada III
Environmental Scientist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

PROJ_NO: 7653

SDG: F18605 MEDIA: WATER DATA FRACTION: M

nsample	CEF-015-GW-10S-02	nsample	CEF-015-GW-13S-02
samp_date	7/15/2003	samp_date	7/15/2003
lab_id	F18605-2	lab_id	F18605-4
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
LEAD	3.4	U	A

Parameter	Result	Val Qual	Qual Code
ARSENIC	13.7		

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-10S-02		
Lab Sample ID:	F18605-2	**Date Sampled:**	07/15/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	3.4 B	5.0	1.2	ug/l	1	07/21/03	07/22/03 DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but <RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-GW-13S-02		
Lab Sample ID:	F18605-4	**Date Sampled:**	07/15/03
Matrix:	AQ - Ground Water	**Date Received:**	07/16/03
		Percent Solids:	n/a
Project:	NAS Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method	Prep Method
Arsenic	13.7	10	2.8	ug/l	1	07/21/03	07/22/03	DM	SW846 6010B	SW846 3010A

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 2327 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7653, CTO 39	SITE 15, NASCF	MARK SPERANZA	412 921 ~~4089~~ 8116	ACCUTEST SUE BELL
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Scott R. McGuire		MERV DALE	904 636 6125	4405 Vineland Rd. Q85
		CARRIER/WAYBILL NUMBER		CITY, STATE
				ORLANDO, FL 32811

STANDARD TAT ☐
RUSH TAT ☒
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

F18605

	DATE YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	PAHS SW846 8310	PAHS with carbazole SW846 8310	NITRO AROMATICS SW846 8330	TOTAL LEAD SW846 6010B	TOTAL ARSENIC SW846 6010B				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)										G	G	G	P	P				
PRESERVATIVE USED										None	None	None	HNO_3	HNO_3				
1	7/16	0945	CEF-015-GW-12S-02				GW	G	6			6						Cool to 4°C
2	7/15	1120	CEF-015-GW-10S-02				GW	G	1				1					
3	7/15	1225	CEF-015-GW-09S-02				GW	G	2	2								Work Release
4	7/15	1455	CEF-015-GW-13S-02				GW	G	1				~~SPM~~	1				N0039-WR365
5	7/16	0840	CEF-015-GW-11S-02				GW	G	4	~~2~~ SPM	2	2						
6	7/16	0000	CEF-015-GW-Dup-02				GW	G	4	~~2~~ SPM	2	2						
7	7/16	1005	CEF-015-GW-14S-02				GW	G	2			2						
8	7/16	1220	CEF-015-GW-02S-02				GW	G	2	2								
			SPM								SPM							

1. RELINQUISHED BY Scott R. McGuire	DATE 7/16/03	TIME 1500	1. RECEIVED BY Accutest Courier	DATE	TIME
2. RELINQUISHED BY Accutest Courier	DATE	TIME	2. RECEIVED BY [illegible]	DATE 7/16/03	TIME 1920.
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

A.2 SUPPLEMENT TO GROUNDWATER TECHNICAL MEMORANDUM FOR NO FURTHER ACTION

TECHNICAL MEMORANDUM

SUPPLEMENT TO
TECHNICAL MEMORANDUM FOR NO FURTHER GROUNDWATER MONITORING
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

1.0 Introduction

The groundwater at Site 15 was decided to be No Further Action (NFA) as described in Technical Memorandum for No Further Groundwater Monitoring listed in Appendix A.1 (TtNUS, 2006a). However, two significant changes have occurred that impact this decisioin

1. Previously overlooked 1995 groundwater monitring results indicated that RDX exceeded its Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Level (GCTL) of 0.3 µg/L at two locations with detected concentrations of 0.451 µg/L at monitoring well MW01S and 0.404 µg/L at monitoring well MW05S. In addition, the same 1995 monitoring data also indicated that 4,4'-DDE exceeded its GCTL of 0.1 µg/L with a detected concentration of 0.26 µg/L at well MW05S.

2. In 2001 the United States Environmental Protection Agency (U.S. EPA) Maximum Contaminant Levels (MCLs) were updated and the arsenic MCL was lowered from 50 to 10 µg/L (U.S. EPA, 2002).

3. In 2005 the FDEP GCTLs were updated and the arsenic GCTL was lowered from 50 to 10 µg/L (FDEP, 2005).

Therefore, the effect of these two changes needs to be evaluated.

2.0 Effect of the RDX and 4,4'-DDE Exceedances

To verify or contradict the exceesances of RDX and 4,4'-DDE detected in 1995, monitoring wells MW01S and MW05S that had since been abandoned were re-installed and re-sampled in August 2006 (TtNUS, 2006b). Results of that re-sampling showed that RDX and 4,4"-DDE were no longer detected at these two locations in excess of their respective analytical dtection limits of 0.07 µg/L and 0.02 µg/L. Therefore, the GCTL exceedances of RDX and 4.4'-DDE were not confirmed.

3.0 Effect of the New Arsenic MCL and GCTL

The arsenic U.S. EPA MCL and FDEP GCTL before the recent revisions was 50 µg/L. The arsenic MCL and GCTL were revised to 10 µg/L in January 2001 and April of 2005, respectively. Arsenic concentrations detected at well CEF-13S ranged from 13.7 to 21.6 µg/L during sampling from July 2003 through March 2006. Therefore, groundwater at Site 15 is no longer NFA and action is required.

4.0 Revisions to the Feasibility Study

Groundwater was added as a medium of concern for the FS. Groundwater ecological impacts are negligible because groundwater does not have a pathway to surface water at the site. No risk assessment was conducted on groundwater. Arsenic is the only constituent detected at concentrations

which exceed the 2002 U.S. EPA MCL and 2005 FDEP GCTL and is the only groundwater chemical of concern (COC) considered in the FS.

Although, as stated above, groundwater was added as a medium of concern for the FS, the Base Realignment and Closure (BRAC) cleanup Team (BCT) has decided that this status would be confirmed following soil remediation and prior to implementation of the groundwater remedy (BCT, 2006).

For this purpose, a sample will be collected from the new monitoring well re-installed at the location of well CEF-015-13S following the remediation of the contaminated soil and that sample will be analyzed for arsenic. If the concentration of arsenic detected in re-installed well CEF-015-13S is below the GCTL and MCL, Site 15 will be considered as NFA for groundwater. If the concentration of arsenic detected in re-installed well CEF-015-13S is above the GCTL and MCL, a second sample will be collected and analyzed for arsenic to verify the exceedance. If the GCTL and MCL exceedance is not confirmed, Site 15 will be considered as NFA for groundwater. If the exceedance is confirmed, groundwater will continue to be considered as a medium of concern and implementation of the groundwater remedy will proceed.

5.0 References

BCT [Base Realignment and Closure (BRAC) Cleanup Team], 2006. Meeting of October 4, 2006, Minute No. 2344, Decision No. 713.

FDEP (Florida Department of Environmental Protection), 2005. Contaminant Cleanup Target Levels. Florida Administrative Code (FAC) Chapter 62-777. April.

TtNUS (Tetra Tech NUS, Inc.), 2006a. Technical Memorandum for No Further Groundwater Monitoring at OU 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field. Prepared for NAVFAC EFD SOUTH, North Charleston, South Carolina. December.

TtNUS, 2006b. Sampling and Analysis Work Plan, Round VI for Groundwater, Site 15, Blue 10 Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. August 22.

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

APPENDIX B

ECOLOGICALLY-BASED REMEDIATION GOALS FOR LEAD AND PAHs IN SOIL

Ecologically-Based Remediation Goals for Lead and PAHs in Soil

Site 15, Blue 10 Ordnance Disposal Area

Naval Air Station Cecil Field

Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0039

November 2003

100113/P

ECOLOGICALLY-BASED REMEDIATION GOALS FOR LEAD ANAD PAHs IN SOIL

SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
AF	Absorption fraction
ASTM	American Society of Testing and Materials
CEC	Cation exchange capacity
CLEAN	Comprehensive Long-Term Environmental Action Navy
FDEP	Florida Department of Environmental Protection
HLA	Harding Lawson Associates
IBDS	Inorganic Background Data Set
ID	Inside diameter
LOAEC	Lowest-observed-effects concentration
NAS	Naval Air Station
NOAEC	No-observed-adverse-effects concentration
PRG	Preliminary remediation goal
TOC	Total organic carbon
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
XRF	X-ray fluorescence

ECOLOGICALLY-BASED REMEDIATION GOALS FOR LEAD AND PAHS IN SOIL SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

1.0 INTRODUCTION

The results of a screening-level ecological risk assessment indicated that lead and polynuclear aromatic hydrocarbons (PAHs) in surface soil in some portions of Site 15 may pose a risk to ecological receptors (ABB-ES, 1997). Additional sampling and risk assessment activities have further characterized locations of elevated lead and PAHs at the site. Site-specific preliminary remediation goals (PRGs) for soil at Site 15 are needed so that risk managers can evaluate remedial options. This document describes how ecologically-based PRGs have been developed for lead and PAHs at Site 15.

The remainder of this section summarizes the history of activities at Site 15 relative to the U.S. Environmental Protection Agency's (U.S. EPA's) 8-step process for designing and conducting ecological risk assessments (U.S. EPA, 1997). Section 2 of this report describes the site investigation conducted in June 2001, and Section 3 presents the data from the site investigation. Data analysis, risk characterization, and PRGs are provided in Section 4. Section 5 presents the summary and conclusions.

The history of activities at Site 15 relative to U.S. EPA's 8-step process for designing and conducting ecological risk assessments is as follows. The initial ecological risk assessment (ABB-ES, 1997) represents Step 1 (Screening Level Problem Formulation and Ecological Effects Evaluation) and Step 2 (Screening Level Exposure Estimate and Risk Calculation). Subsequent to the screening-level ecological risk assessment, several additional sampling events were conducted to further characterize locations of elevated lead and PAHs in soil at the site. The results of this additional sampling were used to develop a draft work plan and sampling and analysis plan, which were completed in March 2001. The draft work plan and sampling and analysis plan represent Step 3 (Baseline Risk Assessment Problem Formulation) and Step 4 (Study Design and Data Quality Objective Process). Step 5 (Field Verification of Sampling Design) was conducted on May 3, 2001. The final work plan and the sampling and analysis plan were completed June 12, 2001 (TTNUS, 2001). The field sampling component of Step 6 (Site Investigation and Data Analysis) was conducted from June 18 to 28, 2001. This document represents the remainder of Step 6 (Data Analysis) and Step 7 (Risk Characterization).

The final work plan (TtNUS, 2001) details the Site 15 conceptual model and addresses the physical characteristics and ecological receptors at the site, complete exposure pathways to be evaluated, assessment endpoints, risk questions, measurement endpoints, and data evaluation procedures. The final work plan was approved by representatives of the Navy, U.S. EPA Region IV, and the Florida Department of Environmental Protection. This document does not provide a detailed description of the conceptual model and data evaluation procedures used to estimate risk and generate PRGs at Site 15. Instead, the reader is advised to consult the final work plan, which is included herein as Appendix A, for details on these topics.

2.0 SITE INVESTIGATION

2.1 Sample Collection

In June 2001, soil samples were collected from 24 locations at Site 15 (Figure 2-1). These samples consisted of 12 samples expected to provide a gradient of lead concentrations with minimal PAH concentrations (SS-701 through SS-719A), and 12 samples expected to provide a gradient of PAH concentrations with minimal lead concentrations (SS-721 through SS-737). The expected gradients were based on data from previous sampling efforts and results from field-portable x-ray fluorescence (XRF) equipment used during sampling activities. Soil samples were also collected from three offsite reference locations (SS-739 through SS-741) expected to contain minimal concentrations of lead and PAHs (Figure 2-1).

Soil samples consisted of the first 3 inches of mineral soil plus the overlying duff layer atop the mineral horizon. Each soil sample was a composite of five sub-samples collected from 10-foot by 15-foot plots and was homogenized in the field. After homogenization, aliquots were taken for chemical and physical analyses and toxicity tests.

The work plan proposed using 15-foot by 15-foot plots for sample collection; however, midway through sampling at the initial plot, it became clear that smaller plots would provide an adequate amount of invertebrates to meet the study objectives. Thus, the field team leader modified the plot size to 10 feet by 15 feet. This decision was supported by Dr. Ted Simon of U.S. EPA Region IV, who was present at the site during sampling, and had been pre-approved by Dr. Bethany Grohs of U.S. EPA's Environmental Response Team.

At each of the 12 lead gradient sampling locations, one additional soil sample was collected and archived for possible future analyses. These additional samples consisted of mineral soil only (no overlying duff) and consisted of composited material of 0 to 12 inches below the surface.

Soil invertebrates were collected from the same 10-foot by 15-foot plots as the soil samples. At each sampling location, tree limbs and debris were removed from the surface, and the duff layer (consisting of decomposing organic matter) atop the mineral horizon was removed and meticulously searched by hand for visible invertebrates. Invertebrates were placed in zip-lock bags and stored on ice in the field. At the end of each day, samples were placed in jars and either frozen (for tissue lead analysis) or preserved in 70 percent alcohol.

Sample location SS-703 consisted of a 10-foot by 13-foot plot instead of a 10-foot by 15-foot plot. The slightly smaller plot was necessitated by inclement weather (thunderstorms) in the area during sampling.

2.2 Sample Analyses

Soil samples were analyzed for lead, PAHs, total organic carbon (TOC), cation exchange capacity (CEC), acidity (pH), moisture content, and grain size. Analyses for lead, PAHs, moisture content, CEC and TOC in soil were conducted by Accutest Laboratories of Orlando, Florida. Grain size analyses were conducted by Civil Services Inc. of Jacksonville, Florida.

Soil invertebrates collected from the 12 lead gradient plots and those from the reference locations were analyzed for lead. Each of the invertebrate samples was a composite of all invertebrates collected within a sampling plot. Invertebrate tissue analyses were performed by Severn Trent Laboratories, Inc. of Canton, Ohio.

Soil samples were also subjected to 14-day toxicity tests in which the survival of laboratory-reared earthworms (*Eisenia fetida*) was evaluated following standardized methods (ASTM, 1998). Four replicates per sample, with 10 earthworms per replicate, were used in the toxicity tests conducted by Springborne Laboratories Inc. of Wareham, Massachusetts.

Soil invertebrates from each of the 27 sampling locations were identified and enumerated by Wade Davidson, Department of Entomology and Nematology, University of Florida, Gainesville, Florida. Invertebrates were identified to the most detailed taxon practicable. Insects, snails, and earthworms were identified to family. Identification of insects beyond the family level was not conducted, as this requires the attention of specialists for each family. For example, a coleopteran specialist would be required to classify beetles and a dipteran expert would be needed to classify flies. Non-insect arthropods were identified to order. Identification of non-insect arthropods beyond the order taxon often requires dissection of mouthparts and/or specialists who work exclusively with a specific order or family of arthropod (i.e. spiders). The level of invertebrate identification was detailed enough to categorize the specimens, as described by White (1963), Borror and White (1970), and Dindal (1990), into the following

functional roles within the food web: generalist predators, specialist predators, omnivores, herbivores, and detritivores.

3.0 RESULTS

3.1 Soil Chemistry and Physical Characteristics

Lead and total PAH concentrations in soil are shown in Table 3-1 and Figure 3-1. Complete laboratory data for lead and PAHs are provided in Appendix B.

Lead was detected in 23 of 24 samples from Site 15, at concentrations ranging from 23.4 to 5,470 mg/kg. Lead concentrations in reference samples ranged from 7.8 to 11.4 mg/kg, well below the Naval Air Station (NAS) Cecil Field site-specific Inorganic Background Data Set (IBDS) lead value of 197 mg/kg (HLA, 1998).

PAHs were detected in 17 of 24 samples from Site 15, and PAHs were not detected in reference samples. Concentrations of total PAHs ranged from 906 to 1,121,520 µg/kg. PAH concentrations presented and discussed herein represent total detected PAHs, and were calculated as the sum of detected individual PAHs within a sample. The impact of this method of calculating total PAHs relative to the risk characterization of PAHs is discussed in Section 4.2.1. For samples in which no PAHs were detected, the values in Table 3-1 and Figure 3-1 represent the lowest detection limit for an individual PAH in that sample.

Soil moisture content, CEC, and TOC data are provided in Table 3-1 and Appendix B. The soil pH values shown in Table 3-1 are those measured by the toxicity test laboratory at test initiation; pH values for each sample at the beginning and end of the 14-day toxicity tests can be found in Appendix C. The soil moisture data in Table 3-1 are values measured by the lab conducting the chemical analyses (Accutest Laboratories); these data averaged 24.1 percent and ranged from 14.0 to 40.4 percent. Soil moisture was also measured by the toxicity test lab (Springborne Laboratories) prior to conducting toxicity tests. Those values (provided in Appendix C) were very similar to the Accutest values. CEC averaged 27.4 milliequivalents per 100 grams of oven dry soil (meq/100g) and ranged from 15.6 to 44.8 meq/100g. Soil TOC averaged 6.1 percent and ranged from 2.5 to 13.7 percent. (Note: The laboratory reported TOC in units of mg/kg and the TOC values in Table 3-1 are in these units. Further reference to TOC values will be in percent. Soil pH averaged 3.5, and ranged from 3.0 to 4.9.

Soil grain size data are provided in Table 3-2. Soils were predominantly fine sand and very fine sand, with small proportions of medium-grained sand and very small proportions of silt and clay.

3.2 Invertebrate Tissue Concentrations of Lead

Lead was detected in all 12 invertebrate samples from Site 15 at concentrations ranging from 0.7 to 333 mg/kg (Table 3-1). The maximum tissue-lead concentration (333 mg/kg) was in invertebrates collected from the plot with the maximum lead concentration (SS-706; 5,470 mg/kg). Lead was not detected in invertebrates collected from the reference locations at a detection limit of 0.16 mg/kg.

The invertebrate tissue data was used to develop soil-to-invertebrate bioaccumulation factors (BAFs). The invertebrate tissue concentrations of lead reported by the laboratory are wet weight concentrations. Because dry weight BAFs are needed to calculate soil remedial goals protective of avian and mammalian receptors, the invertebrate lead concentrations were converted to dry weight concentrations assuming a moisture content of 71 percent, which is the average moisture content of earthworms (84 percent), adult beetles (61 percent), and crickets and grasshoppers (69 percent) (U.S. EPA, 1993). The BAFs, expressed as the ratios between dry weight concentrations of lead in tissue and dry weight concentrations of lead in soil, are presented in Table 3-3 for each of the 12 soil and corresponding invertebrate samples. BAFs ranged from 0.004 to 0.246.

Linear regression was used to derive a site-wide BAF as per the work plan. The critical value for the correlation coefficient at 10 (n-2) degrees of freedom, one independent variable, and alpha = 0.05, was 0.576 (Rohlf and Sokal, 1969). Thus, a correlation coefficient (r) greater than 0.576 is considered significant. Invertebrate lead concentrations were correlated with soil lead concentrations (r = 0.772) and the BAF based on the regression equation was 0.14 (Figure 3-2). The median of the 12 BAFs was 050.

3.3 Soil Toxicity Tests

The 14-day survival of earthworms in all reference samples, in laboratory control samples, and in 22 of 24 samples from Site 15 was 100 percent. The 14-day survival of earthworms in the remaining two samples (SS-703 and SS-706) was 0 percent; all earthworms in these samples were dead at test termination. All earthworms appeared to be healthy and were noted to be burrowing into the soil at test initiation. At test termination, surviving earthworms appeared lethargic in many samples (Table 3-1). Sample SS-703 was noted by laboratory personnel as being "moldy on surface" at test termination. Full details regarding the toxicity tests are contained in the laboratory report (Appendix C).

3.4 Invertebrate Diversity and Abundance

The abundance of invertebrates within sampling plots ranged from 14 individuals at SS-706 to 80 individuals at SS-707 (Tables 3-4 and 3-5). Most invertebrates were classified as generalist predators, and centipedes (*Lithobiomorpha* and *Scolopendromorpha*) were the most commonly encountered

invertebrates. Herbivores and detritivores were present in most sampling plots, but were much less abundant than generalist predators. Omnivores were encountered in small numbers and in very few sampling plots. Only one specialist predator was encountered and in only one plot (Table 3-4); this category is combined with the generalist predator category in Table 3-5. Some invertebrates could not be identified and are included in the "unknown" category (Tables 3-4 and 3-5). The "unknown" invertebrates were almost always larvae. Figure 3-3 presents the total number of invertebrates (excluding ants) in each sampling plot. The complete invertebrate report is included as Appendix D.

The understory tended to cover approximately 20 to 30 percent of most sampling plots, and the most common understory species were gall berry (*Ilex glabra*), greenbrier (*Smilax* sp.), and yellow jessamine (*Gelsemium sempervirens*). A midstory was generally absent, or nearly so, within the plots. The overstory tended to cover approximately 30 to 50 percent of most sampling plots, and slash pine (*Pinus elliottii*) was the most common overstory species. The duff layer of decomposing organic matter ranged in thickness from ½ to 5 inches, but tended to be approximately 1½-2 inches. Habitat descriptions at sampling plots are included as Appendix E.

4.0 DATA ANALYSIS AND RISK CHARACTERIZATION

This section discusses the data analysis and risk characterization, and is divided into separate discussions of lead and PAHs. Uncertainties associated with the data analyses and risk characterizations are also presented.

4.1 Lead

4.1.1 Risk to Soil Invertebrates

Soil invertebrates serve as prey for rodents, shrews, moles, and birds, which are preyed upon by carnivores such as hawks, owls, foxes, weasels, and bobcats. Thus, soil invertebrates are vital components of the ecosystem at Site 15. With this in mind, the assessment endpoint associated with invertebrates at Site 15 is as follows:

- Survival of soil invertebrate populations typical in pine flatwoods habitat.

Based on the conceptual model and the above assessment endpoint, the associated risk questions involving lead contamination at Site 15 are as follows (TtNUS, 2001):

- At what soil concentration does lead at Site 15 cause (or potentially cause) reduced survival of soil invertebrates?

- At what soil concentration does lead at Site 15 cause (or potentially cause) reduced diversity and abundance of soil invertebrates?

The measurement endpoints for these risk questions are discussed in the following subsections.

4.1.1.1 Survival of Soil Invertebrates

The measurement endpoint for the first risk question above was the survival of earthworms in 14-day laboratory toxicity tests using soil samples collected from Site 15 and reference locations. The purpose of the toxicity tests was to determine if lead concentrations in site soil samples are correlated with mortality of the organisms associated with this assessment endpoint (i.e., soil invertebrates). Earthworms were used to represent other soil invertebrates that occur on the site because toxicity test methodologies using earthworms have been standardized, whereas toxicity tests using other invertebrates have not. Earthworms are generally considered to be representative of soil invertebrates in ecological risk assessments (Sample *et al*, 1997).

As mentioned in Section 3.3, all earthworms survived in 22 of 24 samples from Site 15, and in the three reference samples. No earthworms survived (100 percent mortality) in samples SS-703 and SS-706.

The laboratory noted that earthworms were lethargic (sluggish, slow moving) in 18 of 25 samples at test termination (Table 3-1). Discussions with the laboratory director indicated that such a high degree of lethargy is abnormal, even when food has been withheld from test organisms for 14 days, as in the toxicity tests conducted for this investigation. The laboratory director stated that the lethargy might have been due to the high acidity of the samples (pH range = 3.0 to 4.9). Although the reason for the lethargy is unknown, the condition does not appear to be due to lead toxicity because lethargy was also noted in all worms within two of three reference samples (SS-740 and SS-741; Table 3-1).

4.1.1.1.1 Mortality in Sample SS-706

All earthworms in this sample were dead at test termination. Because this sample had the greatest lead concentration (5,470 mg/kg) in this investigation, it is assumed that the observed mortality was due to lead toxicity. This sample also had one of the highest soil-to-invertebrate BAFs (0.210).

4.1.1.1.2 Mortality in Sample SS-703

The lead concentration in sample SS-703 was 1,400 mg/kg (Table 3-1). Lead concentrations were greater in samples SS-708 (2,200 mg/kg), SS-707 (3,080 mg/kg) and SS-704 (3,380 mg/kg), and yet, earthworm survival was 100 percent in these samples.

It is unclear why no earthworms survived in sample SS-703 while all earthworms survived in three samples with greater lead concentrations, but factors other than lead or PAHs might have been responsible for the mortality. PAHs were not detected in SS-703, but chemical analyses of soil samples were limited to lead and PAHs.

Other numerous factors can influence soil toxicity tests. The sample was collected, mixed, preserved, transported, and shipped to the laboratory in the same way as the other samples. It was noted during sample collection that the duff layer in this plot was thicker (3-5 inches) and more thickly intertwined with small roots than at other plots (Appendix E), but this would not appear to be a contributing factor regarding the observed mortality. Based on discussions with the testing laboratory and on the toxicity test report (Appendix C), conditions during the 14-day test appear to have been the same for SS-703 as for the other samples.

The toxicity test laboratory noted that sample SS-703 was moldy at test termination. It is uncertain whether this mold was a normal by-product of the decaying process or was due to fungi present in the sample. ASTM (1998) guidelines note that fungi can influence toxicity test results.

Physicochemical properties such as soil moisture, pH, CEC, TOC, and grain size can interfere with toxicity tests. Soil moisture was not a contributing factor because each soil sample was hydrated to 75 percent of its water holding capacity prior to test initiation. Soil grain size in SS-703 (Table 3-2) was similar to that in other samples.

Soil CEC does not appear to have been a factor in the observed mortality. CEC is a measure of a soil's ability to hold positively charged ions (cations) such as lead. If lead is electrostatically retained onto soil particles instead of leaching downward in the soil, then the lead would be more available for exposure to biota. According to the testing laboratory, a low CEC (<5 meq/100g) indicates a soil is sandy and low in organic matter, and cannot hold many cations, while a high CEC (>25 meq/100g) indicates a soil has a high clay content and/or high organic matter content, and can hold many cations. Addition of organic material will increase a soil's CEC. The relatively high CEC values from Site 15 (Table 3-1) are probably due to the samples being a mixture of sandy soil and the overlying organic duff layer as per the work plan; the CEC values would undoubtedly be much lower if the samples had consisted of mineral soil only.

In summary, the CEC value for SS-703 is not low, and is not believed to be a factor in the observed mortality of earthworms.

Sandy soils in Florida pine flatwoods habitats are typically acidic (Abrahamson and Hartnett, 1990). All soil samples in this investigation were acidic with pH values ranging from 3.0 to 4.9. The pH in sample SS-703 was 3.0, and the TOC in this sample (4.07 percent) was also one of the lower values measured in Site 15 samples. The low pH combined with the somewhat low organic carbon content might have resulted in lead or other chemicals being more bioavailable than in other samples. This speculation is partially supported by TOC data. Below is a summary of the soil samples with lead concentrations greater than 1,000 mg/kg.

Sample	Soil Lead (mg/kg)	Soil pH	Soil TOC	BAF
SS-703	1,400	3.0	4.07%	0.115
SS-704	3,380	3.0	5.37%	0.037
SS-706	5,470	3.5	2.53%	0.210
SS-707	3,080	3.0	12.1%	0.004
SS-708	2,200	3.4	9.3%	0.246

Earthworm mortality in toxicity tests occurred only in samples SS-703 and SS-706, the two samples with relatively low TOC and elevated soil lead concentrations. The maximum soil-to-invertebrate BAF is in SS-708, but earthworm survival in this sample was 100%.

In summary, it is unclear whether the 100 percent mortality in SS-703 was due to lead toxicity, other chemicals, fungi, a combination of these factors, or unknown factors.

4.1.1.1.3 Conclusions

The work plan stated that toxicity test data would be statistically analyzed to determine the no-observed-adverse-effect concentration (NOAEC) and the lowest-observed-adverse-effect concentration (LOAEC). Furthermore, backward elimination stepwise regression analysis was to have been used to determine which parameters accounted for the variability in survival between samples. Independent variables in the regression analysis were to have been lead concentrations, PAH concentrations, soil pH, soil CEC, soil TOC, and soil grain size. However, there were no "partial responses" (i.e., no samples in which survival was between 0 and 100 percent); therefore, the nature of the data precludes statistical analyses of the toxicity test results.

One hundred percent of test organisms died in SS-706 (5,470 mg/kg). Because this sample had the greatest lead concentration in the investigation, it is assumed that the mortality was due to lead toxicity.

The occurrence of 100 percent mortality in SS-703 (1,400 mg/kg lead), while 100 percent of test organisms survived in three samples with greater lead concentrations (2,200 to 3,380 mg/kg), cannot be totally explained. The lethargy noted in surviving organisms from most samples is not believed to be related to lead toxicity because lethargy was also noted in all worms in two of three reference samples. For these reasons, the toxicity test NOAEC and LOAEC cannot be determined.

Conservatively assuming that the toxicity test mortality at 1,400 mg/kg was due to lead toxicity, then the LOAEC would be 1,400 mg/kg and the NOAEC would be 894 mg/kg, which is the lead concentration in SS-708A. The geometric mean of the NOAEC and LOAEC is often used as a "toxicity threshold" when evaluating toxicity test results. The geometric mean of these two values is 1,119 mg/kg.

Because it is unclear whether the earthworm mortality at 1,400 was due to lead toxicity, an alternate approach is to assume that the LOAEC was 5,470 mg/kg (lead concentration in SS-706), and the NOAEC was 3,380 mg/kg (lead concentration in SS-704). The toxicity threshold based on the geometric mean of these two values is 4,300 mg/kg.

4.1.1.2 Diversity and Abundance of Soil Invertebrates

As stated in the introduction to Section 4.1.1, the assessment endpoint associated with invertebrates at Site 15 is the survival of soil invertebrate populations typical in pine flatwoods habitat. The use of earthworms to represent other soil invertebrates introduces some uncertainty into a risk assessment; therefore, a risk question pertinent to this assessment is as follows (TtNUS, 2001):

- At what soil concentration does lead at Site 15 cause (or potentially cause) reduced diversity and abundance of soil invertebrates?

The measurement endpoint for this risk question is the diversity and abundance of soil invertebrates collected from a gradient of lead concentrations at Site 15 and from three reference locations. The invertebrate diversity and abundance data were collected to evaluate the likelihood that site-related lead concentrations are adversely impacting the soil invertebrate community.

Centipedes were present in all plots. Spiders (*Araneida*), scarab beetles (*Scarabidae*), roaches (*Blatellidae*), and click beetles (*Elateridae*) were present in most plots. Other invertebrate taxa were sporadically present (Table 3-5). The abundance of invertebrates, especially those classified as generalist predators and detritivores, was highly variable among sampling plots (Table 3-4 and Figure 3-3). Because habitat characteristics can affect the diversity and abundance of soil invertebrates, the sampling locations were selected such that habitat characteristics were similar among locations to the

maximum practical extent. Nevertheless, no two plots were *exactly* alike, and the diversity and abundance data could be due to a variety of habitat conditions.

As discussed in the work plan, the data collection methods for invertebrate diversity and abundance were not designed for definitive statistical analyses. Instead, the diversity and abundance data were intended to be visually analyzed and used in a "lines of evidence" approach to assess the likelihood that site-related lead toxicity is occurring. Nevertheless, scatter plots comparing the invertebrate data to soil lead concentrations and to various physical soil factors have been generated (Appendix F). Abundance was not correlated with any of these factors. The total biomass (grams) of soil invertebrates tended to increase with increasing TOC (Appendix F).

The total number of invertebrates was lowest in SS-706 (n=14), but was also low (n=16 to 18) in four samples with low soil lead concentrations. Predatory invertebrates might be exposed, through feeding, to lower lead concentrations than herbivores or detritivores. SS-703 was the only sample with no detritivores. The sum of herbivores plus detritivores was lowest in SS-706 (n=1), and was also low in SS-703 (n=3) and SS-704 (n=4). However, one reference sample (SS-739) also had a low number of herbivores and detritivores (n=5). Caution should be taken in the interpretation of the diversity data because the sampling was somewhat biased toward predators and against herbivores and detritivores. Most predators were centipedes and were relatively large and easily seen as they attempted to flee. Most herbivores and detritivores, however, tend to be camouflaged and "freeze" when alarmed.

4.1.2 Risk to Avian and Mammalian Receptors

As discussed in the work plan (TtNUS, 2001), the assessment endpoints for birds and mammals at Site 15 are as follows:

- Growth and reproduction of residential and migratory avian populations typical in pine flatwoods habitat.
- Growth and reproduction of mammalian populations typical in pine flatwoods habitat.

An important distinction pertaining to these two assessment endpoints above is that lead in soil could potentially cause adverse impacts to birds and mammals *directly* through ingestion of contaminated prey and *indirectly* through a reduced food supply (which could result from a toxicity-related decline in prey populations). This discussion focuses on potential direct impacts. Potential indirect impacts are discussed in Section 4.1.1.

Based on the conceptual model and the above assessment endpoints, the associated risk question involving lead contamination at Site 15 is as follows (TtNUS, 2001):

- At what soil concentration does the ingestion of lead at Site 15 cause (or potentially cause) adverse effects to avian and mammalian receptors?

The measurement endpoint for determining the soil concentration at which the ingestion of lead causes adverse effects to avian and mammalian receptors is concentrations of lead in soil and in soil invertebrates collected from the site. The purpose of the invertebrate tissue analyses was to measure lead concentrations in prey items consumed by the species associated with the assessment endpoints. This allows the development of soil-to-invertebrate BAFs for Site 15 with which soil remedial goals protective of avian and mammalian receptors can be calculated. Following the work plan, the mockingbird (*Mimus polyglottus*) was used to represent insectivorous and vermivorous avian receptors at Site 15, and the least shrew (*Cryptotis parva*) was used to represent insectivorous and vermivorous mammalian receptors at Site 15. The term "vermivorous" refers to worm-eating organisms, while "insectivorous" refers to insect-eating organisms. However, most animals that consume worms also consume adult and larval insects and other arthropods, and no animals at Site 15 are strictly vermivorous. Therefore, in this document, the term "insectivorous" will be used for brevity to denote animals whose primary prey is a combination of worms, insects, and other arthropods.

The work plan describes in detail how soil concentrations (i.e., soil PRGs) will be developed that pose acceptable risks to birds and mammals that prey upon soil invertebrates at Site 15. As discussed in the work plan, there are uncertainties associated with each of the following four factors:

- Bioavailability (absorption fraction) of lead
- Incidental ingestion of soil
- Avian food Items
- Soil-to-invertebrate BAF

The following subsections briefly discuss these factors and present values that were used to develop PRGs. The values were based on available literature, conditions at Site 15, and extensive discussions with representatives of the Navy, U.S. EPA Region IV, and the Florida Department of Environmental Protection. A brief description of how dry weight food ingestion values were derived is also included. The final subsection presents the resulting soil PRGs.

4.1.2.1 Bioavailability of Lead

The bioavailability of lead after ingestion depends upon a variety of factors, including the chemical form of lead, the species of organism, and the age, sex, and nutritional status of the individual (Eisler, 1988).

Because relevant bioavailability data do not exist for birds and mammals at Site 15, lead was conservatively assumed to be 100 percent bioavailable.

4.1.2.2 Incidental Ingestion of Soil

Terrestrial animals can ingest lead in soil while grooming fur, preening feathers, digging, grazing close to the soil, or feeding on items to which soil has adhered or contain soil (such as earthworms). Soil ingestion rates are not available for the mockingbird or for closely related avian species. The soil ingestion rate of the wild turkey (*Meleagris gallopavo*) has been estimated to be 9.3 percent of the diet (Beyer et al, 1994). Wild turkeys, however, spend much more time on the ground surface, and forage on nuts and seeds on the ground to a larger extent than the mockingbird or most other perching (Order Passeriformes) birds. Thus, the wild turkey would probably consume more soil than perching birds represented by the mockingbird.

The estimated fractions of soil in wildlife diets are derived from measuring the acid-insoluble ash content of scats or digestive tract contents. Soil in scats and digestive tracts is the result of all the sources mentioned above (grooming, digging, earthworm gut contents, etc). However, the lead data from whole-body invertebrates analyzed in this investigation represents not only lead that was biologically incorporated into invertebrate tissues, but also includes lead in soil adhering to, and within the gut of, the invertebrates. Thus, lead in soil adhering to invertebrates and within the gut of invertebrates is included in the invertebrate analytical data, and in effect would be counted twice if standard literature-derived soil ingestion data are utilized. In addition, invertebrates in the soil/duff layer at Site 15 are primarily arthropods, while earthworms were not commonly observed (Appendix D). Arthropods presumably contain less soil in their digestive tracts than do earthworms. Thus, birds at Site 15 would consume less soil than birds at locations where earthworms are more prevalent. Soil ingestion rates at Site 15 for insectivorous birds represented by the mockingbird cannot be quantified with existing data, but it was assumed that 5.0 percent of the mockingbird diet consists of soil; this value appears to be a reasonable approximation based on the factors discussed above.

An accurate soil ingestion rate is difficult to determine for the least shrew. U.S. EPA (2003) estimates that 3.0 percent of a shrew's diet is soil. This value is the 90th percentile of data from analyses of gastrointestinal (GI) tracts of short-tailed shrews (Blarina spp.) (U.S. EPA, 2003). However, the diet of the nine-banded armadillo (*Dasypus novemcinctus*), which also consumes a variety of soil invertebrates, has been reported to consist of approximately 17 percent soil (Beyer et al, 1994). Soil ingestion rates for shrews at Site 15 cannot be quantified with existing data, but it was assumed that 5.0 percent of the shrew diet consists of soil.

4.1.2.3 Avian Food Items

The average non-soil portion of the mockingbird's diet is approximately 50 percent invertebrates and 50 percent fruit (Derrickson and Breitwisch, 1992). During the breeding season, however, the mockingbird's diet is almost completely insectivorous. The avian PRG was calculated by assuming that the non-soil portion of the mockingbird's diet consists of 75 percent invertebrates and 25 percent fruit. As discussed in the work plan, lead concentrations in fruit (e.g., berries) is probably insignificant, and thus, lead was assumed to be absent in the fruit portion of the diet.

4.1.2.4 Soil-To-Invertebrate BAFs

The BAF based on the regression equation was 0.14 (Figure 3 2). This value is very near the upper end of the range of BAFs from the 12-sample data set, and exceeds 10 of 12 BAFs (Table 3-3). Because the BAF data approximated an exponential relationship rather than a linear one, the median of the 12-sample data set (0.050) is also a legitimate value to represent site-wide conditions.

For this evaluation, it was conservatively assumed that insectivorous birds represented by the mockingbird would forage throughout Site 15. The median BAF, which was assumed to represent site-wide conditions, was used to derive a soil PRG protective of insectivorous birds.

Small insectivorous mammals represented by the least shrew forage over much smaller areas than birds. The home range of the least shrew is approximately 2 acres (Choate and Fleharty, 1973). The median BAF and the regression-derived BAF were used to derive soil PRGs for insectivorous mammals, resulting in two PRGs for consideration by risk managers.

4.1.2.5 Food ingestion

Food ingestion values for insectivorous birds and mammals were converted to dry weight values assuming a moisture content of 71 percent in food items, which is the average moisture content of earthworms (84 percent), adult beetles (61 percent), and crickets and grasshoppers (69 percent) (U.S. EPA, 1993). For the least shrew, the 3.3 gram/day food ingestion value presented in the work plan was converted to 0.957 g/day as follows: 3.3 g/day (fresh weight) x 0.29 (dry matter in food) = 0.957 g/day (dry weight). The mockingbird dry weight total food ingestion was 6.72 g/day. This value was obtained by dividing the mockingbird field metabolic rate by the metabolizable energy available in food of avian insectivores (121 kJ/day ÷ 18 kJ/g = 6.72 g/day) (Nagy et al 1999). Since 75 percent of the mockingbird's diet is assumed to consist of invertebrates (see Section 4.1.2.3), and lead concentrations were assumed to be negligible in other food items, then a mockingbird would consume 5.04 g/day invertebrates (6.72 g/day x 0.75 = 5.04 g/day).

4.1.2.6 Soil PRGs for Insectivorous Birds and Mammals

Based on the values discussed above, the soil PRG for insectivorous birds is 1127 mg/kg. The soil PRG for insectivorous mammals is 2512 mg/kg using a BAF of 0.14, and 4716 mg/kg using a BAF of 0.05 (Table 4-1). Appendix G presents the spreadsheets used to calculate the values in Table 4-1.

4.2 PAHs

As discussed in the work plan, the potential toxicity of PAHs via the terrestrial food web is negligible at the concentrations present at Site 15. Thus, toxicity to upper level receptors such as mammals and birds is not expected and is not evaluated in this investigation. However, some PAHs are toxic to soil invertebrates at concentrations that will remain after the human health remediation at Site 15 is completed. Soil invertebrates are primary prey items for a variety of birds and mammals, and thus, reduced populations of soil invertebrates could impact populations of upper level receptors by decreasing their food supply. Because soil invertebrates are the primary receptors at risk from PAHs at Site 15, the risk questions, assessment endpoints, and measurement endpoints are similar to those described for lead in Section 4.1.1.

4.2.1 Survival of Soil Invertebrates

The only two soil samples in which mortality occurred in toxicity tests were SS-703 and SS-706. PAHs were not detected in SS-703. The concentration of total PAHs in SS-706 was 959 µg/kg (Table 3-1). This concentration is less than the U.S. EPA Region IV ecological screening value for total PAHs (1,000 µg/kg). PAHs were elevated in several samples and were especially high in SS-701 (620,730 µg/kg), SS-721 (395,700 µg/kg), SS-734 (629,150 µg/kg) and SS-726A (1,121,520 µg/kg) (Table 3-1). The absence of mortality in the toxicity test at total PAH concentrations as high as 1,121,520 µg/kg indicates that the mortality in SS-706 was not due to PAHs. As discussed in Section 4.1.1.1.2, the mortality in SS-706 is believed to be due to lead toxicity. Furthermore, the absence of mortality in the toxicity test at elevated PAH concentrations indicates that the soils were not acutely toxic to earthworms under the conditions of the toxicity tests. Based on the results of the toxicity tests, the NOAEC for total PAHs was 1,121,520 µg/kg, the highest total PAH concentration tested.

The NOAEC for total PAHs would be greater than 1,121,520 µg/kg if values representing non-detected PAHs had been used to calculate total PAH concentrations. Total PAH concentrations are often calculated using a pre-determined value to represent non-detected individual PAHs; one-half the detection limit is typically used. Total PAH concentrations in this investigation were calculated as the sum of *detected* PAHs only and thus would be higher than those shown in Table 3-1 if total PAH values had

been calculated using one-half (or any other fraction) of the detection limit for non-detected PAHs. For example, the maximum concentration of total PAHs was measured in SS-726A, but six PAHs were not detected in this sample (Appendix A). The 1,121,520 µg/kg value, therefore, is a conservative estimate of the NOAEC.

4.2.2 Diversity and Abundance of Soil Invertebrates

Invertebrate diversity and abundance were not correlated with PAH concentrations. The greatest PAH concentrations were in samples SS-701, SS-721, SS-726A, and SS-734; diversity in these samples was similar to that in other samples. The total abundance of invertebrates in SS-701, SS-721, and SS-734 exceeded the site-wide average and equaled the site-wide average in SS-726A. The invertebrate population data do not appear to be correlated with PAH concentrations (See scatter plot, Appendix F).

5.0 SUMMARY AND CONCLUSIONS

This document evaluates data and characterizes ecological risk at Site 15, Naval Air Station Cecil Field, Jacksonville, Florida, and is based on sampling conducted in June 2001. The outcome of the risk characterization process is a range of ecologically-based PRGs for lead and PAHs at the site. The site investigation, data evaluation, and risk characterization procedures were based on U.S. EPA's 8-step process for designing and conducting ecological risk assessments (U.S. EPA, 1997). The site-specific methods for this process are contained in the final work plan (TtNUS, 2001) that has been approved by representatives of the Navy, U.S. EPA Region IV, and the Florida Department of Environmental Protection. Potential risk to soil invertebrates and to insectivorous mammals and birds from exposure to lead and potential risk to soil invertebrates from exposure to PAHs were evaluated.

5.1 Soil Invertebrates

For lead and PAHs, the assessment endpoint associated with invertebrates at Site 15 was the survival of soil invertebrate populations typical in pine flatwoods habitat. Invertebrate survival was examined through soil toxicity tests and measurement of the diversity and abundance of invertebrate populations.

Toxicity tests using laboratory-reared earthworms were conducted using 24 soil samples from Site 15 representing a range of lead and PAH gradients and from three reference locations. No earthworms died at the maximum total PAH concentration of 1,121,520 µg/kg. All earthworms died in the samples with soil lead concentrations of 5,470 and 1,400 mg/kg, while all earthworms survived in other samples (including three samples with soil lead concentrations of 2,200 to 3,380 mg/kg).

The diversity and abundance of soil invertebrates were evaluated by collecting, identifying, and enumerating invertebrates from 10-foot by 15-foot plots at each soil sampling location. The toxicity test results combined with the invertebrate population data indicate that risk posed by PAHs in soil is negligible at concentrations of up to 1,121,520 µg/kg.

Risk to invertebrates from lead in soil is evident at the highest concentration in this investigation (5,470 mg/kg). There is no indication of lead-related impacts at concentrations less than 1,120 mg/kg. There is uncertainty regarding lead-toxicity at soil concentrations between these two values. It appears, however, that concentrations in this range might pose risk to invertebrates when the soil TOC is less than approximately 4 percent.

5.2 Insectivorous Birds

The soil PRG for lead protective of insectivorous birds is 1127 mg/kg (site-wide average lead concentration). Because insectivorous birds forage over large areas, this value is intended as a site-wide remediation goal.

5.3 Insectivorous Mammals

The characterization of lead-related risk to insectivorous mammals is complicated by uncertainty regarding the most appropriate soil-to-invertebrate BAF. The work plan for this investigation (Appendix A) stated that the BAF would be derived using regression analysis from the 12 corresponding soil and tissue samples, if the correlation was significant. The regression analysis indicated that the correlation was significant, but a more detailed evaluation of the data indicated that the data approximated an exponential relationship rather than a linear one. Moreover, the soil data, tissue data, and the BAFs are all lognormally distributed. Thus, the median value is also a legitimate BAF for use in deriving an ecological PRG. The two BAFs result in two PRGs for consideration by risk managers: 2,512 mg/kg (based on the regression-derived BAF) and 4,716 mg/kg (based on the median BAF). Because the home range of insectivorous mammals represented by the least shrew is approximately 2 acres, both of these PRGs are intended to apply to 2-acre average lead concentrations.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, October.

Abrahamson, W.G. and D.C. Hartnett, 1990. *Pine Flatwoods and Dry Prairies*, in Myers, R. L. and J. J. Ewel (eds.), 1990, *Ecosystems of Florida*, University of Central Florida Press, Orlando, Florida.

ASTM (American Society for Testing and Materials), 1998. Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests With the Lumbricid Earthworm *Eisenia Fetida*). E 1676-97, West Conshohocken, Pennsylvania.

Choate, J. R. and E. D. Fleharty, 1973. Habitat preference and spatial relations of shrews in a mixed grassland in Kansas. Southwestern Naturalist 18:110-112.

Choate, J.R., J.K. Jones, Jr., and C. Jones, 1994. Handbook of Mammals of the South-Central States, Louisiana State University Press, Baton Rouge, Louisiana, pp 304.

Derrickson, K. C. and Breitwisch, 1992. Northern mockingbird. In: *The Birds of North America,* No. 7 (A. Poole, P. Stettenheim, and F. Gill, eds.). Philadelphia, the Academy of Natural Sciences, Washington, D.C.: The American Ornithologists' Union.

Dasmann, R.F., 1981. Wildlife Biology. John Wiley & Sons, Inc., New York, New York, pp 212.

Eisler, R., 1988. Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. USFWS Biological Report 85(1.14).

Rohlf, F.J. and R.R. Sokal, 1969. Statistical Tables. W.H. Freeman and Company, San Francisco, California.

Sample, B.E., M.S. Alpin, R.A. Efroymson, G. W. Suter II, and C.J.E. Welsh, 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. ORNL/TM-13391. Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Stone, C.L., M.R.S. Fox, and K.S. Hogye, 1981. Bioavailability of lead in oysters fed to young Japanese quail. Environmental Research, 26: 409-421.

TtNUS (Tetra Tech NUS, Inc.), 2001. Development of Ecologically-Based Remediation Goals for Lead and PAHs in Soil, Site 15, Blue 10 Ordinance Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, June.

U.S. EPA (U.S. Environmental Protection Agency). 2003. Guidance for Developing Ecological Soil Screening Levels. OSWER Directive 92857-55. Office of Solid Waste and Emergency Response, Washington, D.C. August.

U.S. EPA (U.S. Environmental Protection Agency), 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, June 5, Edison, New Jersey.

U.S. EPA (U.S. Environmental Protection Agency). 1993. Wildlife Exposure Factors Handbook: Volumes I and II. EPA/600/R-93/187. U.S. EPA Office of Research and Development, Washington, D.C.

U.S. EPA, 1986. *Air Quality Criteria for Lead. Vol. I of IV,* Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA-600/8-83/028aF, Cited in Risk Assessment Information System website, Toxicity Profiles, Lead; http://risk.lsd.ornl.gov/tox/profiles/lead.htm

Wixson, B. G. and B. E. Davies, 1993. *Bioavailability of Lead for Animals*, Lead in Soil Task Force Recommended Guidelines, Society for Environmental Geochemistry and Health. Science Reviews, 132 pp.

TABLE 3-1

DATA SUMMARY
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample	Soil Lead Conc. (mg/kg)	Soil PAH Conc. (µg/kg)	Invertebrate Lead Conc. (mg/kg)	Total Number of Invertebrates	Soil Moisture (percent)	Soil pH	Soil CEC (meq/100g)	Soil TOC (mg/kg)	Toxicity tests: Lethargic worms at day 14?
SS-701	419	620730	5.2	48	25.8	3.6	23.3	63300	Yes (all)
SS-703	1400	340 U	46.5	32	20.6	3.0	21.8	40700	all dead
SS-704	3380	1305	36.7	21	18.8	3.0	25.4	53700	Yes (all)
SS-706	5470	959	333	14	18.3	3.5	20.6	25300	all dead
SS-707	3080	500 U	3.8	80	32.9	3.0	34	121000	Yes (all)
SS-707A	672	490 U	1.7	52	31.6	3.0	41.8	119000	Yes (all)
SS-708	2200	15099	157	49	40.4	3.4	38.9	93000	No
SS-708A	894	370 U	3.5	20	28.1	3.6	34	98600	Yes (all)
SS-709	709	906	11.6	41	16.6	3.0	23.3	30400	Yes (all)
SS-717	120	320 U	3.7	37	15.9	3.0	23.1	32900	Yes (all)
SS-719	66.3	9425	0.7	36	23.0	3.1	18.2	37100	No
SS-719A	97.8	1144	1.7	16	26.7	4.4	42.8	80500	No
SS-721	102	395700	NA	45	23.7	3.7	23.8	58600	No
SS-722	23.4	370 U	NA	20	28.7	3.5	29.2	68600	Yes (all)
SS-724	31	2191	NA	18	18.7	3.0	21.6	49200	Yes (all)
SS-726A	532	1121520	NA	38	15.2	4.9	24.1	28000	Yes (some)
SS-727A	283	16396	NA	17	14.0	3.6	15.6	31300	No
SS-728A	84.8	50337	NA	54	22.5	4.0	24.1	54100	Yes (some)
SS-732	214	5403	NA	18	22.5	3.7	20	53600	No
SS-733	336	89717	NA	37	18.5	4.1	31	43000	Yes (some)
SS-734	73	629150	NA	66	19.7	3.4	26.7	48500	Yes (all)
SS-735A	40.6	1308	NA	54	14.8	3.3	23.8	53900	Yes (all)
SS-736A	0.73 U	420 U	NA	43	36.5	3.5	44.8	137000	Yes (all)
SS-737	45.8	4958	NA	53	29.2	3.4	28.6	42100	Yes (all)
SS-739[a]	11.4	400 U	0.16 U	45	33.8	3.5	23.7	59700	No
SS-740[a]	9.3	430 U	0.16 U	26	22.4	3.0	25.3	55000	Yes (all)
SS-741[a]	7.8	190 U	0.16 U	53	30.8	3.4	29.2	71500	Yes (all)

Conc: Concentration.
CEC: Cation exchange capacity.
TOC: Total organic carbon.
NA: Not applicable; invertebrate tissue analysis not conducted in this sample.
U = Not detected at or above detection limit (associated value).
a Reference sample.

TABLE 3-2

SOIL GRAIN SIZE DISTRIBUTION
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample	% Medium Sand[a]	% Fine Sand[b]	% Very Fine Sand[c]	% Silt and Clay[d]
CEF-015-SS-701	11.0	55.0	33.0	1.0
CEF-015-SS-703	6.0	55.0	35.0	4.0
CEF-015-SS-704	6.0	56.0	36.0	2.0
CEF-015-SS-706	4.0	50.0	39.0	7.0
CEF-015-SS-707	12.0	55.5	31.0	1.5
CEF-015-SS-707A	13.0	55.0	29.0	3.0
CEF-015-SS-708A	25.0	40.0	25.0	10.0
CEF-015-SS-708	10.0	53.0	34.0	3.0
CEF-015-SS-709	18.0	36.0	38.0	8.0
CEF-015-SS-717	5.0	53.0	39.0	3.0
CEF-015-SS-719	6.0	55.0	37.0	2.0
CEF-015-SS-719A	11.0	54.0	31.0	4.0
CEF-015-SS-721	7.0	55.0	35.0	3.0
CEF-015-SS-722	6.0	57.0	35.0	2.0
CEF-015-SS-724	9.0	56.0	33.0	2.0
CEF-015-SS-726A	7.5	56.3	33.1	3.1
CEF-015-SS-727A	4.7	55.8	36.7	2.8
CEF-015-SS-728A	6.0	53.0	38.0	3.0
CEF-015-SS-732	15.0	49.0	30.0	6.0
CEF-015-SS-733	5.5	57.0	35.0	2.5
CEF-015-SS-734	14.0[e]	49.0	35.0	2.0
CEF-015-SS-735A	5.0	54.5	37.5	3.0
CEF-015-SS-736A	23.0	58.0	18.0	1.0
CEF-015-SS-737	10.0	55.9	32.6	1.5
CEF-015-SS-739	12.0	53.2	33.1	1.7
CEF-015-SS-740	9.0	50.0	39.0	2.0
CEF-015-SS-741	16.0	48.0	34.0	2.0

a Percentage of sample passing through 2.0 mm sieve and retained on 0.25 mm sieve.
b Percentage of sample passing through 0.25 mm sieve and retained on 0.15 mm sieve.
c Percentage of sample passing through 0.15 mm sieve and retained on 0.075 mm sieve.
d Percentage of sample passing through 0.075 mm sieve.
e 14.0 % value for this sample actually consisted of 6% coarse sand (passed through 4.75 mm sieve and retained on 2.0 mm sieve) and 8% medium sand; course sand was absent from all other samples.

TABLE 3-3

SOIL-TO-INVERTEBRATE BAIOACCUMULATION FACTORS (BAFs) FOR LEAD
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample[a]	Invertebrate Lead Concentration (mg/kg wet weight)	Invertebrate Lead Concentration (mg/kg dry weight)[b]	Soil Lead Concentration (mg/kg dry weight)	BAF[c]
SS-707	3.8	13.1	3080	0.004
SS-707A	1.7	5.9	672	0.009
SS-708A	3.5	12.1	894	0.013
SS-719	0.7	2.4	66.3	0.036
SS-704	36.7	126.6	3380	0.037
SS-701	5.2	17.9	419	0.043
SS-709	11.6	40.0	709	0.056
SS-719A	1.7	5.9	97.8	0.060
SS-717	3.7	12.8	120	0.106
SS-703	46.5	160.3	1400	0.115
SS-706	333	1148.3	5470	0.210
SS-708	157	541.4	2200	0.246

a Samples are arranged so that BAFs are in ascending numerical order.
b Dry weight concentrations were derived assuming 71 percent moisture content in invertebrates.
c BAF = invertebrate lead concentration (dry weight) ÷ soil lead concentration

TABLE 3-4

SUMMARY OF INVERTEBRATE ABUNDANCE BY FUNCTIONAL ROLE
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample	Generalist Predators	Specialist Predators	Omnivores	Herbivores	Detritivores	Unknown	Total Abundance	Total Mass (g)
SS-701	38	0	0	4	6	0	48	3.7
SS-703	27	0	0	3	0	2	32	2.3
SS-704	16	0	0	1	3	1	21	2.6
SS-706	13	0	0	0	1	0	14	0.9
SS-707	60	0	0	1	14	5	80	6.6
SS-707A	35	0	0	7	6	4	52	3.9
SS-708	33	0	1	3	12	0	49	1.4
SS-708A	13	0	0	3	4	0	20	2.3
SS-709	26	0	0	4	8	3	41	2.6
SS-717	26	0	0	4	6	1	37	2.2
SS-719	26	0	0	3	6	1	36	2.7
SS-719A	9	0	0	4	1	2	16	5.2
SS-721	20	0	1	5	16	3	45	NA
SS-722	14	0	0	2	4	0	20	NA
SS-724	9	0	0	2	4	3	18	NA
SS-726A	21	0	0	1	10	6	38	NA
SS-727A	10	0	0	3	4	0	17	NA
SS-728A	37	0	2	5	9	1	54	NA
SS-732	8	0	0	0	9	1	18	NA
SS-733	23	0	0	1	10	3	37	NA
SS-734	49	0	0	1	14	2	66	NA
SS-735A	35	0	1	5	13	0	54	NA
SS-736A	27	1	0	1	11	3	43	NA
SS-737	38	0	0	0	14	1	53	NA
SS-739	40	0	0	1	4	0	45	2.3
SS-740	16	0	1	1	8	0	26	1.8
SS-741	30	0	0	0	21	2	53	2.7
Average	25.9	0.04	0.2	2.4	8.1	1.6	38.3	2.9
SD	13.1	0.2	0.5	1.9	5.1	1.7	17.0	1.5

Ants were not enumerated and are not included above (as per work plan).
NA: Mass of invertebrates was not determined from PAH-gradient sample plots.
SD: Standard deviation

TABLE 3-5

INVERTEBRATE ABUNDANCE BY TAXON
SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

TAXON	SS-701	SS-703	SS-704	SS-706	SS-707	SS-707A	SS-708	SS-708A	SS-709	SS-717	SS-719	SS-719A	SS-721	SS-722
Predators														
Anthocoridae	-	1	-	-	4	-	-	-	1	1	-	1	-	-
Araneida	-	4	3	4	5	4	4	-	2	6	2	1	12	4
Carabidae	-	-	-	1	3	1	2	-	-	-	-	-	-	-
Cicindelidae	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Cleridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithobiomorpha	4	10	3	5	3	10	21	4	5	11	1	-	-	1
Mantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opiolones	1	-	-	-	1	-	-	-	-	-	-	-	1	
Reduviidae	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Scolopendromorpha	33	12	10	2	43	20	6	9	18	6	23	7	7	9
Scorpiones	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Omnivores														
Formicidae[b]	A	P	P	P	P	P	P	A	P	P	P	P	A	P
Melandryidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Staphylinidae	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Herbivores														
Cicadidae	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Lygaeidae	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Miridae	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Scarabidae	4	2	1		1	7	1	3	4	3	3	3	5	2
Tettigonidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitrinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Detritivores														
Blatellidae	2	-	2	-	5	4	9	3	3	3	-	-	11	-
Diplipoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elateridae	4	-	1	-	6	1	-	1	2	2	5	1	3	2
Gryllidae	-	-	-	1	2	-	3	-	3	-	1	-	-	2
Helodidae	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Hydrophilidae	-	-	-	-	-	1	-	-	-		-	-	-	-
Isopoda	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lumbricidae	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Silphidae	-	-	-	-	1	-	-	-	-	-	-	-	1	-
Tabanidae[c]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	-	2	1	-	5	4	-	-	3	1	1	2	3	-
Total Abundance	48	32	21	14	80	52	49	20	41	36	36	16	45	20

TABLE 3-5

INVERTEBRATE ABUNDANCE BY TAXON
SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

TAXON	SS-724	SS-726A	SS-727A	SS-728A	SS-732	SS-733	SS-734	SS-735A	SS-736A	SS-737	SS-739[a]	SS-740[a]	SS-741[a]
Predators													
Anthocoridae	-	-	-	2	-	-	6	9	-	1	-	-	-
Araneida	2	8	2	2	2	4	5	6	3	3	-	1	3
Carabidae	-	1		2		3	5	2	-	2	-	-	2
Cicindelidae	-	-	-	-	-	-	-	-	1	-	-	-	-
Cleridae	-	-	-	-	-	-	-	-	1	-	-	-	-
Lithobiomorpha	2	1	4	2	-	5	11	3	1	7	21	2	-
Mantidae	-	-	-	-	-	-	-	-	-	-	1	-	-
Opiolones	-	-	-	3	-	-	3	3	-	4	-	-	2
Reduviidae	-	-			1		-	-	-	-	-	-	-
Scolopendromorpha	5	11	4	26	5	10	19	12	22	21	18	13	23
Scorpiones	-	-	-	-	-	1	-	-	-	-	-	-	-
Omnivores													
Formicidae[b]	P	P	P	A	P	A	P	A	P	P	P	P	P
Melandryidae	-	-	-	-	-	-	-	-	-	-	-	1	-
Staphylinidae	-	-	-	2	-	-	-	1	-	-	-	-	-
Herbivores													
Cicadidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Lygaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Miridae	-	-	-	-	-	-	-	-	-	-	-	-	-
Scarabidae	2	1	2	5	-	1	1	4	1	-	1	1	-
Tettigonidae	-	-	1	-	-	-	-	-	-	-	-	-	-
Vitrinidae	-	-	-	-	-	-	-	1	-	-	-	-	-
Detritivores													
Blatellidae	1	7	-	6	5	6	12	11	9	3	1	3	4
Diplipoda	-	-	-	-	-	2	-	-	-	-	-	-	-
Elateridae	3	2	1	-	-	2	2	2	1	10	2	5	17
Gryllidae	-	-	1	-	1	-	-	-	1	1	1		-
Helodidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydrophilidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopoda	-	-	-	-	2	-	-	-	-	-	-	-	-
Lumbricidae	-	-	1	3	1	-	-	-	-	-	-	-	-
Silphidae	-	-	1	-	-	-	-	-	-	-	-	-	-
Tabanidae[c]	-	1	-	-	-	-	-	-	-	-	-	-	-
Unknown	3	6	-	1	1	3	2	-	3	1	-	-	2
Total Abundance	18	38	17	54	18	37	66	54	43	53	45	26	53

a Reference location.
b Formicidae (ants) noted as present (P) or absent (A) but not enumerated as per work plan.
c Tabanidae (horse fly) is a detritovore only in larval stage.
d Egg sacks were not included in enumeration of individual taxa or total number;egg sacks were observed in the following plots:
SS-706: Blatellidae (n=2); Araneida (n=1)
SS-707: Blatellidae (n=1)
SS-707A: Blatellidae (n=2)
SS-717: Blatellidae (n=1)
SS-722: Araneida (n=1)

TABLE 4-1

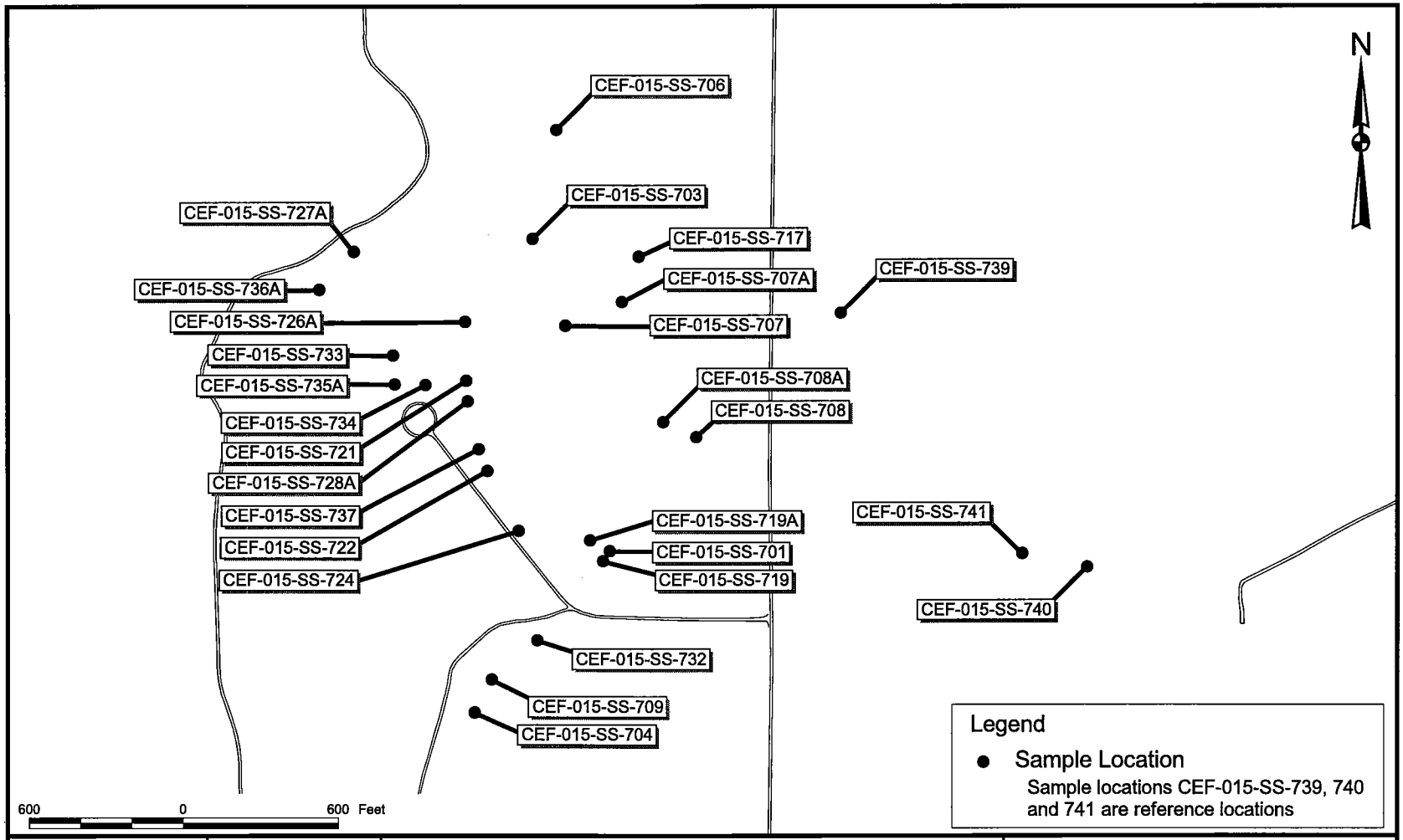
PRELIMINARY REMEDIATION GOALS FOR LEAD
MAMMALIAN AND AVIAN RECEPTORS
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Representative Receptor	BAF	PRG (mg/kg)
Mammal (shrew)	0.14	2512
	0.05	4716
Bird (mockingbird)	0.05	1127

BAF: Soil-to-invertebrate bioaccumulation factor

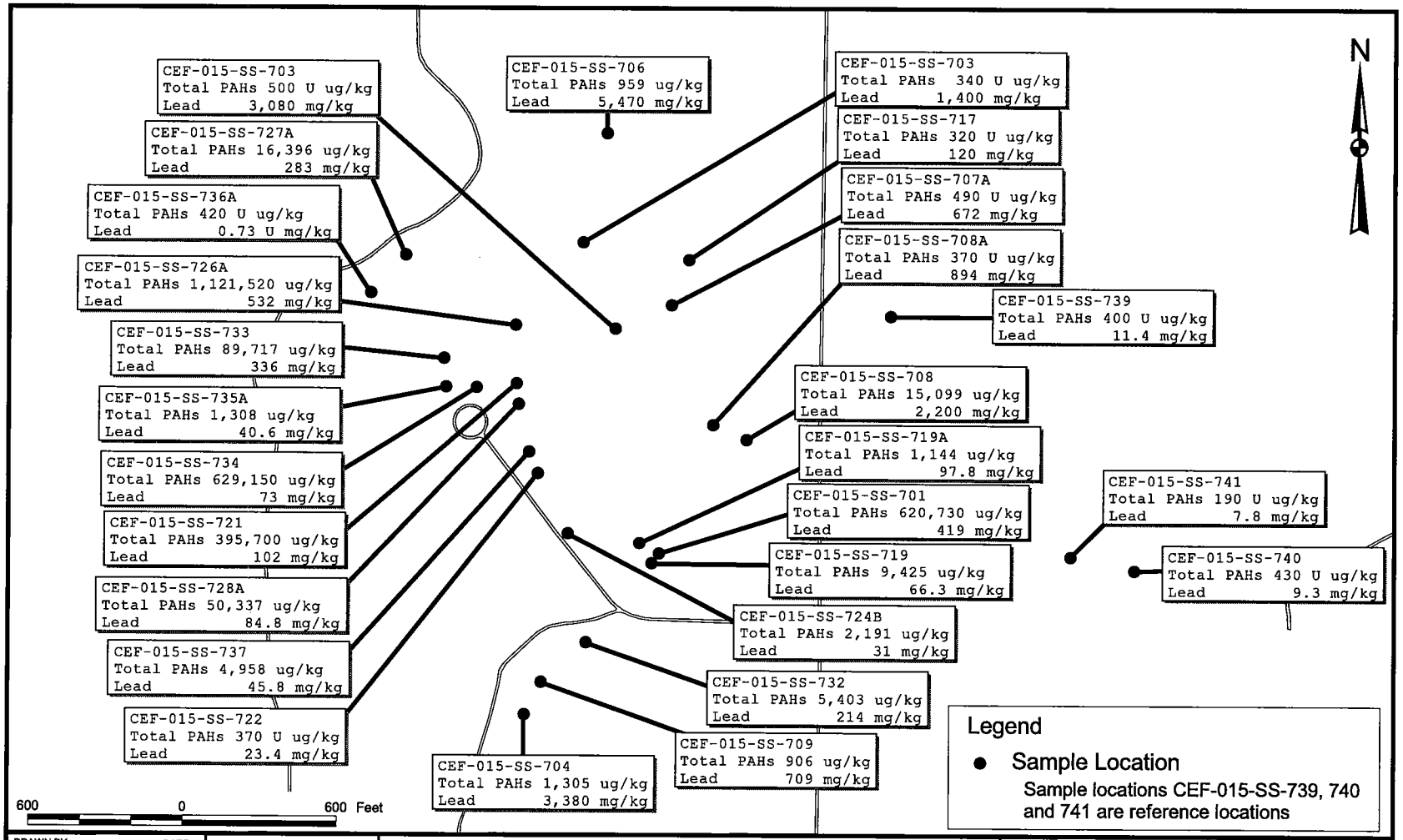
PRG: Preliminary remediation goal

See text for explanation of values used and associated assumptions.



DRAWN BY	DATE			CONTRACT NUMBER 7653	
MJJ	19Dec00		SAMPLE LOCATIONS	APPROVED BY —	DATE —
CHECKED BY —	DATE —		SITE 15	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			NAS CECIL FIELD	DRAWING NO. FIGURE 2-1	REV 0
SCALE AS NOTED			JACKSONVILLE, FLORIDA		

P:\GIS\NAS_CecilField\Site-15_eco.apr 18Sep01 MJJ Layout3



DRAWN BY	DATE
MJJ	25Aug01
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

LEAD AND TOTAL PAH CONCENTRATIONS IN SOIL SAMPLES

SITE 15

NAS CECIL FIELD

JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
7653	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3-1	REV 0

P:\GIS\NAS_CecilField\Site-15_eco.apr 18Sep01 MJJ Layout2

FIGURE 3-2

INVERTEGRATE LEAD CONCENTRATION AS A FUNCTION OF SOIL LEAD CONCENTRATON
SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

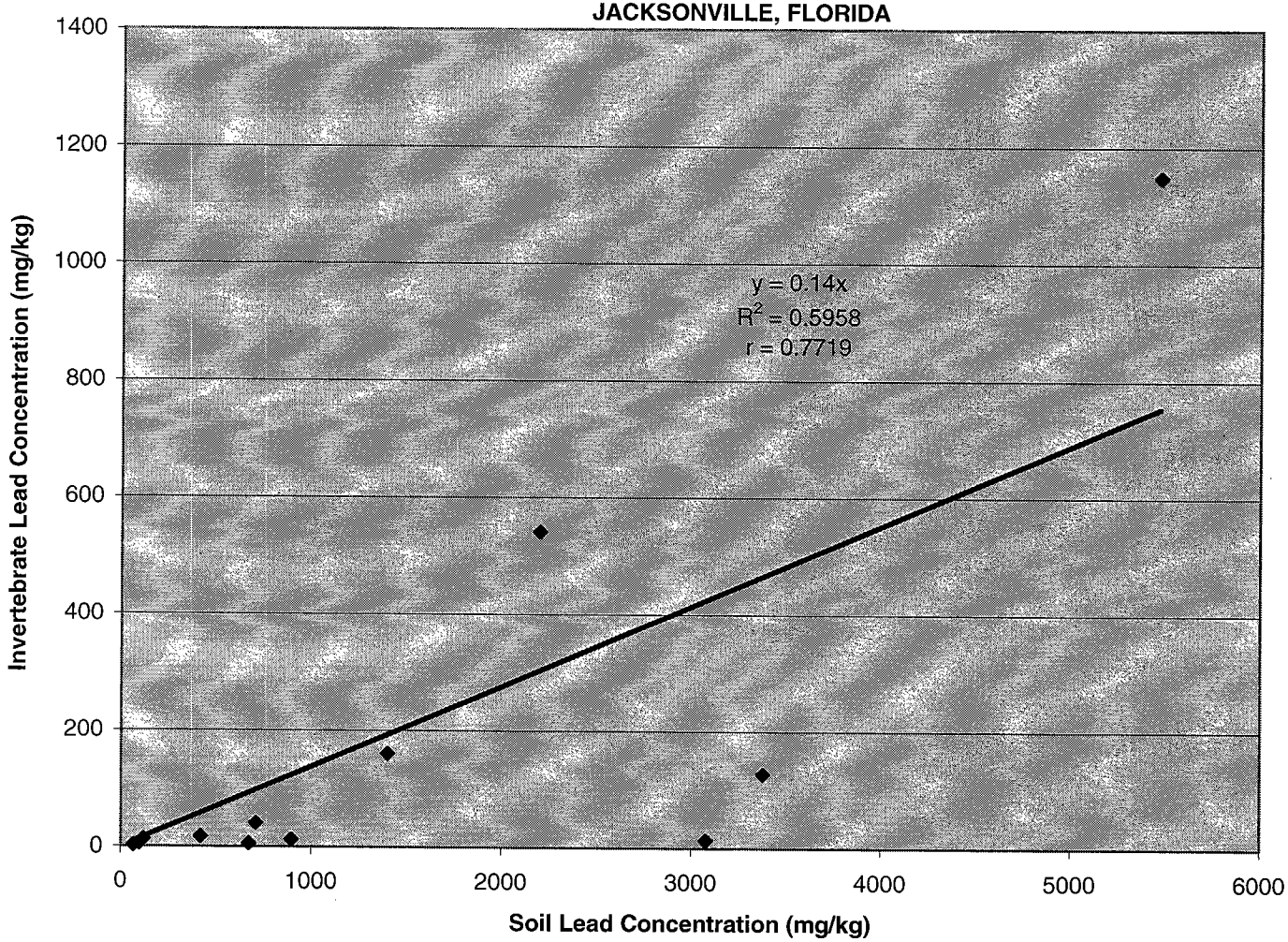
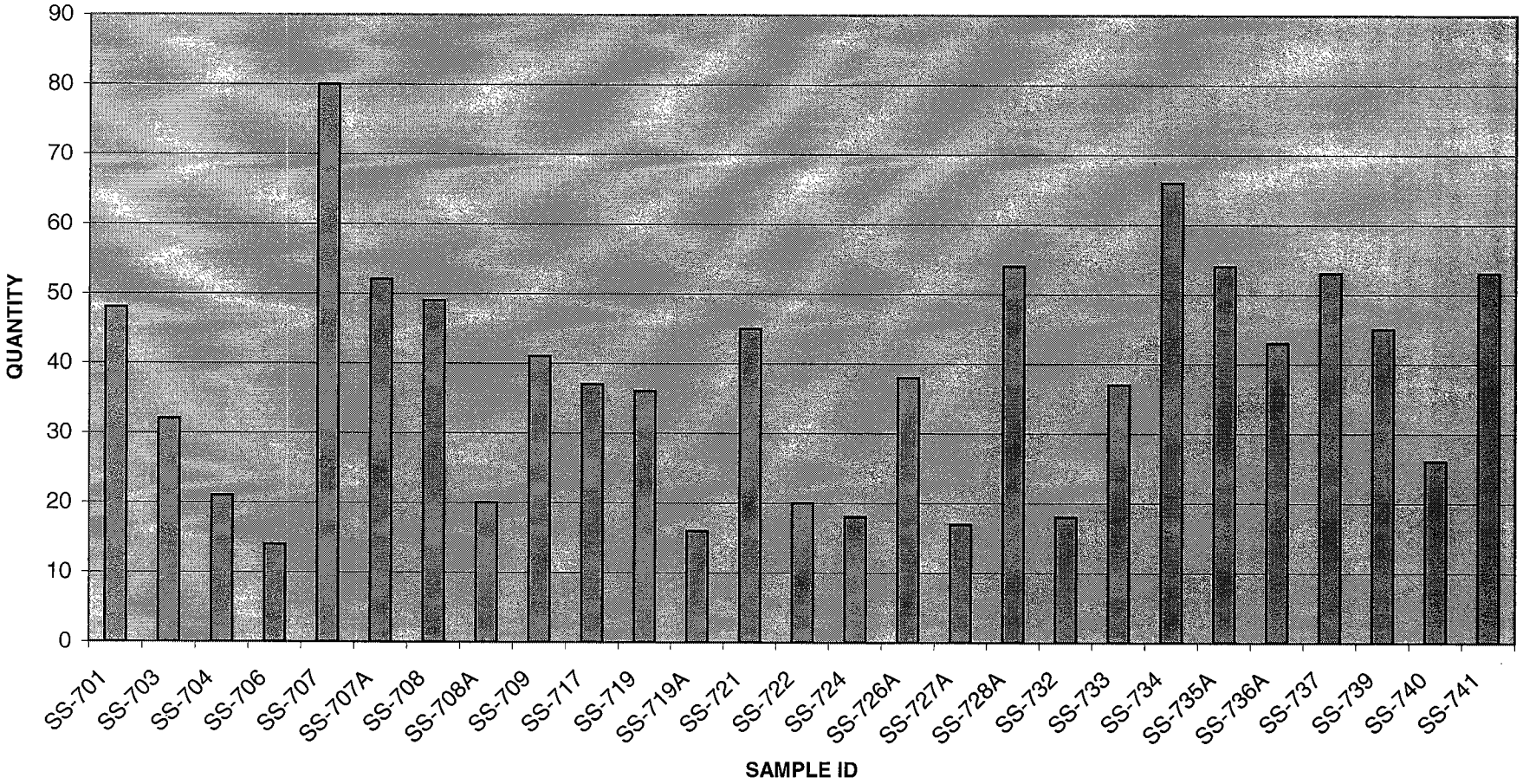


FIGURE 3-3

TOTAL NUMBER OF INVERTEBRATES BY SAMPLING PLOT
SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA



APPENDIX A

WORK PLAN AND SAMPLING AND ANALYSIS PLAN

Development of Ecologically-Based Remediation Goals for Lead and PAHs in Soil

Site 15, Blue 10 Ordnance Disposal Area

Naval Air Station Cecil Field

Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888
Contract Task Order 0078

June 2001

DEVELOPMENT OF ECOLOGICALLY-BASED REMEDIATION GOALS FOR LEAD AND PAHs IN SOILS

FOR

SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

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

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0078

JUNE 2001

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DEVELOPMENT OF ECOLOGICALLY-BASED REMEDIATION GOALS FOR LEAD AND PAHs IN SOIL SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

1.0 INTRODUCTION

Previous sampling of media at Site 15 conducted in support of an ecological risk assessment has shown that lead and polycyclic aromatic hydrocarbons (PAHs) in surface soil in some portions of the site may pose risk to ecological receptors (ABB, 1997). Additional sampling at Site 15 has further characterized locations of elevated lead and PAHs in soil at the site. Site-specific preliminary remediation goals (PRGs) for soil at Site 15 are needed so that risk managers can evaluate remedial options.

This report describes how ecologically-based PRGs will be developed for lead and PAHs at Site 15. The methodologies described herein have been approved by representatives of the Navy, the U.S. Environmental Protection Agency (EPA) Region IV, and the Florida Department of Environmental Protection in a teleconference on May 11, 2001.

The development of PRGs requires the creation of a conceptual site model that addresses the physical characteristics and ecological receptors at the site, complete exposure pathways that will be evaluated, assessment endpoints, risk questions, and measurement endpoints. Each of these topics is discussed herein.

2.0 THE CONCEPTUAL SITE MODEL

This section describes the conceptual site model for Site 15 and begins with a description of the habitats and ecological receptors at the site.

2.1 Habitat Types and Ecological Receptors

Site 15 covers approximately 85 acres in the northern portion of NAS Cecil Field. The majority of the site consists of pine flatwoods (Figure 1). This habitat type is characterized by flat topography, acidic, sandy soil, an overstory of pines, an extensive low shrub stratum, and a variable but often sparse herbaceous layer (Abrahamson and Hartnett, 1990). Planted slash pine (*Pinus elliottii*) is the dominant tree species at the site. The understory in some portions of this habitat is a thick layer of shrubs dominated by saw palmetto (*Serenoa repens*) and gallberry (*Ilex glabra*), while in other areas the understory is sparsely vegetated. A 1 to 5 inch layer of decaying organic matter (i.e., detritus, duff) covers the surface throughout most of the pine flatwoods habitat. Trees were harvested from an area at the eastern portion of the site in 1997. A large portion of the pine flatwoods south and west of the paved entrance road was

burned by a forest fire in 1999; this area was subsequently clear-cut, is now largely devoid of trees and shrubs, and consists mostly of logging debris.

Other habitats at the site include mesic pine/hardwoods, a narrow strip of floodplain forest, and a depressional area that was formerly a cypress dome swamp (Figure 1). The floodplain forest is located along a wet-weather stream that drains the southern portion of the site, and is dominated by oaks (*Quercus spp.*), red bay (*Persea borbonia*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and blackgum (*Nyssa sylvatica*). Major understory species here include saw palmetto, gallberry, *Vaccinium spp.*, and wild grape (*Vitis rotundifolia*). The mesic pine/hardwoods habitat occurs where the floodplain forest merges with the pine flatwoods, and is composed of plants typically found in the latter two habitats. A shallow circular depression covering approximately ¾ acre is located in the eastern portion of the site. This area appears to have been a cypress dome swamp in the past, but now consists of bare ground except for a few scattered bald cypress (*Taxodium distichum*) trees. Yellow jessamine (*Gelsemium sempervirens*), myrtle-leaf holly (*Ilex myrtifolia*), and saw palmetto are scattered around the edge of the depression. The depression has been dry during site visits by Tetra Tech NUS biologists. Drainage ditches north and northwest of the site have apparently altered the hydrology, so that appreciable surface water runoff into this area no longer occurs, and the depression presumably rarely (if ever) contains surface water.

Based on several site visits by Tetra Tech NUS biologists, Site 15 appears to be typical of other pine flatwoods habitats in northern peninsular Florida. As such, the site provides habitat for several species of vertebrate receptors. Numerous bird species such as the brown-headed nuthatch (*Sitta pusilla*), prairie warbler (*Dendroica discolor*), pine warbler (*Dendroica pinus*), rufous-sided towhee (*Pipilo erythrophthalmus*), mockingbird (*Mimus polyglottus*), and red-bellied woodpecker (*Melanerpes carolinus*) have been observed on the site. Mammals such as the white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), gray squirrel (Sciurus carolinensis), nine-banded armadillo *(Dasypus novemcinctus*), Eastern cottontail (Sylvilagus floridanus), and Eastern mole (*Scalopus aquaticus*) are known to utilize the site. Based on current habitat and known geographic range, mammals such as the cotton mouse (*Peromyscus gossypinus*), cotton rat (*Sigmodon hispidus*), Southern short-tailed shrew (*Blarina carolinensis*), Southeastern shrew (*Sorex longirostris*), and least shrew (*Cryptotis parva*) are expected to be present. Amphibians and reptiles such as the oak toad (*Bufo quercicus*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*) probably occur on the site.

Previous observations at Site 15 and at nearby reference locations indicate that invertebrates are scarce in soils deeper than one to three inches below the top of the mineral horizon, presumably due to the typically low organic mater content of the sandy soils in pine flatwoods (Abrahamson and Hartnett, 1990).

However, a variety of invertebrates (e.g. beetles, spiders, centipedes, millipedes, and termites) have been observed at Site 15 in the organic duff layer and at the interface between the duff layer and mineral soil. (Note: The remaining text uses the term "soil invertebrates" to include invertebrates in the mineral soil as well as those in the organic duff layer).

2.2 Contaminant Sources

Site 15 was used as a trap and skeet range during the 1940s and 1950s. A second shooting area possibly existed south of the access road (ABB, 1997). Lead shot from the trap and skeet range is the primary source of lead contamination in soils at the site. Soil concentrations of lead are elevated in some portions of the site, with a maximum concentration of approximately 65,000 mg/kg.

A metal chamber near the center of Site 15 was used to incinerate ordnance from the mid 1960s through 1977. Ash resulting from the burned ordnance was presumably deposited in various areas in the vicinity of the burn chamber (ABB, 1997). Soil concentrations of PAHs are elevated in some portions of the site, with a maximum concentration of approximately 12,000 mg/kg. The source of elevated PAHs at the site is assumed to be the disposal of ash from the burn chamber and/or fragments of "clay pigeons" used as targets on the former trap and skeet range. A study at one trap and skeet range showed that clay pigeons were comprised of 32 percent petroleum pitch, which consisted of several PAHs (Baer et al, 1995).

2.3 Migration Pathways

Surface soil is considered to be the only significant exposure medium for ecological receptors at Site 15. Previous sampling and analyses have shown that infiltration of contaminants into groundwater and subsequent discharge of groundwater contaminants into surface water is negligible at the site (ABB, 1997). Overland flow and surface runoff are minor due to the overall flat character of the site. Furthermore, the forest cover and duff layer throughout most of the site minimizes erosion as a migration pathway. In addition, aquatic habitat at the site is negligible. A wet-weather stream is located in the southern portion of the site, and a second wet-weather stream is in the extreme western portion of the site. However, these two streams are dry except after recent rain events, and permanent aquatic habitats have not become established therein. For the above reasons, site-related contaminants are relatively stationary in soil, and soil is the only significant exposure medium.

2.4 Exposure Pathways

2.4.1 Lead

Soil invertebrates are directly exposed to lead in soil at Site 15. Terrestrial animals can be exposed to site-related lead contamination through ingestion of contaminated food items. Animals can also incidentally ingest lead in soil while grooming fur, preening feathers, digging, grazing close to the soil, or

feeding on items to which soil has adhered. Absorption of lead from the gastrointestinal tract is the primary pathway of intake for terrestrial receptors, and chronic exposure to lead can produce adverse neurological, gastrointestinal, respiratory, immunological, and reproductive (fetal and maternal) effects (Eisler, 1988).

Ingestion of lead shot can be acutely toxic to birds, but previous studies at Site 15 indicate that relatively few lead pellets remain in the soil. Specifically, 36 soil samples were collected and sieved through a No. 20 sieve to remove pelletized lead shot (ABB, 1997). Each of the samples was analyzed for lead before and after sieving. Lead concentrations in the sieved samples were within 16 percent (average difference) of the lead concentrations in the unsieved samples. The authors concluded that most of the lead shot had oxidized (ABB, 1997). Based on the ABB study, and since no pelletized lead shot has been observed by Tetra Tech NUS biologists during previous site visits, lead shot is assumed to be largely absent from surficial soils. Therefore, exposure to lead in soil at Site 15 is considered to be primarily chronic, rather than acute.

Soil invertebrates at the site undoubtedly serve as food items for vermivorous, insectivorous, and omnivorous mammals and birds that are known or expected to occur at Site 15. These mammals include the Eastern mole, nine-banded armadillo, Southern short-tailed shrew, Southeastern shrew, least shrew, cotton mouse, and others. (Note: "vermivorous" refers to worm-eating organisms. However, most animals that consume worms also consume adult and larval insects and other arthropods, and no animals at Site 15 are strictly vermivorous. Thus, the term "vermivorous/insectivorous" will be used herein to denote animals whose primary prey is a combination of worms, insects, and other arthropods). Numerous species of birds prey upon soil invertebrates at the site; examples include the bobwhite quail (*Colinus virginianus)*, mockingbird, American robin (*Turdus migratorius*), and rufous-sided towhee. Invertebrates in lead-contaminated soils are known to accumulate lead (Eisler, 1988), and the exposure pathway of soil to invertebrates to animals that prey on invertebrates is assumed to be the primary pathway of exposure to lead at Site 15 (Figure 2). This pathway includes toxicity to soil invertebrates and toxicity to birds and mammals that prey upon soil invertebrates.

The contaminant pathway at Site 15 is admittedly more complex than the simplified pathway shown in Figure 2. For example, lead in soil can reduce plant growth and photosynthesis. Lead in soil can also be taken up via plant roots, transported through the vascular system, and deposited in foliage; the foliage can then provide lead exposure to herbivorous mammals as well as to insects and subsequently to insectivorous birds and mammals. Senescent foliage on the ground is colonized by fungi, which are foraged upon by mites and other tiny arthropods; these are preyed upon by larger arthropods such as nematodes and spiders, which are consumed by birds and mammals. Reptiles and amphibians can be exposed to lead through activities such as consuming lead-contaminated insects and other organisms.

Upper level carnivores such as hawks, owls, foxes, and weasels can ingest lead through the consumption of lead-contaminated prey items (e.g., reptiles, amphibians, vermivorous/insectivorous birds and mammals). As EPA (1997) points out, however, it is frequently possible to reduce the number of exposure pathways that need to be evaluated to one or a few critical exposure pathways. Furthermore, it is not practical or necessary to directly evaluate risks to all of the individual components of the ecosystem (EPA, 1997). The exposure pathway of soil to invertebrates to animals that prey on invertebrates represents a sensitive and ecologically important pathway. It is sensitive because soil invertebrates are in constant contact with the contaminated medium (*i.e.*, soil), and invertebrates are known to be vulnerable to lead toxicity. This pathway is ecologically important because site-related lead toxicity can adversely impact not only the invertebrate community, but can also adversely impact populations of vermivorous/insectivorous birds and mammals. Reduced populations of vermivorous/insectivorous birds and mammals would result in fewer prey items for carnivorous animals that consume the vermivorous/insectivorous animals, and thus, populations of carnivorous animals might be reduced as an indirect result of impacts to the invertebrate community.

The pathway of soil to vegetation to herbivorous animals is likely complete, but lead ingestion for invertebrate-eating mammals and birds will be higher than lead ingestion for herbivorous and omnivorous mammals. At least two factors are responsible for this. First, lead accumulation in plants is usually less than accumulation in invertebrates (Sample et al, 1998a; ORNL, 1998). Second, food ingestion rates of insectivorous/vermivorous mammals such as shrews and moles are greater than food ingestion rates of herbivorous and omnivorous mammals (Table 1). Moles and shrews have high metabolic rates (Brown, 1997), so their food ingestion rates are greater than food ingestion rates of herbivorous and omnivorous rodents. Therefore, the soil-to-herbivore pathway will not be investigated because the remediation goals will be developed using the more highly exposed receptors.

Lead usually does not biomagnify in food chains (Eisler, 1988), and lead concentrations in prey items of vermivorous/insectivorous mammals and birds will be greater than in prey items of large carnivores. For example, mean and median soil-to-earthworm uptake factors for lead were 3.342 and 0.266, respectively, in a review of several published literature studies (Sample et al, 1998a), while mean and median soil-to-small mammal uptake factors for lead were 0.1615 and 0.1054, respectively, in a review of several published literature studies (Sample et al, 1998b). Ingestion of food containing biologically incorporated lead is unlikely to cause clinical signs of toxicity in birds of prey (Eisler, 1988; Custer *et al*, 1984; Henny *et al*, 1994). Lead tends to be deposited in bones, but bones are not digested by owls, and are only partially digested by hawks and falcons before being regurgitated in pellets (Henny *et al*, 1994). In summary, the soil-to-carnivore pathway will not be investigated because the remediation goals will be developed using more highly exposed and sensitive receptors.

2.4.2 PAHs

PAHs show little tendency to biomagnify in the food web (Eisler, 1987). U.S. EPA Region IV considers the potential toxicity of PAHs via the terrestrial food web to be generally negligible unless PAHs are present at extremely high concentrations (i.e., percent levels: 10,000 mg/kg) in soil. Risks to human health from carcinogenic PAHs at Site 15 have been evaluated, and preliminary human-health remediation goals have been generated; the maximum concentration of total PAHs expected at Site 15 after human health-based remediation of carcinogenic PAHs is 746 mg/kg. Because this value is well below percent levels, toxicity to upper level receptors is not expected and will not be further evaluated.

Some PAHs are toxic to soil invertebrates at concentrations that will remain after the human health remediation. For example, in a toxicity study of fluorene, a concentration of 170 mg/kg was lethal to 50 percent of the earthworms used in the test (Neuhauser *et al*, 1986). Since soil invertebrates are primary prey items for a variety of birds and mammals, reduced populations of soil invertebrates could impact populations of upper level receptors by decreasing their food supply. The soil-to-invertebrate pathway is assumed to be the primary pathway of exposure to PAHs at Site 15 (Figure 2). Adverse impacts to plants from PAHs are rare (Eisler, 1987) and risks to plants from PAHs will not be evaluated.

3.0 ASSESSMENT AND MEASUREMENT ENDPOINTS

An assessment endpoint is "an explicit expression of the environmental value that is to be protected", while a measurement endpoint is "a measurable ecological characteristic that is related to the valued characteristic chosen as the assessment endpoint" (EPA, 1997). Measurement endpoints represent the assessment endpoints chosen for a site, and are measures of biological effects (EPA, 1997). The appropriate selection of assessment and measurement endpoints is critical for the evaluation of ecological risks and the establishment of remediation goals. A discussion of assessment endpoints, risk questions, and measurement endpoints for lead is presented below, and is followed by a similar discussion for PAHs.

3.1 Lead

3.1.1 Assessment Endpoints

Based on the conceptual model for Site 15, assessment endpoints for lead have been developed for soil invertebrates, birds, and mammals. Soil invertebrates serve as prey for rodents, shrews, moles, and birds, which are preyed upon by carnivores such as hawks, owls, foxes, weasels, and bobcats. Thus, soil invertebrates are vital components of the ecosystem at Site 15. With this in mind, the first assessment endpoint for lead at Site 15 is as follows:

- Survival of soil invertebrate populations typical in pine flatwoods habitat.

As mentioned above, birds and small mammals serve as prey items for carnivores such as hawks, owls, foxes, weasels, and bobcats. Thus, contaminant-related reduced populations of birds and small mammals could result in reduced populations of receptors higher in the food chain. With this in mind, the two remaining assessment endpoints for lead at Site 15 are as follows:

- Growth and reproduction of residential and migratory avian populations typical in pine flatwoods habitat.
- Growth and reproduction of mammalian populations typical in pine flatwoods habitat.

An important distinction pertaining to the latter two assessment endpoints above is that lead in soil could potentially cause adverse impacts to predators *directly* through ingestion of contaminated prey and *indirectly* through a reduced food supply (which could result from a toxicity-related decline in prey populations).

3.1.2 Risk Questions

Ecological risk questions are based on assessment endpoints and provide a basis for developing the study design (EPA, 1997). Based on the conceptual model and the assessment endpoints, the primary risk questions involving lead contamination at Site 15 are as follows:

- At what soil concentration does lead at Site 15 cause (or potentially cause) reduced survival of soil invertebrates?
- At what soil concentration does lead at Site 15 cause (or potentially cause) reduced diversity and abundance of soil invertebrates?
- At what soil concentration does the ingestion of lead at Site 15 cause (or potentially cause) adverse effects to avian and mammalian receptors?

3.1.3 Measurement Endpoints

The measurement endpoint for each of the lead-associated risk questions is provided below.

3.1.3.1 Survival of Soil Invertebrates

The measurement endpoint for the first risk question in Section 3.1.2 will be the survival of earthworms in 14-day laboratory toxicity tests using soil samples collected from Site 15 and a reference area. The purpose of the toxicity tests will be to determine if lead concentrations in site soil samples are correlated with mortality of the organisms associated with this assessment endpoint (i.e., soil invertebrates). The survival of laboratory-reared earthworms (*Eisenia fetida*) in site soil samples will be evaluated following standardized methods (ASTM, 1998). Survival will be measured at 14 days, since this is the typical duration of toxicity tests using *Eisenia fetida* when mortality is the endpoint (ASTM, 1998). Although

laboratory toxicity tests do not reflect actual field conditions, their use allows the control of factors such as temperature, moisture, predation, etc. that could confound conclusions regarding site-related contaminants.

Earthworms will be used to represent other soil invertebrates that occur on the site, since toxicity test methodologies using earthworms have been standardized, whereas toxicity tests using other invertebrates have not. Unfortunately, there are no data in the literature on the comparability of earthworms versus other terrestrial invertebrates regarding lead toxicity. However, earthworms are generally considered to be representative of soil invertebrates in ecological risk assessments (Sample *et al*, 1997). Earthworms have been shown to be more sensitive than insects to chemicals such as cadmium and PCBs (Parmelee *et al*, 1997), and many researchers have proposed that conclusions derived from earthworms should apply at least somewhat to other soil invertebrates (Beyer and Stafford, 1993). The uncertainty resulting from the lack of data on the comparability between earthworms and insects will be partially mitigated by the measurement endpoint discussed in Section 3.1.3.2.

Twelve samples will be collected from Site 15 for toxicity tests. This number of samples is expected to be sufficient to determine if lead concentrations in site soils are correlated with survival of earthworms in the toxicity tests, and will provide sufficient data for the measurement endpoint discussed in Section 3.1.3.2. Lead chemistry data from previous sampling events at Site 15 were used to identify a gradient of lead concentrations in surface soil represented by four intervals: 197 to 499 mg/kg, 500 to 999 mg/kg, 1,000 to 4,999 mg/kg, and >5,000 mg/kg. The 197 mg/kg value is the concentration indicative of background soil concentrations of lead at NAS Cecil Field (NAS Cecil Field Inorganic Background Data Set; HLA, 1998). The remaining interval boundaries were selected based on lead toxicity data in the literature. Existing PAH data were evaluated to select sampling locations with minimal expected PAH concentrations in order to minimize the possibility that PAHs would confound any conclusions regarding lead toxicity. Three soil samples in each lead concentration interval and three samples from the reference area will be collected for a total of 15 soil samples (Figure 3).

Soil samples collected for toxicity tests at Site 15 and at the reference location will consist of the first three inches of mineral soil plus the overlying duff layer atop the mineral horizon, since this is the predominant stratum in which soil invertebrates exist at the site. Each soil sample will consist of five composites from throughout 15 ft x 15 ft quadrats. The five composites will be homogenized in the field and split into sub-samples for chemical analyses and toxicity tests. Soil samples will be subjected to a quick laboratory turnaround (7 days maximum) for lead and total PAH analyses. Toxicity tests using Site 15 samples will be analyzed only when lead concentrations exceed 197 mg/kg (NAS Cecil background).

As explained above, the 12 locations from which samples will be collected for toxicity tests at Site 15 (Figure 3) are based on lead data from previous sampling events. However, most existing soil lead data from Site 15 are based on samples that were composites of 0 to 12 inches below the surface, while samples in the current study will consist of the upper 3 inches of soil plus the overlying duff layer. Therefore, the lead concentrations in the samples to be collected for toxicity tests could be greater or less than concentrations suggested by existing lead data. Because of this uncertainty, and since samples are desired from a gradient of lead concentrations, field-portable x-ray fluorescence (XRF) equipment will be utilized to select the sampling locations. Thus, the locations shown in Figure 3 can be considered as provisional.

The three reference samples will be collected from a forested area approximately 2,000 feet east of Site 15 (Figure 4). Existing soil types, vegetation, and habitats in this area are similar to those at Site 15. The XRF will be used to select three sample locations where lead concentrations are at or below 197 mg/kg (NAS Cecil background).

As explained above, the 12 soil samples collected for toxicity tests and chemical analyses at Site 15 will consist of the first three inches of mineral soil plus the overlying duff layer. At each of the 12 sampling locations, one additional soil sample will be collected and archived for possible future analyses of lead. These additional samples will consist of mineral soil only (no overlying duff) and will be composites of 0 to 12 inches below the surface.

3.1.3.2 Diversity and Abundance of Soil Invertebrates

The diversity and abundance of soil invertebrates will be evaluated by collecting soil invertebrates from a gradient of lead concentrations at Site 15 and from three locations at a reference area. The soil invertebrates will be collected simultaneously with, and from the same soil/duff stratum at the same 15 locations, as the soil samples that are collected for the soil toxicity tests (Section 3.1.3.1). After removing overlying leaves, limbs, and debris from the surface, invertebrates in the duff layer atop the mineral horizon will be collected by hand during a careful examination of surface litter from the 15 ft x 15 ft sampling quadrats. Invertebrate species that are not normally in close contact with soil and/or duff (e.g., butterflies, dragonflies, ticks) will not be collected.

Invertebrates will be classified to the genus level to the maximum practical extent. When this level of classification becomes excessively problematic for a qualified entomologist/taxonomist, classification to family level will be acceptable. Earthworms, however, will be classified simply as "earthworms". The number of invertebrates within each genus or family will be recorded at each 15 x 15 ft quadrat. Ants will not be enumerated; however, their presence will be noted and the number of mounds or colonies within each quadrat will be recorded. Habitat characteristics such as soil type, duff thickness, plant species

composition, and percent coverage of overstory, midstory, and understory layers of trees, shrubs, etc. will be recorded. Attempts will be made to select sampling locations such that habitat characteristics are similar among stations.

Many factors other than chemistry can affect the diversity and abundance of soil invertebrates. These factors include vegetation species and abundance in the vicinity, soil litter characteristics, amount of sunlight, weather events, and soil characteristics such as moisture, acidity, and organic matter content of the soil. In addition, since invertebrate populations vary seasonally, soil invertebrate surveys are frequently conducted throughout one full year, and often for two years. Surface crawling invertebrates are generally collected in pitfall traps made from buried cups, cans, jars, or troughs. Pitfall traps are usually checked once or twice each day, since less frequent collection allows samples to be preyed upon by organisms such as birds, small mammals, and fire ants. Invertebrates are often sorted into trophic groups such as fungivores, bacterivores, herbivores, omnivores, and predators. The invertebrate collection proposed for Site 15 is not intended to be such an exhaustive investment of time and resources. Instead, the diversity and abundance data will provide a "snapshot" of conditions during the approximately 10-day period in which sampling activities are conducted.

3.1.3.3 Impacts to Birds and Small Mammals

The measurement endpoint for determining the soil concentration at which the ingestion of lead causes adverse effects to avian and mammalian receptors will be concentrations of lead in soil and in soil invertebrates collected from the site. The purpose of the invertebrate tissue analyses is to measure lead concentrations in prey items consumed by the species associated with the assessment endpoints. This will allow the development of soil-to-invertebrate bioaccumulation factors (BAFs) for Site 15 with which soil remedial goals can be calculated (Section 4.1).

Lead concentrations will be measured in soil invertebrates and in co-located soil samples. The soil samples will be sub-samples of those collected for the soil toxicity tests (see Section 3.1.3.1), and the invertebrate samples will be those collected and described in Section 3.1.3.2. Thus, 15 soil and 15 invertebrate samples will be collected. The analytical laboratory selected for tissue analyses indicates that approximately 1.3 grams (g) of tissue will be required for lead analyses. Invertebrate tissues from Site 15 samples will be analyzed only when lead concentrations in co-located soil samples from Site 15 exceed 197 mg/kg (NAS Cecil background).

As mentioned in Section 3.1.3.1, soil samples will be collected from the top three inches of mineral soil and the duff atop the mineral soil. Since invertebrates are scarce in Site 15 soil at depths greater than approximately three inches below the surface, lead at deeper depths poses negligible risk to soil invertebrates and organisms that consume these invertebrates.

3.2 PAHs

3.2.1 Assessment Endpoints

As discussed in Section 2.4.2, the soil-to-invertebrate pathway is assumed to be the primary pathway of exposure to PAHs at Site 15. Invertebrates in soil serve as prey items for birds and many small mammals. Therefore, even though PAH-related toxicity to upper level receptors via the terrestrial food web is negligible, PAH-related toxicity to soil invertebrates could result in reduced populations of vermivorous/insectivorous birds and mammals at the site, which could result in reduced populations of carnivorous birds and mammals. For this reason, the assessment endpoint for PAHs at Site 15 is as follows:

- Survival of soil invertebrate populations typical in pine flatwoods habitat.

3.2.2 Risk Questions

Based on the conceptual model and the above assessment endpoints, the primary risk questions involving PAH contamination at Site 15 are as follows:

- At what soil concentrations do PAHs at Site 15 cause (or potentially cause) reduced survival of soil invertebrates?
- At what soil concentration do PAHs at Site 15 cause (or potentially cause) reduced diversity and abundance of soil invertebrates?

3.2.3 Measurement Endpoints

The measurement endpoint for each of the lead-associated risk questions is provided below.

3.2.3.1 Survival of Soil Invertebrates

The measurement endpoint for the first risk question in Section 3.2.2 will be the survival of earthworms in 14-day laboratory toxicity tests using soil samples collected from Site 15 and a reference area. The purpose of the soil toxicity tests will be to determine if PAH concentrations in site soil samples are correlated with mortality of the species associated with the assessment endpoint.

Fourteen-day survival of laboratory-reared earthworms (*Eisenia fetida*) in site soil samples will be evaluated following standardized methods (ASTM, 1998). The appropriateness of laboratory toxicity tests, and of using earthworms to represent other soil invertebrates, was discussed in Section 3.1.3.1.

Twelve samples will be collected from areas of elevated PAHs for toxicity tests. This number of samples is expected to be sufficient to determine if PAH concentrations in site soils are correlated with survival of earthworms in the toxicity tests. PAH data from previous sampling events were used to generate a

gradient of total PAH concentrations in surface soil represented by four intervals: 20,000 to 49,999 µg/kg, 50,000 to 499,999 µg/kg, and > 500,000 µg/kg.

Three soil samples in each PAH concentration interval and three samples from the previously mentioned reference area will be collected for a total of 15 soil samples (Figure 5). Existing lead data were evaluated to select locations with minimal expected lead concentrations so as to minimize the possibility that lead would confound any conclusions regarding PAH toxicity. Soil samples will be subjected to a quick laboratory turnaround (7 days maximum) for analyses of total PAHs and lead.

Soil samples will consist of the first three inches of mineral soil plus the duff layer atop the mineral horizon. Soil samples will consist of five composites from throughout 15 ft x 15 ft quadrats, and will be homogenized in the field and split into sub-samples for chemical analyses and toxicity tests.

3.2.3.2 Diversity and Abundance of Soil Invertebrates

The diversity and abundance of soil invertebrates will be measured by collecting soil invertebrates from a gradient of PAH concentrations at Site 15 and from three locations at a reference area. The diversity and abundance of invertebrates in the samples from Site 15 will then be compared to the results from the reference area. The methodology to be employed for data collection and evaluation will be the same as that discussed in Section 3.1.3.2.

4.0 DEVELOPMENT OF PRGs

If lead concentrations in all soil samples collected for this study are less than 197 mg/kg (NAS Cecil background value; HLA, 1998) further evaluation of lead and concomitant calculation of remediation goals will be considered unnecessary. The section below describes how PRGs will be developed for lead, and is followed by a description of how PRGs will be developed for PAHs.

4.1 Lead PRG Development for Soil Invertebrates

4.1.1 Toxicity Tests

The toxicity test data will be statistically analyzed to determine whether there are significant differences between survival in the Site 15 soil samples versus survival in the reference samples. The survival data will be analyzed using a commercial computer program, the details of which will be provided by the laboratory selected for the toxicity tests. All statistical analyses will be performed at the 0.05 probability level. Backward elimination stepwise regression analyses will be used to determine which parameters account for the variability in survival between samples. Independent variables included in the regression analyses will be lead concentrations, PAH concentrations, soil pH, soil cation exchange capacity (CEC), soil total organic carbon (TOC), and soil grain size.

If the lead concentrations are correlated with earthworm mortality in the toxicity tests, protective concentrations within the exposure-response curve can be identified. Specifically, the protective concentration is bounded by the no-observed-effect-concentration (NOEC) and the lowest-observed-effect-concentration (LOEC) from the toxicity tests. Therefore, remedial goals for consideration by the risk managers will consist of the NOEC and LOEC. If lead concentrations are not correlated with earthworm survival, remedial goals associated with the assessment endpoint for invertebrates will be evaluated using all available data in a lines of evidence approach.

4.1.2 Diversity and Abundance of Soil Invertebrates

The data collection methods for invertebrate diversity and abundance at the site are not designed for definitive statistical analyses. Instead, the analyses of diversity and abundance data will be qualitative only. Differences among locations along lead gradients, PAH gradients, and at reference locations will be evaluated by visually examining bar graphs of the data. If the diversity or abundance differs among sampling locations, all available data for the samples in question (*e.g.*, soil lead concentration, habitat characteristics) will be evaluated in a "lines of evidence" approach to assess the likelihood that site-related lead toxicity is occurring. No "decision point" will be generated by this qualitative analysis. Instead, the data will assist the risk managers in their evaluation of remedial options for Site 15.

4.2 Lead PRG Development for Birds and Small Mammals

The equation below describes potential risks to birds and mammals that prey upon soil invertebrates. The equation combines the hazard from the incidental ingestion of soil and the hazard from ingestion of contaminated prey.

$$HQ = [(C_s \times AUF \times SA_s \times AF \times F)/(TRV \times WR \times CF)] + [(C_{prey} \times FA \times AUF \times AF \times F)/(TRV \times WR \times CF)] \quad (1)$$

where:

HQ	=	hazard quotient
C_s	=	lead concentration in soil (mg/kg)
AUF	=	area use factor (portion of home range that overlaps impacted area)
SA_s	=	soil as a portion of diet
AF	=	absorption faction (unitless)
F	=	total amount of food plus soil consumed (mg/day)
TRV	=	toxicity reference value for lead (mg/kg/day)
WR	=	weight of receptor (kg)
CF	=	conversion factor (kg to mg)
FA	=	portion of diet consisting of invertebrates (1.0 minus soil portion of diet)
C_{prey}	=	lead concentration in invertebrates (mg/kg)

Equation # 1 will be used to calculate soil concentrations (i.e., soil PRGs) that pose acceptable risk to birds and mammals that prey upon soil invertebrates at Site 15. To do this, the lead concentration in invertebrates (C_{prey} in equation # 1) must be expressed as a function of the lead concentration in soil. Thus, C_{prey} is rewritten as C_s x BAF, where BAF is the soil-to-invertebrate bioaccumulation factor. By rearranging equation # 1 to solve for C_s, and setting the hazard quotient equal to 1.0, remediation goals will be calculated as follows:

$$C_S = \frac{TRV \times WR \times CF}{(AUF \times AF \times F) \times (SA_S + BAF \times FA)} \qquad (2)$$

The least shrew will be used to represent mammals that prey upon soil invertebrates at Site 15, and the northern mockingbird will be used to represent birds that prey upon soil invertebrates. These two species have a high probability of exposure to lead in soil at the site based on their diet and habitat preferences.

The northern mockingbird is a familiar songbird known to be present at Site 15. Mockingbirds in Florida are non-migratory and highly territorial throughout the year. Body mass averages 49 g (Derrickson and Breitwisch, 1992). The diet of adult mockingbirds is about 50 percent invertebrates (especially beetles, ants, bees, grasshoppers), and 50 percent fruit. The proportion of animal prey in the diet increases to approximately 85 percent during the breeding season and decreases in winter to approximately 13 percent (Derrickson and Breitwisch, 1992). Using Nagy's (1987) equation for passerine birds (commonly known as "song birds"), the expected food consumption for a mockingbird is 10.9 g dry mass/day. This equates to 37.6 g fresh mass/day based on 71 percent moisture content in food items. Average territory sizes of mockingbirds in south-central Florida varied from 0.31 ha (0.8 acres) in winter to 1.27 ha (3.1 acres) during the May and June breeding season (Derrickson and Breitwisch 1992).

The least shrew inhabits pine flatwoods and other habitats in Florida (Abrahamson and Hartnett, 1990; Brown, 1997), and is expected to be present at Site 15. It weighs about 3.5 to 6.5 g (Choate et al, 1994). This species uses runways and burrows of other animals, but also makes its own tunnels in loose, soft soils. Least shrews consume large numbers of insects and other invertebrates, and are food items for predators such as owls, hawks, weasels, and skunks (Brown, 1997). Using Nagy's (1987) equation for mammals, the expected food consumption of the least shrew is 0.954 g dry mass/day. This equates to 3.3 g fresh mass/day based on 71 percent moisture content in food items. The 71 percent moisture value is the average of moisture contents in earthworms (84 percent), crickets and grasshoppers (69 percent) and adult beetles (61 percent) (EPA, 1993). Home ranges for the least shrew usually vary from approximately 0.4-1.4 ha (1-3.5 acres) (Choate and Fleharty, 1973) but home ranges in some studies have been reported to be as small as 0.5 acre (Choate et al, 1994).

The BAF term in equation # 2, expressed as mg lead/kg tissue ÷ mg lead/kg soil, will be derived from lead concentrations in the 12 soil and corresponding invertebrate samples described in Section 3.1.3.3. Regression analyses will be used to derive the BAF. It is possible, however, that the correlation of soil and invertebrate lead concentrations will be poor. This could result from variable invertebrate composition among samples, or from other factors. If the correlation of soil and invertebrate lead concentrations is poor, the BAF used in equation # 2 will be represented by the mean of the BAFs derived from the 12 individual soil and corresponding invertebrate samples. The maximum BAF from the 12-sample data set will also be used to derive a worst case PRG.

Exposure parameters for the WR and F terms to be used in the above equation for the least shrew and mockingbird are summarized in Table 2.

An accurate SA_s term in equation # 2 is difficult to determine for the shrew. EPA (2000) estimates that three percent of a shrew's diet is soil. This value is the 90th percentile of data from analyses of gastrointestinal (GI) tracts of short-tailed shrews (*Blarina spp.*) collected in an area where earthworms were plentiful (EPA 2000; Sample, 2001), and thus, the shrews probably fed heavily on earthworms. Wildlife species whose diets consist largely of earthworms generally have high soil ingestion rates (EPA, 1993), since earthworms are typically 20-30 percent soil by weight (Beyer *et al*, 1994). Based on previous site visits, arthropods such as beetles, centipedes and millipedes probably comprise a considerably greater portion of the diets of small mammals than do earthworms. Soil ingestion rates for shrews at Site 15 cannot be quantified with existing data, but are probably less than the literature values for shrews. A value of 0.015 will be used as the SA_s term for the shrew; this value is approximately the mean (0.0156) of data for the short tailed shrew in EPA (2000), and appears to be a reasonable approximation based on the factors discussed above.

For similar reasons, an accurate soil ingestion rate for mockingbirds at Site 15 cannot be quantified with existing data. The soil ingestion rate in Table 2 for the mockingbird is based on GI tract data for the American woodcock (*Scolopax minor*), whose diet consists largely of earthworms and was 99 percent earthworms in one study (Beyer *et al*, 1994; EPA, 1993). The SA_s term in equation # 2 for the mockingbird will be assigned two values. In one scenario, a value of 0.02 will be used as the SA_s term for the mockingbird, and is derived following the approach of Sample and Suter (1994). Specifically, if the diet of the woodcock is 99 percent earthworms and 10.4 percent of the woodcock diet is soil (Beyer *et al*, 1994), then a mockingbird consuming 20 percent earthworms (a conservative upper estimate for Site 15), will consume 2 percent soil. In the second scenario, a value of 0.093 (9.3 percent) will be used as the SA_s term for the mockingbird. This value is the soil ingestion rate for the wild turkey (*Meleagris gallopavo*) based on data presented by Beyer *et al* (1994). Although the wild turkey is much larger than the

mockingbird, prey items for these two species are similar, and both species forage by visually locating prey in the soil litter.

The area use factor in equation # 2, calculated as the portion of the representative receptor's home range that overlaps the impacted area, will be assigned a value of 1.0 for the shrew and mockingbird. This assumes that the receptors spend 100 percent of their life on the site. This is a valid assumption for the least shrew, since its home range is 3.5 acres or less. Unfortunately, home range data for the mockingbird were not available. As discussed above, average territory sizes for this bird range from 0.8 to 3.1 acres. The term "territory" refers to the area occupied by an animal or group of animals that is forcibly defended against by intruders of the same species. The home range is the area within which an animal normally spends all, or most, of its time in the course of a season (Dasmann, 1981), and home ranges of birds are usually larger than their territories. For this evaluation, it will be conservatively assumed that Site 15 encompasses the home range of the mockingbird.

No-observed-adverse-effect-levels (NOAELs) and lowest-observed-adverse-effect-levels (LOAELs) that could be used as TRVs in equation # 2 cover a wide range of values. Screening level ecological risk assessments often use NOAELs to identify contaminants of concern for ecological receptors. NOAELs are conservative because they represent the lowest dose that produces "no effect" in a toxicity study, or in a database of several toxicity studies. The use of a NOAEL as a threshold toxicity value estimates a point below which effects are unlikely, and above which effects are uncertain. Hence their value in screening-level risk assessments. The uncertainty associated with site-related doses that lie between the NOAEL and LOAEL is often not acceptable for setting PRGs, because of the expense and habitat disruption that is often involved in remediation to these PRGs. In order to avoid unnecessary remediation, LOAELs are often used to set PRGs. LOAELs, when used as threshold toxicity values, estimate points above which effects are likely, and below which effects are uncertain. LOAELs reflect the most sensitive species and the most sensitive appropriate endpoints available, and therefore a measure of conservativeness is retained. The results of a literature search for lead TRVs have previously been presented to the NAS Cecil Field Partnering Team. Based on the results of the literature search, the NAS Cecil Field Partnering Team has approved the following values as TRVs for lead. A LOAEL of 11.3 mg/kg/day will be used as the avian TRV. This value is based on reduced egg hatching in a reproduction study in which Japanese quail (a laboratory surrogate for avian species at Site 15) were exposed to lead in their diet for 12 weeks (Edens et al., 1976). A LOAEL of 80 mg/kg/day will be used as the mammal TRV. This value is based on reduced offspring weights and kidney damage in offspring and was derived from a one-year reproduction study in which three generations of rats were exposed to lead in their diet (Azar et al., 1973).

The bioavailability of ingested lead (i.e., the absorption fraction [AF] in equation # 2) refers to the portion of lead that is absorbed from the gastrointestinal tract. An AF of 1.0 (100 percent) will be used in the most conservative PRG scenario. The actual bioavailability of lead after ingestion depends upon a variety of factors, including the chemical form of lead, the species of organism, and the age, sex, and nutritional status of the individual (Eisler, 1988). Most toxicity studies of dietary lead exposure (including the two cited for the LOAEL values) used lead acetate as a test substance. Lead acetate is considered to be 100 percent bioavailable (Wilson and Davies, 1993). Lead in oyster meat was 69-75% percent bioavailable relative to lead acetate when mixed in a standard bird diet and fed to Japanese quail (Stone *et al*, 1981). Absorption rates for lead in other food items of birds and small mammals were not available, but are probably less than 100 percent. Thus, using an AF of 1.0 in equation # 2 will overestimate the potential risks of lead ingestion under field conditions. A less conservative value of 72 percent (the average of values in the Stone et al [1981] study) will be used to represent the AF in equation # 2 for each of the representative receptors. This will result in a range of PRGs for consideration by the risk managers.

The total food consumption (F) used in equation # 2 for the mockingbird will be assigned two values. In the most conservative scenario, the non-soil portion of the mockingbird's diet will be assumed to consist of 100 percent invertebrates. However, the average diet of adult mockingbirds is about 50 percent invertebrates and 50 percent fruit. Therefore, a second PRG will be generated by assuming that the non-soil portion of the mockingbird's diet consists of 50 percent invertebrates and 50 percent fruit. In this scenario, lead will be assumed to be absent in the fruit portion of the diet. Within above-ground tissues, concentrations of lead in plants are higher in stems than in leaves, and are higher in leaves than in reproductive tissues. Lead is rarely transferred to reproductive organs in plants (Morel, 1997). Edible portions of vegetables (*e.g.*, green beans, corn, tomatoes) grown in sandy soils amended with four sewage sludges showed negligible accumulation of lead, while leaves of the same plants accumulated lead at concentrations considered to be toxic to humans (Keefer *et al*, 1986). Therefore, based on available data, the contribution of lead in berries and seeds appears to be insignificant, and the collection and analyses of berries and seeds at the site does not appear to be warranted.

4.3 PRG Development for PAHs

Since soil invertebrates are the primary receptors at risk from PAHs at the site, the development of an associated remedial goal follows the procedure described for lead in Section 4.1. The only difference is that an NOEC and LOEC for PAHs (rather than lead) will be generated.

5.0 SUMMARY

Previous sampling of media at Site 15 indicates that lead and PAHs in surface soil in some portions of the site may pose risk to ecological receptors. Site-specific PRGs for lead and PAHs in soil at Site 15 are

needed for risk managers to evaluate remedial options at the site. Based on the toxicological characteristics of lead and PAHs, and on the physical characteristics and ecological receptors at Site 15, a site conceptual model was developed through which ecological assessment endpoints and measurement endpoints were established. The primary receptors at risk from lead are soil invertebrates, and birds and mammals that prey on soil invertebrates. The primary receptors at risk from PAHs are soil invertebrates.

Lead chemistry data previously collected were used to select tentative locations from which further samples will be collected and analyzed for lead. Final locations will be determined using XRF equipment. Composite soil samples will be collected along a gradient of soil lead concentrations, and from a reference location. A sub-sample of each composited soil sample will be analyzed for lead, total PAHs, pH, TOC, CEC, grain size, and moisture content. The remaining sub-sample will be used in standardized toxicity tests in which the survival of laboratory-reared earthworms (*Eisenia fetida*) will be measured. Soil dwelling invertebrates will be collected from co-located soil samples simultaneously with the soil samples. The diversity and abundance of invertebrates in Site 15 samples will be compared to results in reference samples. Results of the toxicity tests and the diversity and abundance data will be used to generate remedial goals for lead that pose acceptable risk to soil invertebrates. The collected soil invertebrates will also be analyzed for lead. Concentrations of lead in soil and invertebrates will be used to estimate ingestion doses for representative avian and mammalian receptors. This will allow the development of soil concentrations (remediation goals) that pose acceptable risk to the selected representative receptors.

PAH chemistry data previously collected were used to select locations from which further samples will be collected and analyzed for total PAHs. Composite soil samples will be collected along a gradient of soil concentrations of total PAHs, and from a reference site. A sub-sample of each composited soil sample will be analyzed for total PAHs, lead, pH, TOC, CEC, grain size, and moisture content. The remaining sub-sample will be used in standardized toxicity tests in which the survival of laboratory-reared earthworms (*Eisenia fetida*) will be measured. Soil dwelling invertebrates will be collected from co-located soil samples simultaneously with the soil samples. The diversity and abundance of invertebrates in Site 15 samples will be compared to results in reference samples. Results of the toxicity tests and the diversity and abundance data will be used to generate remedial goals for PAHs that pose acceptable risk to soil invertebrates.

TABLE 1

FOOD INGESTION RATES IN HERBIVOROUS AND OMNIVOROUS MAMMALS

SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

Mammal	Food Ingestion (g/g bw/day) *	Food Habits	Source
mole	~0.5	insectivorous/vermivorous	Gorman and Stone, 1990
short tailed shrew	0.49 – 0.62	insectivorous/vermivorous	EPA, 1993
deer mouse	0.18 – 0.45	omnivorous	EPA, 1993
prairie vole	0.09 – 0.14	largely herbivorous	EPA, 1993
meadow vole	0.30 – 0.35	largely herbivorous	EPA, 1993
muskrat	0.26 – 0.34	herbivorous	EPA, 1993

* g/g bw/day = food (grams, fresh weight) per gram of body weight per day

TABLE 2

EXPOSURE PARAMETERS FOR REPRESENTATIVE ECOLOGICAL RECEPTORS

SITE 15, BLUE 10 ORDINANCE DISPOSAL AREA

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

Receptor	Body Weight (grams)	Food Ingestion[1] (grams/day)	Assumed Diet for Exposure Assessment	Home Range (acres)
Least shrew (*Cryptotis parva*)	5.5[2]	3.3[3]	98.5% invertebrates 1.5% soil[4]	0.5 to 3.5 [5]
Northern mockingbird (*Mimus polyglottus*)	49[6]	37.6[7]	49% invertebrates 49% vegetation 2% soil[8]	Not available[9]

1 Food ingestion values include intended food items plus incidentally ingested soil.

2 Nowak (1991), Cothran et al (1991)

3 Calculated using mammal equation Nagy (1987); converted to fresh weight assuming 71 percent water content in food items.

4 See Section 4.1 of text.

5 Choate and Fleharty (1973), Choate et al (1994).

6 Derrickson and Breitwisch (1992)

7 Calculated using passerine equation Nagy (1987); converted to fresh weight assuming 71 percent water content in food items.

8 Diet from Derrickson and Breitwisch (1992), see Section 4.1 of text for other soil ingestion scenarios.

9 Home range data not available, but based on non-migratory and territorial nature of this species (Derrickson and Breitwisch, 1992), home range is assumed to be contained within Site 15.

REFERENCES

ABB (ABB Environmental Services, Inc). 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, October.

Abrahamson, W.G. and D.C. Hartnett. 1990. *Pine Flatwoods and Dry Prairies*, in Myers, R. L. and J. J. Ewel (eds.), 1990, *Ecosystems of Florida*, University of Central Florida Press, Orlando, Florida.

American Society for Testing and Materials (ASTM). 1998. Standard Guide for Conducting Laboratory Soil Toxicity or Bioaccumulation Tests With the Lumbricid Earthworm *Eisenia Fetida*). E 1676-97, West Conshohocken, Pennsylvania.

Azar, A., H. J. Trochimowicz, and M. E. Maxwell. 1973. Review of lead studies in animals carried out at Haskell Laboratory: two-year feeding study and response to hemorrhage study. In: *Environmental Health Aspects of Lead: Proceedings, International Symposiu*m, D. Barth et al., eds. Commission of European Communities. pp. 199-210, in Sample, B.E., D. M. Opresko, and G. W. Suter II. 1996. Toxicological Benchmarks for Wildlife, 1996 Revision. Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Baer, K.N., D.G Hutton, R.L. Boeri, T.J. Ward, and R.G. Stahl, Jr. 1995. *Toxicity evaluation of trap and skeet shooting targets to aquatic test species*. Ecotoxicology, 4: 385-392.

Beyer, W.N., E.E. Connor, and S. Gerould. 1994. Estimates of soil ingestion by wildlife. Journal of Wildlife Management, 58 (2): 375-382.

Beyer, W.N and C Stafford. 1993. Survey and evaluation of contaminants in earthworms and in soils derived from dredged material at confined disposal facilities in the Great Lakes region. Environmental Monitoring and Assessment 24: 151-165.

Brown, L.N. 1997. A Guide to the Mammals of the Southeastern United States. University of Tennessee Press, Knoxville, Tennessee, pp 236.

Choate, J. R. and Fleharty, E. D. 1973. Habitat preference and spatial relations of shrews in a mixed grassland in Kansas. Southwestern Naturalist 18:110-112.

Choate, J.R., J.K. Jones, Jr., and C. Jones. 1994. Handbook of Mammals of the South-Central States, Louisiana State University Press, Baton Rouge, Louisiana, pp 304.

Cothran, E.G., M.H. Smith, J.O. Wolff, and J.B. Gentry. 1991. Mammals of the Savannah River Site, SRO-NERP-21, Savannah River Ecology Laboratory, Aiken, South Carolina, pp 191.

Custer, T.W., J.C. Franson, and O.H. Pattee. 1984. Tissue lead distribution and hematologic effects in American kestrels (Falco sparverius L.) fed biologically incorporated lead. Journal of Wildlife Diseases, 20(1): 39-43.

Dasmann, R.F. 1981. Wildlife Biology. John Wiley & Sons, Inc., New York, New York, pp 212.

Derrickson, K. C. and Breitwisch. 1992. Northern mockingbird. In: *The Birds of North America,* No. 7 (A. Poole, P. Stettenheim, and F. Gill, eds.). Philadelphia, the Academy of Natural Sciences, Washington, D.C.: The American Ornithologists' Union.

Edens, F., W. E. Benton, S. J. Bursian, and G. W. Morgan. 1976. Effect of Dietary Lead on Reproductive Performance in Japanese Quail, *Coturnix coturnix japonica*. *Toxicol. Appl. Pharmaco*l. 38: 307-314, in Sample, B.E., D. M. Opresko, and G. W. Suter II. 1996. Toxicological Benchmarks for Wildlife, 1996 Revision. Risk Assessment Program, Health Sciences Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Eisler, R. 1987. Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. USFWS Biological Report 85(1.11).

Eisler, R. 1988. Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. USFWS Biological Report 85(1.14).

EPA (U.S. Environmental Protection Agency). 2000. Ecological Soil Screening Level Guidance – Draft. Office of Emergeny and Remedial Response, Washington, D.C. July 10.

EPA (U.S. Environmental Protection Agency). 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, June 5, Edison, New Jersey.

EPA (U.S. Environmental Protection Agency). 1993. Wildlife Exposure Factors Handbook: Volume I. EPA/600/R-93/187. U.S. EPA Office of Research and Development, Washington, D.C.

Gorman, M.L. and R.D. Stone. 1990. *The Natural History of Moles.* Comstock Publishing Associates, Ithica, New York. pp 138.

Henny, C.J., L.J. Blus, D.J. Hoffman, and R.A. Grove. 1994. Lead in hawks, falcons and owls downstream from a mining site on the Coeur d'Alene River, Idaho. Environmental Monitoring and Assessment 29: 267-288.

HLA (Harding Lawson Associates). 1998. Inorganic Background Data Set.

Keefer, R.F., R.N. Singh, and D.J. Horvath. 1986. Chemical composition of vegetables grown on an agricultural soil amended with sludge. J. Environ. Qual., 15, 146. Cited in Morel, J. 1997. "Bioavailability of trace elements to terrestrial plants". In Tarradellas, J., G. Bitton, and D. Rossel (eds.). 1997. *Soil Ecotoxicology.* Lewis Publishers, Boca Raton, Florida.

Lingenfelser, S. 2000. Addendum to the Final Work Plan for the Former Skeet Range (Site 17B), U.S. Army Transportation Center, Fort Eustis, Virginia. U.S. Fish and Wildlife Servce, September 7.

MHSP&E (Ministry of Housing, Spatial Planning and Environment). 1994. Intervention values and target values – soil quality standards. Department of Soil Protection, The Hague, The Netherlands; in Friday, G.P. 1998. *Ecological Screening Values for Surface Water, Sediment, and Soil.* Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina. WSRC-TR-98-00110. November.

Morel, J. 1997. "Bioavailability of trace elements to terrestrial plants". In Tarradellas, J., G. Bitton, and D. Rossel (eds.). 1997. *Soil Ecotoxicology.* Lewis Publishers, Boca Raton, Florida.

Nagy, K.A. 1987. Field metabolic rate and food requirement scaling in mammals and birds. Ecological Monographs, 57: 111-128, in EPA (U.S. Environmental Protection Agency). 1993. Wildlife Exposure Factors Handbook: Volumes I and II. EPA/600/R-93/187. U.S. EPA Office of Research and Development, Washington, D.C.

Neuhauser, E.F., P.R. Durkin, M.R. Malecki, and M. Anatra. 1986. Comparative toxicity of ten organic chemicals to four earthworm species. *Comp. Biochem. Physiol.* 83C(1):197-200.

Nowak, R. M. 1991. *Walker's Mammals of the World.* Fifth ed. Baltimore, Maryland: John Hopkins University Press.

ORNL (Oak Ridge National Laboratory). 1998. (Author not provided). *Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation.* BJC/OR-112, Oak Ridge National Laboratory, Oak Ridge Tennessee.

Parmelee, R.W., C.T. Phillips, R.T. Checkai, and P.J. Bohlen. 1997. Determining the effects of pollutants on soil faunal communities and trophic structure using a refined microcosm system. Environmental Toxicology and Chemistry, 16 (6), pp 1212-1217.

Sample, B. E. and G. W. Suter, 1994. Estimating Exposure of Terrestrial Wildlife to Contaminants, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sample, B.E., M.S. Alpin, R.A. Efroymson, G. W. Suter II, and C.J.E. Welsh. 1997. Methods and Tools for Estimation of the Exposure of Terrestrial Wildlife to Contaminants. ORNL/TM-13391. Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G. W. Suter II, and T.L. Ashwood. 1998a. Development and Validation of Bioaccumulation Models for Earthworms. ES/ER/TM/-220. Environmental Restoration Program, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

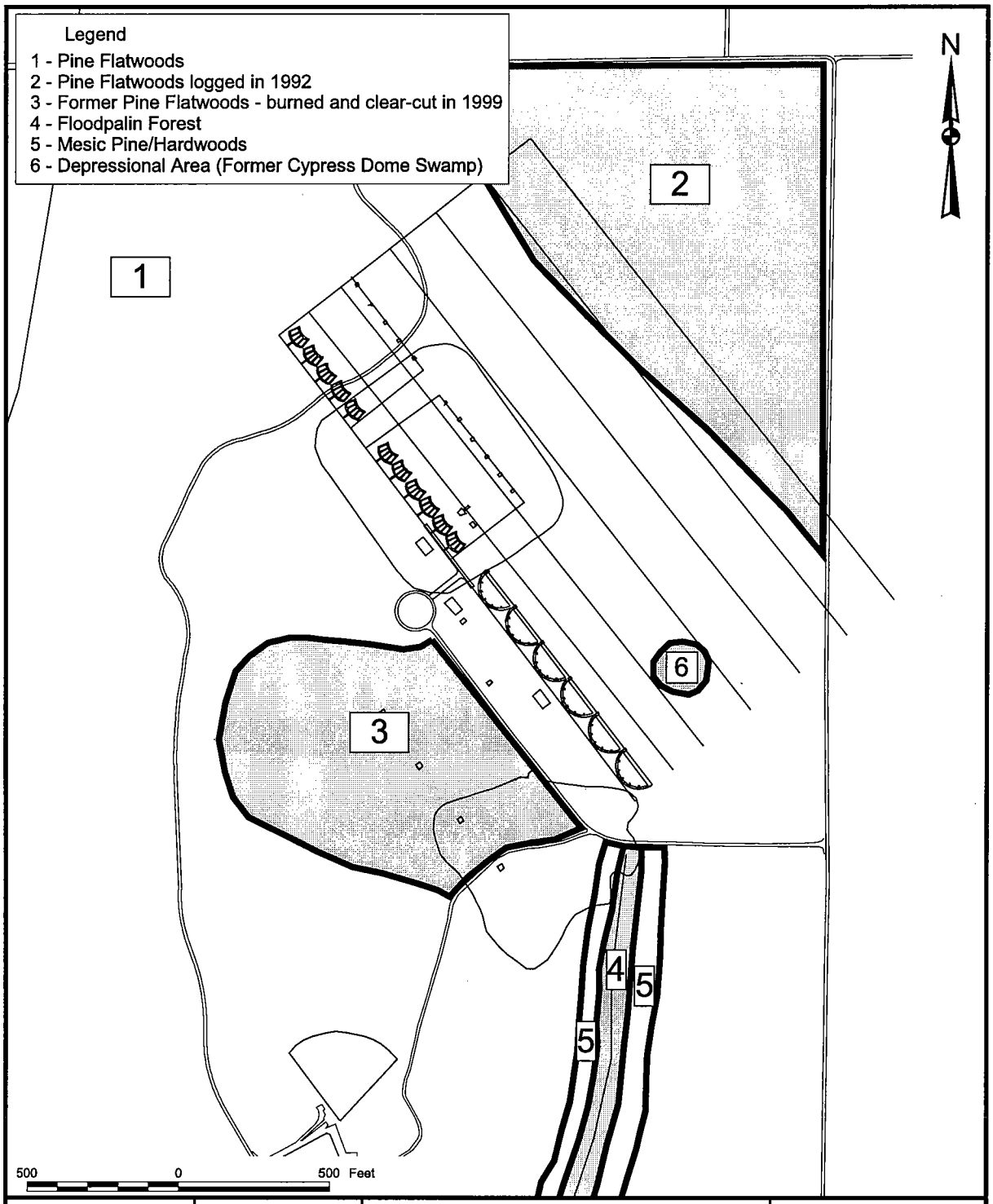
Sample, B.E., J.J. Beauchamp, R.A. Efroymson, and G. W. Suter II. 1998b. Development and Validation of Bioaccumulation Models for Small Mammals. ES/ER/TM/-219. Environmental Restoration Program, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sample, B.E. (CH2MHill, Sacramento, California). 2001. Personal Communication with M.L. Whitten, March 20 (Tetra Tech NUS, Inc, Aiken, South Carolina).

Stone, C.L., M.R.S. Fox, and K.S. Hogye. 1981. Bioavailability of lead in oysters fed to young Japanese quail. Environmental Research, 26: 409-421.

Swartjes, F.A. 1999. Risk based assessment of soil and groundwater quality in the Netherlands: standards and remediation urgency. Risk Analysis, 19 (6): 1235-1249.

Wixson, B. G. and B. E. Davies. 1993. *Bioavailability of Lead for Animals*, Lead in Soil Task Force Recommended Guidelines, Society for Environmental Geochemistry and Health. Science Reviews, pp 132.



DRAWN BY MJJ	DATE 19Dec00	SITE 15 HABITAT MAP NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV 0

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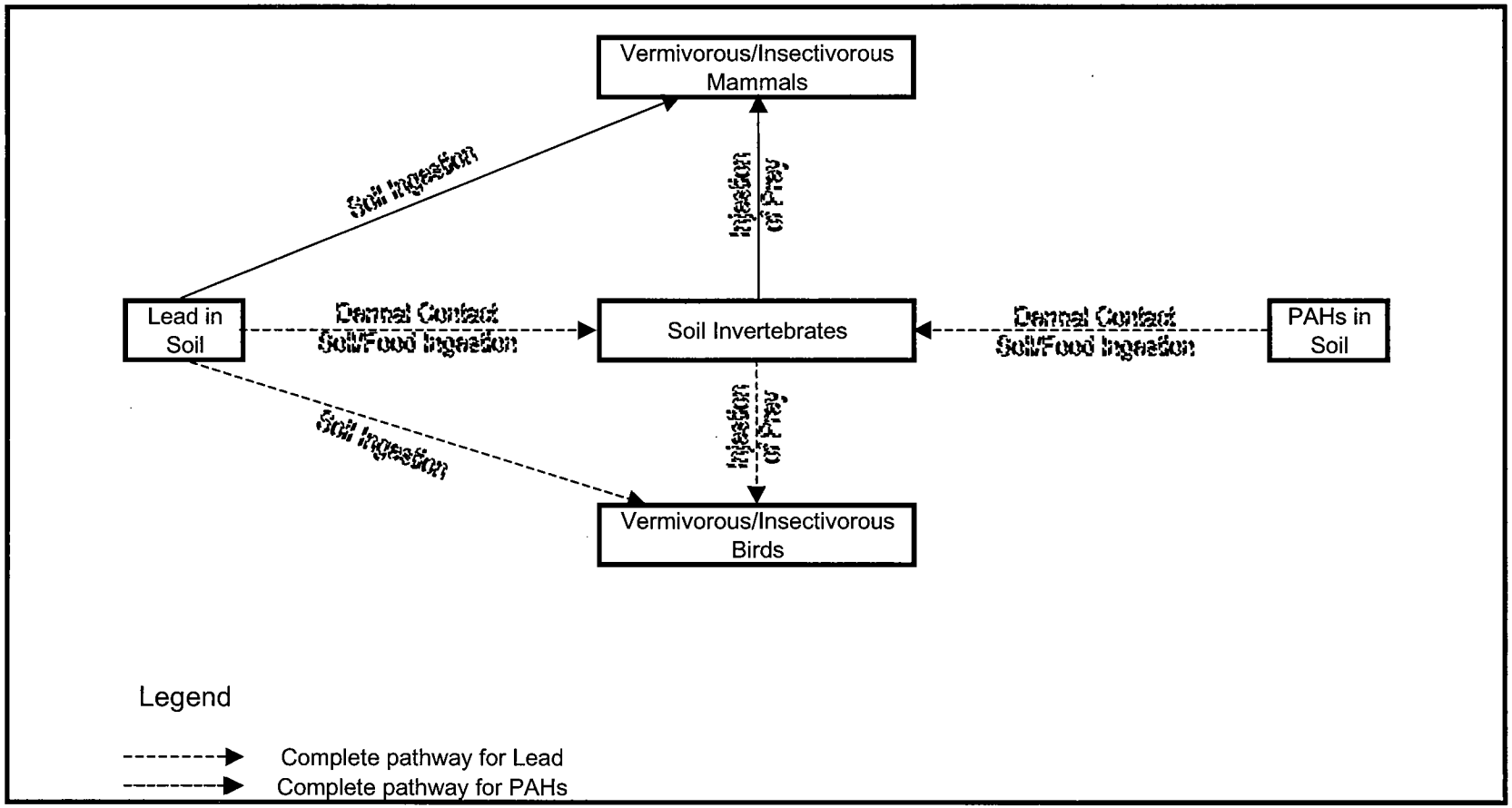
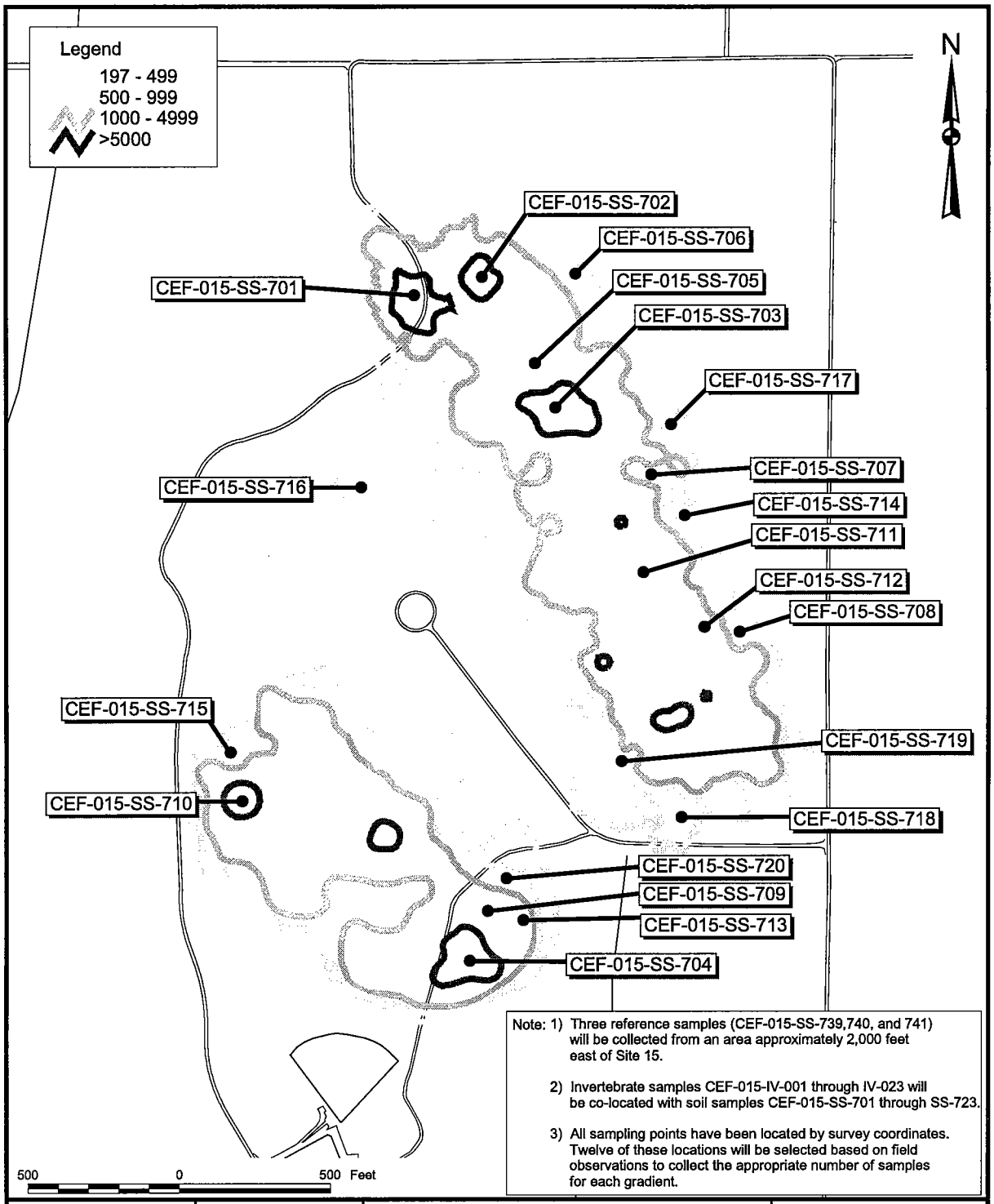


Figure 2

Contaminant Pathways at Site 15
NAS Cecil Field, Jacksonville, Florida



Note: 1) Three reference samples (CEF-015-SS-739,740, and 741) will be collected from an area approximately 2,000 feet east of Site 15.

2) Invertebrate samples CEF-015-IV-001 through IV-023 will be co-located with soil samples CEF-015-SS-701 through SS-723.

3) All sampling points have been located by survey coordinates. Twelve of these locations will be selected based on field observations to collect the appropriate number of samples for each gradient.

DRAWN BY MJJ	DATE 19Dec00	ISOCONCENTRATION CONTOURS FOR LEAD IN SOIL (mg/kg) AND PROPOSED SAMPLE LOCATIONS SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3 REV 0

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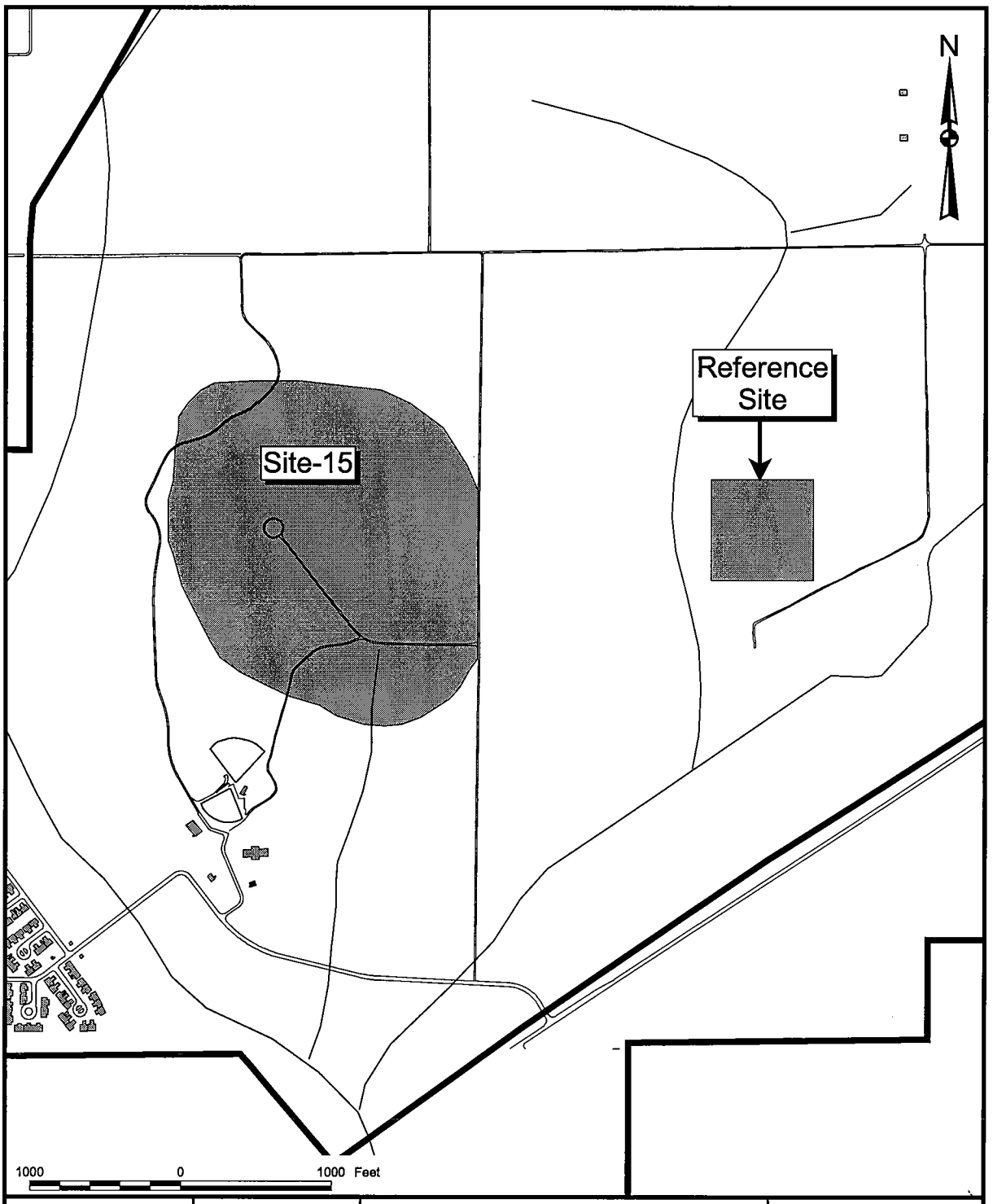

DRAWN BY MJJ	DATE 05Jan01	SITE 15 AND REFERENCE SITE LOCATION SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 REV 0

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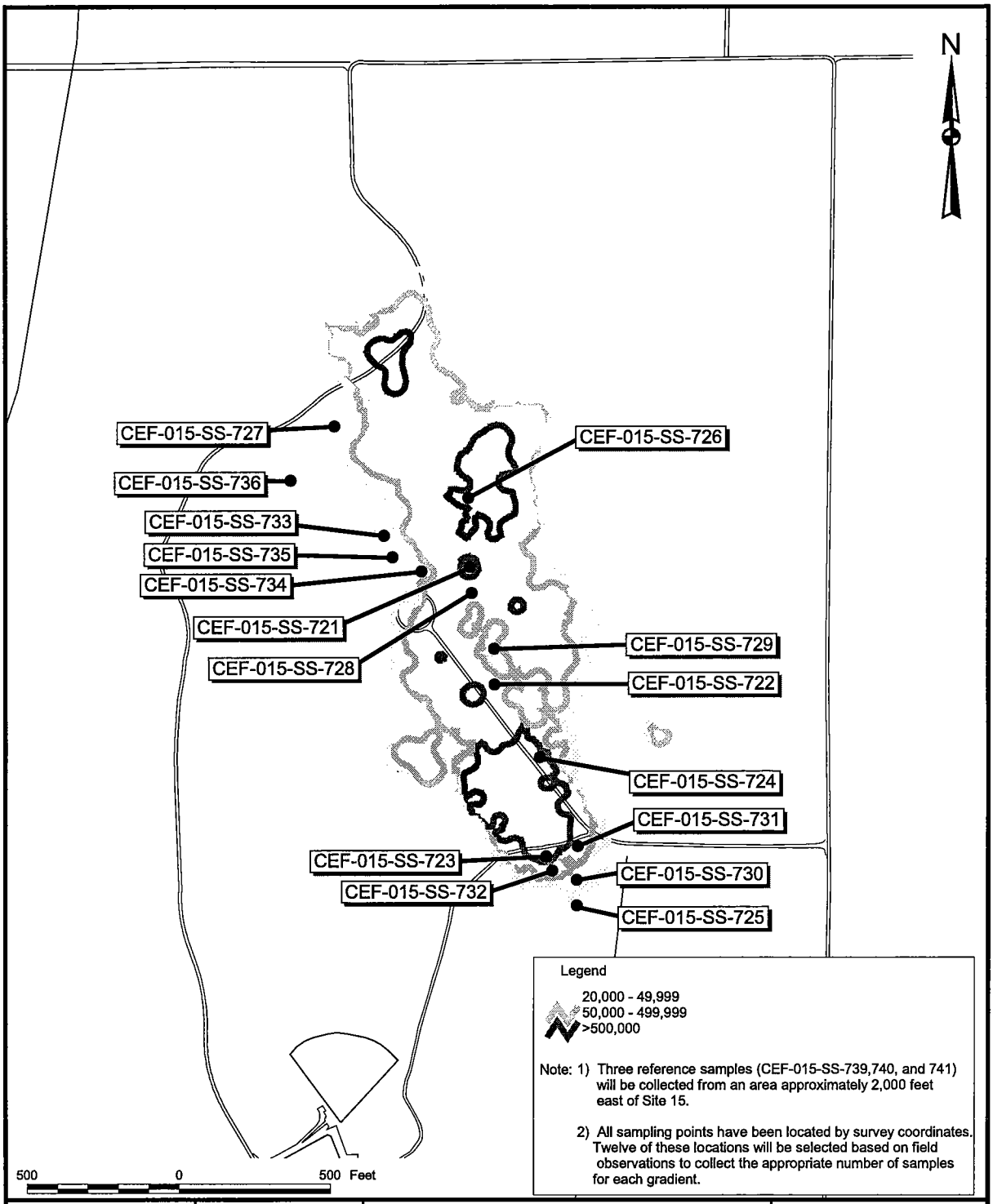

DRAWN BY MJJ	DATE 19Dec00	ISOCONCENTRATION CONTOURS FOR TOTAL PAHs IN SOIL (ug/kg) AND PROPOSED SAMPLE LOCATIONS SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 5 REV 0

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APPENDIX A

SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
PHASE VIII SAMPLING AND ANALYSIS WORK PLAN

APPENDIX A

Phase VIII Sampling and Analysis Work Plan
Site 15, Blue 10 Ordnance Disposal Area
Naval Air Station Cecil Field
Jacksonville, Florida

Phase VIII sampling and analysis of surface soil and soil invertebrates are proposed for Site 15 as identified in Figures A-1 and A-2. Sampling and analysis will be conducted to generate remediation goals for lead and polynuclear aromatic hydrocarbons (PAHs) in surface soil at the site. A total of 27 soil samples and 15 invertebrate samples will collected during this sampling event. Soil samples to be collected include 3 samples from each of 4 lead concentration gradients (12 samples), 4 samples from each of 3 PAH concentration gradients (12 samples) and 3 samples from a reference location. Sample locations for the 27 soil samples will be chosen from the 38 potential sampling locations identified on Figures A-1 and A-2 and summarized in Tables A-1 and A-2 based on field observations.

Soil samples will consist of the first three inches of mineral soil and the overlying duff (decaying organic matter) atop the mineral horizon. Invertebrates observed in the soil and duff will be manually collected from co-located soil sample locations, each of which shall consist of an area approximately 15 feet x 15 feet in size. The invertebrates will be collected simultaneously with, and from the same soil/duff stratum, as the soil samples. Soil samples will consist of five composites from throughout the 15 ft x 15 ft areas, and will be homogenized in the field and split into sub-samples for chemical analyses and standardized toxicity tests in which the survival of laboratory-reared earthworms (*Eisenia fetida*) will be measured.

Personnel protection equipment and other waste trash (e.g. disposable trowels) will not be considered hazardous and will be disposed in a municipal landfill. Such trash will be collected in a plastic bag and disposed in a suitable trash receptacle. Removed soil and invertebrates in excess of sampling volume requirements will be placed back on the ground and the ground cover will be replaced.

The sampling activities and procedures described in this Work Plan will be performed in accordance with the U. S. EPA Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) and the Base-Wide Generic Work Plan for Naval Air Station (NAS) Cecil Field. Specifically, the Base-Wide Generic Work Plan includes procedures for management of investigation-derived wastes in Volume I and standard operating procedures in the Project Operations Plan in Volume II.

Surface soil and invertebrate samples will be collected using plastic, disposable trowels. Decontamination of this disposable equipment will not be required. Non-disposable sampling equipment may also be used, and decontamination of this equipment will be conducted in accordance with the EISPOQAM and Base-Wide Generic Work Plan. The proposed samples will be collected at previous sampling locations that will be located by surveying prior to or during the sampling event.

The following laboratories have been subcontracted:

<u>Lead, PAHs, TOC, and CEC in soil</u>:

ACCUTEST SOUTHEAST
4405 Vineland Road, Suite C-15
Orlando, Florida 32881
Attention: Linda Williams
(407) 425-6700
Fax: (407) 425-0707

<u>Grain Size (Soils Geotech Lab)</u>:

Civil Services, Inc.
2394 St. Johns Bluff Road, South
Jacksonville, FL 32246
Attention: Bruce Khosorozadeh
(904) 641-1834

Earthworm Toxicity Lab:

Springborn Laboratories, Inc.
Massachusetts Research Center
790 Main Street
Wareham, MA 02571-1075
Attn: Arthur Putt
(508) 295-2550
Fax: (508) 295-8170

Invertebrate Lead Lab:

Severn Trent Laboratories
4101 Shuffel Drive, NW
North Canton, OH 44720
Attention: Becky Strait
(330) 497-9396

Sample handling requirements, the bottleware required, preservation, and holding time requirements for the analysis proposed for this sampling event are as identified in the following table:

Analysis	Analytical Method	Bottleware	Preservation	Holding Time[1]
SOILS				
By Accutest				
PAHs	SW-846 8310	8-oz. glass jar	Cool to 4°C	14 days to extraction; 40 days to analysis
Lead	SW-846 6010B	8-oz. glass jar	Cool to 4°C	180 days to analysis
TOC	Lloyd Kahn	8-oz. glass jar	Cool to 4°C	28 days to analysis
CEC	SW-846 9081	8-oz. glass jar	Cool to 4°C	28 days to analysis
By Soils Geotech Lab				
Grain Size	ASTM D422	8-oz. glass jar	Cool to 4°C	28 days to analysis
By Earthworm Tox Lab				
Earthworm Toxicity (including pH and % moisture)	ASTM E1676-97; SW-846 9045C; ASTM 2216	To be determined by the lab	Cool to 4°C	14 days to analysis
INVERTEBRATES				
By Invertebrate Lead Lab				
Lead	SW-846 6010B	1.3 g sample mass; botleware to be determined by lab	Cool to 4°C	180 days to analysis

1 Holding times are measured from the date/time of sample collection.

Analytical results for soil samples for ***PAHs and lead*** will be provided on a ***7-day*** turn around basis. All ***other analyses*** are ***21-day*** turnaround.

As agreed upon by the BCT, the collection of rinsate and trip blanks has been eliminated at NAS Cecil Field. In addition, field blanks will not be collected during this sampling program because there will be minimal decontamination of sampling equipment. In accordance with these changes, the following table summarizes the frequency and type of field Quality Assurance/Quality Control (QA/QC) samples to be collected for this sampling program regarding soil samples. Field duplicates are not applicable for invertebrates.

Type of Samples	Frequency	Samples to be Collected
Field Duplicate	1/10 samples (soil)	4 Soil (PAH and lead)
Lab MS/MSD	1/20 samples/matrix	2 Soil (PAH and lead)/ 1 Tissue[1]

1 MS/MSD is a Laboratory QA/QC requirement, separate sample not required, only additional volume.

As agreed upon by the BCT, formal data validation has been eliminated from the installation restoration program at NAS Cecil Field. However, the analytical data packages generated by the analytical laboratory will be reviewed by Tetra Tech NUS personnel to eliminate false positives and false negative results.

Table A-1
Phase VIII Sampling and Analysis
Surface Soil
Site 15, Blue 10 Ordnance Disposal Area

Sample ID CEF-015	Location	PAHs 8310	Lead	Soil Physical Characteristics[1]	14-Day Soil Toxicity
SS-701	Within area of lead concentration >5,000 ppm	X	X	X	X
SS-702	Within area of lead concentration >5,000 ppm	X	X	X	X
SS-703	Within area of lead concentration >5,000 ppm	X	X	X	X
SS-704	Within area of lead concentration >5,000 ppm	X	X	X	X
SS-705	Within lead concentration range of 1,000 to 4,999 ppm	X	X	X	X
SS-706	Within lead concentration range of 197 to 499 ppm	X	X	X	X
SS-707	Within lead concentration range of 500 to 999 ppm	X	X	X	X
SS-708	Within lead concentration range of 500 to 999 ppm	X	X	X	X
SS-709	Within lead concentration range of 1,000 to 9,999 ppm	X	X	X	X
SS-710	Within area of lead concentration >5,000 ppm	X	X	X	X
SS-711	Within lead concentration range of 1,000 to 4,999 ppm	X	X	X	X
SS-712	Within lead concentration range of 1,000 to 4,999 ppm	X	X	X	X
SS-713	Within lead concentration range of 1,000 to 4,999 ppm	X	X	X	X
SS-714	Within lead concentration range of 197 to 499 ppm	X	X	X	X
SS-715	Within lead concentration range of 500 to 999 ppm	X	X	X	X
SS-716	Within lead concentration range of 197 to 499 ppm	X	X	X	X
SS-717	Within lead concentration range of 197 to 499 ppm	X	X	X	X
SS-718	Within lead concentration range of 197 to 499 ppm	X	X	X	X
SS-719	Within lead concentration range of 500 to 999 ppm	X	X	X	X

Table A-1 (continued)
Phase VIII Sampling and Analysis
Surface Soil
Site 15, Blue 10 Ordnance Disposal Area

Sample ID CEF-015	Location	PAHs 8310	Lead	Soil Physical Characteristics[1]	14-Day Soil Toxicity
SS-720	Within lead concentration range of 500 to 999 ppm	X	X	X	X
SS-721	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-722	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-723	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-724	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-725	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-726	Within area of PAH concentration >500,000 ppb	X	X	X	X
SS-727	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-728	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-729	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-730	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-731	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-732	Within total PAH concentration range of 50,000 to 499,999 ppb	X	X	X	X
SS-733	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-734	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-735	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-736	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-737	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-738	Within total PAH concentration range of 20,000 to 49,999 ppb	X	X	X	X
SS-739*	From reference area approximately 2,000 feet east of Site 15	X	X	X	X
SS-740*	From reference area approximately 2,000 feet east of Site 15	X	X	X	X
SS-741*	From reference area approximately 2,000 feet east of Site 15	X	X	X	X

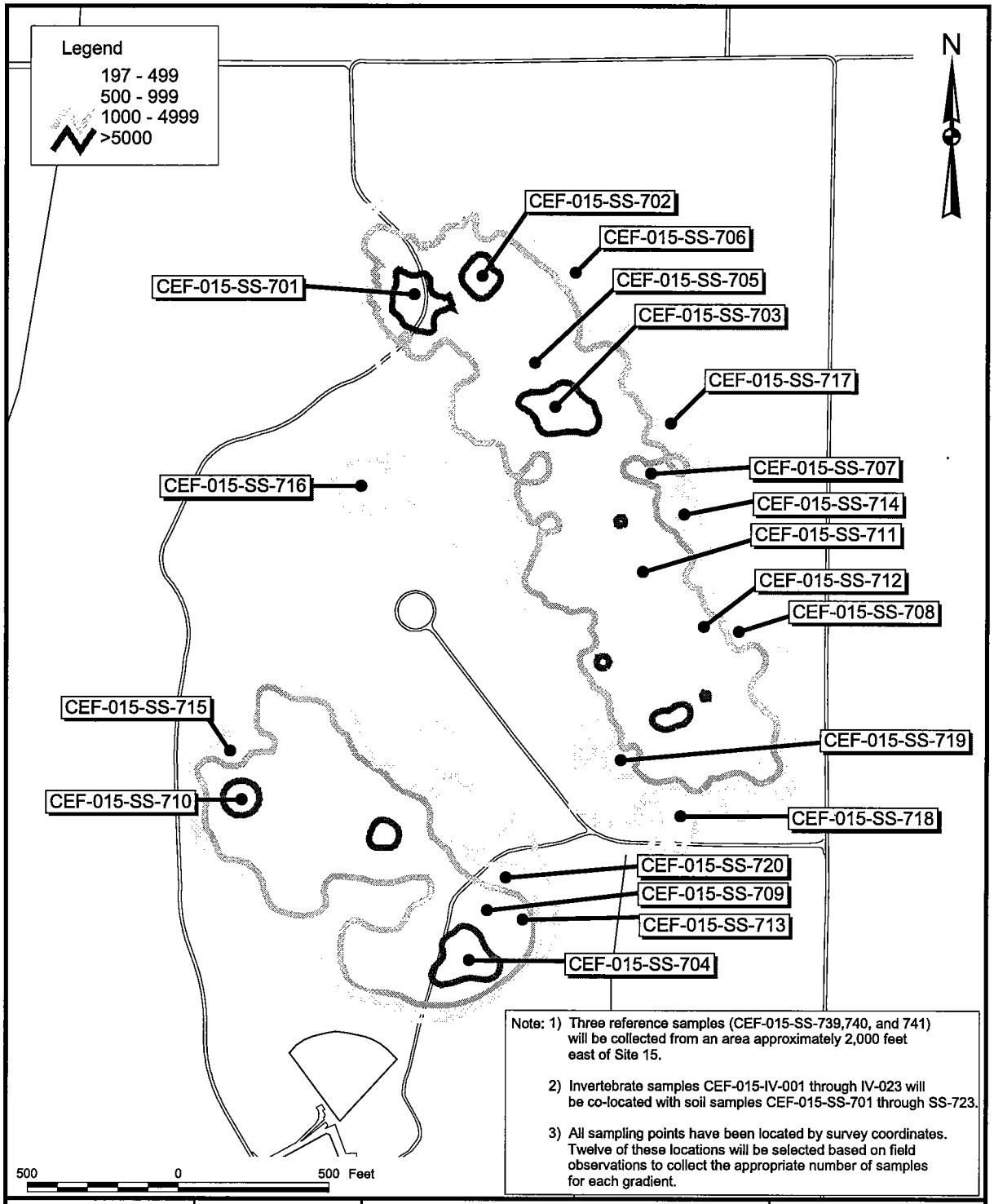
1 Total organic carbon, pH, grain size, and moisture content.
* These samples will be collected from the reference site.
NOTE: Based on field observations, 12 soil samples will be collected from the 20 potential locations determined based on lead gradients, and 12 soil samples will be collected from the 18 potential locations determined based on PAH gradients. Three samples also will be collected from the reference area, resulting in a total of 27 samples.

Table A-2

Phase VIII Sampling and Analysis
Invertebrates
Site 15, Blue 10 Ordnance Disposal Area

Sample ID	Location	Lead
CEF-015-IV-001	At CEF-015-SS-701 location	X
CEF-015-IV-002	At CEF-015-SS-702 location	X
CEF-015-IV-003	At CEF-015-SS-703 location	X
CEF-015-IV-004	At CEF-015-SS-704 location	X
CEF-015-IV-005	At CEF-015-SS-705 location	X
CEF-015-IV-006	At CEF-015-SS-706 location	X
CEF-015-IV-007	At CEF-015-SS-707 location	X
CEF-015-IV-008	At CEF-015-SS-708 location	X
CEF-015-IV-009	At CEF-015-SS-709 location	X
CEF-015-IV-010	At CEF-015-SS-710 location	X
CEF-015-IV-011	At CEF-015-SS-711 location	X
CEF-015-IV-012	At CEF-015-SS-712 location	X
CEF-015-IV-013	At CEF-015-SS-713 location	X
CEF-015-IV-014	At CEF-015-SS-714 location	X
CEF-015-IV-015	At CEF-015-SS-715 location	X
CEF-015-IV-016	At CEF-015-SS-716 location	X
CEF-015-IV-017	At CEF-015-SS-717 location	X
CEF-015-IV-018	At CEF-015-SS-718 location	X
CEF-015-IV-019	At CEF-015-SS-719 location	X
CEF-015-IV-020	At CEF-015-SS-720 location	X

NOTE: A total of 12 samples will be collected corresponding to the locations chosen for soil samples.



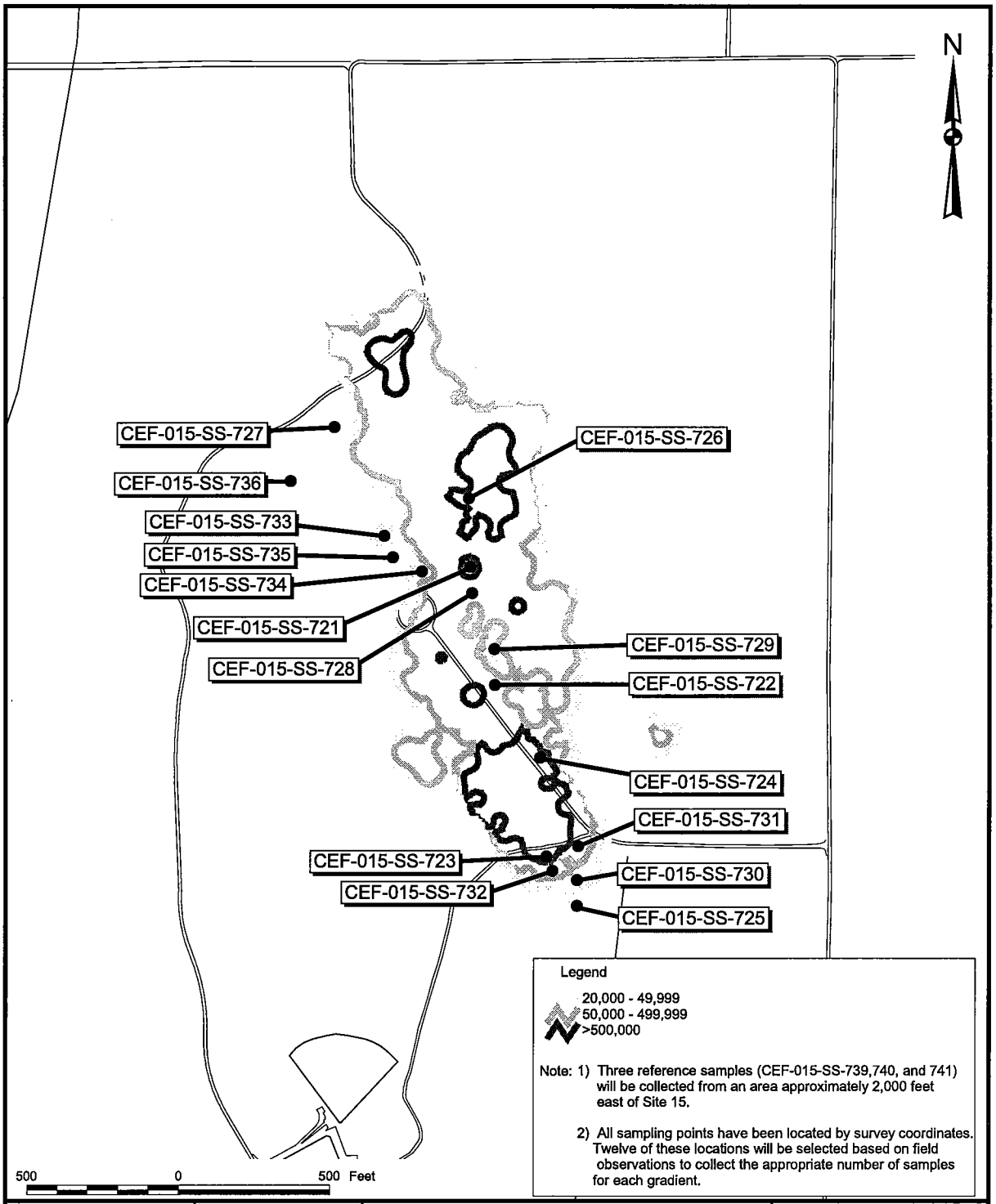
Note: 1) Three reference samples (CEF-015-SS-739,740, and 741) will be collected from an area approximately 2,000 feet east of Site 15.

2) Invertebrate samples CEF-015-IV-001 through IV-023 will be co-located with soil samples CEF-015-SS-701 through SS-723.

3) All sampling points have been located by survey coordinates. Twelve of these locations will be selected based on field observations to collect the appropriate number of samples for each gradient.

DRAWN BY MJJ	DATE 19Dec00	ISOCONCENTRATION CONTOURS FOR LEAD IN SOIL (mg/kg) AND PROPOSED SAMPLE LOCATIONS SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE A-1 REV 0

P:\GIS\NAS_CecilField\Site-15_eco.apr 21May01 MJJ Layout01



DRAWN BY MJJ	DATE 19Dec00	ISOCONCENTRATION CONTOURS FOR TOTAL PAHs IN SOIL (ug/kg) AND PROPOSED SAMPLE LOCATIONS SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE A-2 REV 0

P:\GIS\NAS_CecilField\Site-15_eco.apr 21May01 MJJ Layout02

APPENDIX B

LABORATORY ANALYTICAL DATA

B-1 INVERTEBRATE LEAD DATA

B-2 SOIL PAH, LEAD, TOC, AND CEC DATA

B-3 SOIL GRAIN SIZE ANALYSIS RESULTS

B-1

INVERTEBRATE LEAD DATA

INVERTEBRATE SAMPLE IDs vs. SOIL SAMPLE IDs

Invertebrate Sample ID	Corresponding Soil Sample ID
CEF-015-IV-003	CEF-015-SS-703
CEF-015-IV-004	CEF-015-SS-704
CEF-015-IV-006	CEF-015-SS-706
CEF-015-IV-007	CEF-015-SS-707
CEF-015-IV-007A	CEF-015-SS-707A
CEF-015-IV-008	CEF-015-SS-708
CEF-015-IV-008A	CEF-015-SS-708A
CEF-015-IV-009	CEF-015-SS-709
CEF-015-IV-017	CEF-015-SS-717
CEF-015-IV-019	CEF-015-SS-719
CEF-015-IV-019A	CEF-015-SS-719A
CEF-015-IV-021	CEF-015-SS-739
CEF-015-IV-022	CEF-015-SS-740
CEF-015-IV-023	CEF-015-SS-741
CEF-015-IV-024	CEF-015-SS-701

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 3, 2001**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – LEAD**
CTO-039 NAS CECIL FIELD
SAMPLE DELIVERY GROUP (SDG) – CF001

SAMPLES: 15/Tissue/

CEF-015-IV-003	CEF-015-IV-004	CEF-015-IV-006
CEF-015-IV-007	CEF-015-IV-007A	CEF-015-IV-008
CEF-015-IV-008A	CEF-015-IV-009	CEF-015-IV-017
CEF-015-IV-019	CEF-015-IV-019A	CEF-015-IV-021
CEF-015-IV-022	CEF-015-IV-023	CEF-015-IV-024

Overview

The sample set for CTO 039, NAS Cecil Field, SDG CF001, consists of fifteen (15) environmental tissue samples.

All samples were analyzed for lead. The samples were collected by TetraTech NUS from June 23-27, 2001 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Lead analyses were conducted using SW 846 method 6010B.

Lead analyses were conducted using Inductively Coupled Plasma (ICP) methodologies.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
* • Laboratory Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
N01 = Internal Standard Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

CTO039-NAS CECIL FIELD
SOIL DATA
STL-NORTH CANTON
SDG: CF001

SAMPLE NUMBER:	CEF-015-IV-003	CEF-015-IV-004	CEF-015-IV-006	CEF-015-IV-007
SAMPLE DATE:	06/27/01	06/26/01	06/27/01	06/25/01
LABORATORY ID:	A1F300102015	A1F300102012	A1F300102014	A1F300102008
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	100.0 %	100.0 %	100.0 %	100.0 %
UNITS:	MG/KG	MG/KG	MG/KG	MG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	46.5			36.7			333			3.8		

SAMPLE NUMBER:	CEF-015-IV-007A			CEF-015-IV-008			CEF-015-IV-008A			CEF-015-IV-009		
SAMPLE DATE:	06/25/01			06/26/01			06/23/01			06/26/01		
LABORATORY ID:	A1F300102007			A1F300102010			A1F300102006			A1F300102011		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	100.0 %			100.0 %			100.0 %			100.0 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	1.7			157			3.5			11.6		

CTO039-NAS CECIL FIELD
SOIL DATA
STL-NORTH CANTON
SDG: CF001

SAMPLE NUMBER:	CEF-015-IV-017	CEF-015-IV-019	CEF-015-IV-019A	CEF-015-IV-021
SAMPLE DATE:	06/27/01	06/26/01	06/23/01	06/24/01
LABORATORY ID:	A1F300102013	A1F300102009	A1F300102005	A1F300102001
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	100.0 %	100.0 %	100.0 %	100.0 %
UNITS:	MG/KG	MG/KG	MG/KG	MG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	3.7			0.70			1.7			0.16	U	

SAMPLE NUMBER:	CEF-015-IV-022	CEF-015-IV-023	CEF-015-IV-024	
SAMPLE DATE:	06/24/01	06/24/01	06/23/01	/ /
LABORATORY ID:	A1F300102002	A1F300102003	A1F300102004	
QC_TYPE:	NORMAL	NORMAL	NORMAL	
% SOLIDS:	100.0 %	100.0 %	100.0 %	100.0 %
UNITS:	MG/KG	MG/KG	MG/KG	
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	0.16	U		0.16	U		5.2					

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFTAC **Client ID** CEF-015-IV-003

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	46.5		1	ICPST	7/17/01	18:18

Comments: Lot #: A1F300102 Sample #: 15

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR97 **Client ID** CEF-015-IV-004

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	36.7		1	ICPST	7/17/01	18:04

Comments: Lot #: A1F300102 Sample #: 12

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFTAA **Client ID** CEF-015-IV-006

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 0.50 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.32	0.60	333		1	ICPST	7/17/01	18:14

Comments: Lot #: A1F300102 Sample #: 14

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR92 **Client ID** CEF-015-IV-007

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	3.8		1	ICPST	7/17/01	22:22

Comments: Lot #: A1F300102 Sample #: 8

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR91 **Client ID** CEF-015-IV-007A

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	1.7		1	ICPST	7/17/01	22:17

Comments: Lot #: A1F300102 Sample #: 7

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR95 **Client ID** CEF-015-IV-008

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	157		1	ICPST	7/17/01	22:42

Comments: Lot #: A1F300102 Sample #: 10

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR90 **Client ID** CEF-015-IV-008A

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	3.5		1	ICPST	7/17/01	22:12

Comments: Lot #: A1F300102 Sample #: 6

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR96 **Client ID** CEF-015-IV-009

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	11.6		1	ICPST	7/17/01	22:47

Comments: Lot #: A1F300102 Sample #: 11

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR99 **Client ID** CEF-015-IV-017

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	3.7		1	ICPST	7/17/01	18:09

Comments: Lot #: A1F300102 Sample #: 13

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR94 **Client ID** CEF-015-IV-019

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	0.70		1	ICPST	7/17/01	22:37

Comments: Lot #: A1F300102 Sample #: 9

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR9X **Client ID** CEF-015-IV-019A

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	1.7		1	ICPST	7/17/01	22:07

Comments: Lot #: A1F300102 Sample #: 5

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR9R **Client ID** CEF-015-IV-021

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.353	0.16	0.30	0.16	U	1	ICPST	7/17/01	16:13

Comments: Lot #: A1F300102 Sample #: 1

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR9T **Client ID** CEF-015-IV-022

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.353	0.16	0.30	0.16	U	1	ICPST	7/17/01	16:22

Comments: Lot #: A1F300102 Sample #: 2

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR9V **Client ID** CEF-015-IV-023

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.353	0.16	0.30	0.16	U	1	ICPST	7/17/01	16:27

Comments: Lot #: A1F300102 Sample #: 3

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form 1 Equivalent

STL North Canton

Metals Data Reporting Form

Sample Results

Lab Sample ID EFR9W **Client ID** CEF-015-IV-024

Matrix: Biological **Units:** mg/kg **Prep Date:** 7/11/01 **Prep Batch:** 1192095

Weight: 1.00 **Volume:** 100 **Percent Moistur** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Lead	220.35	0.16	0.30	5.2		1	ICPST	7/17/01	22:02

Comments: Lot #: A1F300102 Sample #: 4

Version 4.10.5

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

B-2

SOIL PAH, LEAD, TOC, AND CEC DATA

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 10, 2001**
FROM:	**DOUGLAS S. SCHLOER**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION – PAH CTO 039, NAS CECIL FIELD SDGs: F10200 and F10146**		
SAMPLES:	17/ Solid / PAH		

CEF-015-SS-703	CEF-015-SS-704	CEF-015-SS-706
CEF-015-SS-708	CEF-015-SS-709	CEF-015-SS-717
CEF-015-SS-719A	CEF-015-SS-724B	CEF-015-SS-001
CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708A
CEF-015-SS-719	CEF-015-SS-739	CEF-015-SS-740
CEF-015-SS-741	CEEF-015-SS-DUP3	

OVERVIEW

The sample set for CTO 039, NAS Cecil Field; SDGs F10200 and F10146 consist of seventeen (17) environmental soil samples. The samples were analyzed for polynuclear aromatic hydrocarbons (PAHs). One field duplicate pair was included in SDG 10146: CEF-015-SS-719A and CEF-015-SS-DUP3.

The samples were collected by TetraTech NUS on June 23rd through 27th, 2001 and analyzed by Accutest Laboratories. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Method 8310 analytical and reporting protocol. The data contained in this SDG were validated with regard to the following parameters:

- * Data completeness
- * Holding times
- * Initial/continuing calibrations
- * Laboratory method blank results
- Surrogate recovery
- Matrix Spike/Matrix Spike Duplicate
- * Field Duplicate Results
- Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

The text of this report is formulated to address only gross noncompliances resulting in the rejection of data and the elimination of false positives.

PAH

Calibration verification percent Differences (%Ds) exceeded the 15% quality control limit on one analytical detector for benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene on instrument HPCHEM1, on 7/2/01, at 15:54. No action was warranted based on these noncompliances due to the nature of this data review.

The surrogates o-terphenyl and p-terphenyl were not recovered for the analysis of sample CEF-015-SS-001. However, since the sample required a 100X dilution for analysis, no action was taken based on this noncompliance.

Due to sample matrix interference, all samples in SDG F10200 were analyzed and reported at a 4X dilution. This accounts for the elevated reporting limits for these samples.

Due to sample matrix interference, the following samples were analyzed and reported at the dilution factors indicated below:

CEF-015-SS-741	2X	CEF-015-SS-708A	4X
CEF-015-SS-739	4X	CEF-015-SS-707	5X
CEF-015-SS-707A	5X	CEF-015-SS-719A	5X
CEF-015-SS-740	5X	CEF-015-SS-DUP3	5X

This accounts for the elevated reporting limits for these samples.

Due to the presence of target compounds that exceeded the linear range of the instrument calibration, sample CEF-015-SS-001 was analyzed and reported at a 100X dilution. This accounts for the elevated reporting limits for this sample.

EXECUTIVE SUMMARY

Laboratory Performance Issues: The continuing calibration of several compounds failed to meet the %D criteria on one analytical detector.

Other Factors Affecting Data Quality: None

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the NFESC guidelines "Navy IRCDQM" (Sept 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Douglas S. Schloer
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

FIELD DUPLICATE SUMMARY
NAS CECIL FIELD CTO 039

Analytical Fraction	Compound	CEF-015-SS-719A	CEF-015-SS-DUP3	RPD
PAH				
	Benzo(a)pyrene	292 J	282 J	3.5
	Benzo(b)fluoranthene	368 J	424 J	-14.1
	Benzo(k)fluoranthene	1512 J	ND J	NC
	Indeno(1,2,3-cd)pyrene	305 J	313 J	-2.6

ND - Compound not detected.
NC - RPD not calculated.

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-703			CEF-015-SS-704			CEF-015-SS-706			CEF-015-SS-708		
SAMPLE DATE:	06/27/01			06/26/01			06/27/01			06/26/01		
LABORATORY ID:	F10200-7			F10200-4			F10200-6			F10200-2		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	79.4 %			81.2 %			81.7 %			59.6 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	1700	U		1600	U		1600	U		2200	U	
2-METHYLNAPHTHALENE	1700	U		1600	U		1600	U		2200	U	
ACENAPHTHENE	3400	U		3300	U		3300	U		4500	U	
ACENAPHTHYLENE	3400	U		3300	U		3300	U		4500	U	
ANTHRACENE	1700	U		1600	U		1600	U		2200	U	
BENZO(A)ANTHRACENE	1700	U		1600	U		1600	U		1720	J	P
BENZO(A)PYRENE	340	U		325	J	P	282	J	P	2120		
BENZO(B)FLUORANTHENE	340	U		219	J	P	188	J	P	1500		
BENZO(G,H,I)PERYLENE	340	U		366			298	J	P	1960		
BENZO(K)FLUORANTHENE	340	U		151	J	P	330	U		999		
CHRYSENE	1700	U		1600	U		1600	U		1720	J	P
DIBENZO(A,H)ANTHRACENE	340	U		330	U		330	U		450	U	
FLUORANTHENE	1700	U		1600	U		1600	U		1990	J	P
FLUORENE	1700	U		1600	U		1600	U		2200	U	
INDENO(1,2,3-CD)PYRENE	340	U		244	J	P	191	J	P	1310		
NAPHTHALENE	1700	U		1600	U		1600	U		2200	U	
PHENANTHRENE	1700	U		1600	U		1600	U		2200	U	
PYRENE	1700	U		3200	U		1600	U		1780	J	P

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-709	CEF-015-SS-717	CEF-015-SS-719	CEF-015-SS-724B
SAMPLE DATE:	06/26/01	06/27/01	06/26/01	06/27/01
LABORATORY ID:	F10200-3	F10200-5	F10200-1	F10200-8
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	83.4 %	84.1 %	77.0 %	81.3 %
UNITS:	UG/KG	UG/KG	UG/KG	UG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	1600	U		1600	U		1700	U		1600	U	
2-METHYLNAPHTHALENE	1600	U		1600	U		1700	U		1600	U	
ACENAPHTHENE	3200	U		3200	U		3500	U		3300	U	
ACENAPHTHYLENE	3200	U		3200	U		3500	U		3300	U	
ANTHRACENE	1600	U		1600	U		1700	U		1600	U	
BENZO(A)ANTHRACENE	1600	U		1600	U		1060	J	P	1600	U	
BENZO(A)PYRENE	288	J	P	320	U		1330			517		
BENZO(B)FLUORANTHENE	170	J	P	320	U		800			351		
BENZO(G,H,I)PERYLENE	274	J	P	320	U		1280			585		
BENZO(K)FLUORANTHENE	320	U		320	U		625			364		
CHRYSENE	1600	U		1600	U		1000	J	P	1600	U	
DIBENZO(A,H)ANTHRACENE	320	U		320	U		350	U		330	U	
FLUORANTHENE	1600	U		1600	U		1180	J	P	1600	U	
FLUORENE	1600	U		1600	U		1700	U		1600	U	
INDENO(1,2,3-CD)PYRENE	174	J	P	320	U		850			374		
NAPHTHALENE	3200	U		3200	U		1700	U		1600	U	
PHENANTHRENE	1600	U		1600	U		1700	U		1600	U	
PYRENE	1600	U		1600	U		1300	J	P	1600	U	

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-001	CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708A
SAMPLE DATE:	06/23/01	06/25/01	06/25/01	06/23/01
LABORATORY ID:	F10146-2	F10146-8	F10146-7	F10146-3
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	74.2 %	67.1 %	68.4 %	71.9 %
UNITS:	UG/KG	UG/KG	UG/KG	UG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	45000	U		2500	U		2400	U		1800	U	
2-METHYLNAPHTHALENE	45000	U		2500	U		2400	U		1800	U	
ACENAPHTHENE	90000	U		5000	U		4900	U		3700	U	
ACENAPHTHYLENE	90000	U		5000	U		4900	U		3700	U	
ANTHRACENE	45000	U		2500	U		2400	U		1800	U	
BENZO(A)ANTHRACENE	74200			2500	U		2400	U		1800	U	
BENZO(A)PYRENE	72200			500	U		490	U		370	U	
BENZO(B)FLUORANTHENE	54400			500	U		490	U		370	U	
BENZO(G,H,I)PERYLENE	40600			500	U		490	U		370	U	
BENZO(K)FLUORANTHENE	38600			500	U		490	U		370	U	
CHRYSENE	79600			2500	U		2400	U		1800	U	
DIBENZO(A,H)ANTHRACENE	8030	J	P	500	U		490	U		370	U	
FLUORANTHENE	97300			2500	U		2400	U		1800	U	
FLUORENE	45000	U		2500	U		2400	U		1800	U	
INDENO(1,2,3-CD)PYRENE	47200			500	U		490	U		370	U	
NAPHTHALENE	45000	U		2500	U		2400	U		1800	U	
PHENANTHRENE	20800	J	P	2500	U		2400	U		1800	U	
PYRENE	87800			2500	U		2400	U		1800	U	

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-719A			CEF-015-SS-739			CEF-015-SS-740			CEF-015-SS-741		
SAMPLE DATE:	06/23/01			06/24/01			06/24/01			06/24/01		
LABORATORY ID:	F10146-1			F10146-4			F10146-5			F10146-6		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	71.0 %			66.2 %			77.6 %			69.2 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2300	U		2000	U		2100	U		960	U	
2-METHYLNAPHTHALENE	2300	U		2000	U		2100	U		960	U	
ACENAPHTHENE	4700	U		4000	U		4300	U		1900	U	
ACENAPHTHYLENE	4700	U		4000	U		4300	U		1900	U	
ANTHRACENE	2300	U		2000	U		2100	U		960	U	
BENZO(A)ANTHRACENE	2300	U		2000	U		2100	U		960	U	
BENZO(A)PYRENE	292	J	P	400	U		430	U		190	U	
BENZO(B)FLUORANTHENE	368	J	P	400	U		430	U		190	U	
BENZO(G,H,I)PERYLENE	470	U		400	U		430	U		190	U	
BENZO(K)FLUORANTHENE	152	J	P	400	U		430	U		190	U	
CHRYSENE	2300	U		2000	U		2100	U		960	U	
DIBENZO(A,H)ANTHRACENE	470	U		400	U		430	U		190	U	
FLUORANTHENE	2300	U		2000	U		2100	U		960	U	
FLUORENE	2300	U		2000	U		2100	U		960	U	
INDENO(1,2,3-CD)PYRENE	305	J	P	400	U		430	U		190	U	
NAPHTHALENE	2300	U		2000	U		2100	U		960	U	
PHENANTHRENE	2300	U		2000	U		2100	U		960	U	
PYRENE	2300	U		2000	U		2100	U		960	U	

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-DUP3											
SAMPLE DATE:	06/23/01			/ /			/ /			/ /		
LABORATORY ID:	F10146-9											
QC_TYPE:	NORMAL											
% SOLIDS:	4.0 %			100.0 %			100.0 %			100.0 %		
UNITS:	UG/KG											
FIELD DUPLICATE OF:	CEF-015-SS-719A											
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2200	U										
2-METHYLNAPHTHALENE	2200	U										
ACENAPHTHENE	4400	U										
ACENAPHTHYLENE	4400	U										
ANTHRACENE	2200	U										
BENZO(A)ANTHRACENE	2200	U										
BENZO(A)PYRENE	282	J	P									
BENZO(B)FLUORANTHENE	424	J	P									
BENZO(G,H,I)PERYLENE	440	U										
BENZO(K)FLUORANTHENE	440	U										
CHRYSENE	2200	U										
DIBENZO(A,H)ANTHRACENE	440	U										
FLUORANTHENE	2200	U										
FLUORENE	2200	U										
INDENO(1,2,3-CD)PYRENE	313	J	P									
NAPHTHALENE	2200	U										
PHENANTHRENE	2200	U										
PYRENE	2200	U										

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-703		
Lab Sample ID:	F10200-7	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	79.4
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004230.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3400	ug/kg	
208-96-8	Acenaphthylene	ND	3400	ug/kg	
120-12-7	Anthracene	ND	1700	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1700	ug/kg	
50-32-8	Benzo(a)pyrene	ND	340	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	340	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	340	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	340	ug/kg	
218-01-9	Chrysene	ND	1700	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	340	ug/kg	
206-44-0	Fluoranthene	ND	1700	ug/kg	
86-73-7	Fluorene	ND	1700	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	340	ug/kg	
91-20-3	Naphthalene	ND	1700	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1700	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1700	ug/kg	
85-01-8	Phenanthrene	ND	1700	ug/kg	
129-00-0	Pyrene	ND	1700	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		37-158%
92-94-4	p-Terphenyl	92%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-704		
Lab Sample ID:	F10200-4	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	81.2
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004225.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3300	ug/kg	
208-96-8	Acenaphthylene	ND	3300	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	325	330	ug/kg	J
205-99-2	Benzo(b)fluoranthene	219	330	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	366	330	ug/kg	
207-08-9	Benzo(k)fluoranthene	151	330	ug/kg	J
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	330	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	244	330	ug/kg	J
91-20-3	Naphthalene	ND	1600	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene [b]	ND	3200	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	101%		37-158%
92-94-4	p-Terphenyl	102%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.
(b) Elevated reporting limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-706		
Lab Sample ID:	F10200-6	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	81.7
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004227.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3300	ug/kg	
208-96-8	Acenaphthylene	ND	3300	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	282	330	ug/kg	J
205-99-2	Benzo(b)fluoranthene	188	330	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	298	330	ug/kg	J
207-08-9	Benzo(k)fluoranthene	ND	330	ug/kg	
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	330	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	191	330	ug/kg	J
91-20-3	Naphthalene	ND	1600	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene	ND	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	104%		37-158%
92-94-4	p-Terphenyl	103%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708		
Lab Sample ID:	F10200-2	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	59.6
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004223.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4500	ug/kg	
208-96-8	Acenaphthylene	ND	4500	ug/kg	
120-12-7	Anthracene	ND	2200	ug/kg	
56-55-3	Benzo(a)anthracene	1720	2200	ug/kg	J
50-32-8	Benzo(a)pyrene	2120	450	ug/kg	
205-99-2	Benzo(b)fluoranthene	1500	450	ug/kg	
191-24-2	Benzo(g,h,i)perylene	1960	450	ug/kg	
207-08-9	Benzo(k)fluoranthene	999	450	ug/kg	
218-01-9	Chrysene	1720	2200	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	450	ug/kg	
206-44-0	Fluoranthene	1990	2200	ug/kg	J
86-73-7	Fluorene	ND	2200	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	1310	450	ug/kg	
91-20-3	Naphthalene	ND	2200	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2200	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2200	ug/kg	
85-01-8	Phenanthrene	ND	2200	ug/kg	
129-00-0	Pyrene	1780	2200	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	93%		37-158%
92-94-4	p-Terphenyl	108%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-709		
Lab Sample ID:	F10200-3	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	83.4
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004224.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3200	ug/kg	
208-96-8	Acenaphthylene	ND	3200	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	288	320	ug/kg	J
205-99-2	Benzo(b)fluoranthene	170	320	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	274	320	ug/kg	J
207-08-9	Benzo(k)fluoranthene	ND	320	ug/kg	
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	320	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	174	320	ug/kg	J
91-20-3	Naphthalene [b]	ND	3200	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene	ND	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	106%		37-158%
92-94-4	p-Terphenyl	101%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.
(b) Elevated reporting limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-717		
Lab Sample ID:	F10200-5	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	84.1
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004226.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3200	ug/kg	
208-96-8	Acenaphthylene	ND	3200	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	ND	320	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	320	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	320	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	320	ug/kg	
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	320	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	320	ug/kg	
91-20-3	Naphthalene [b]	ND	3200	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene	ND	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		37-158%
92-94-4	p-Terphenyl	93%		59-149%

(a) Dilution required due to matrix interference.
(b) Elevated reporting limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

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Report of Analysis

Client Sample ID:	CEF-015-SS-719		
Lab Sample ID:	F10200-1	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	77.0
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004222.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3500	ug/kg	
208-96-8	Acenaphthylene	ND	3500	ug/kg	
120-12-7	Anthracene	ND	1700	ug/kg	
56-55-3	Benzo(a)anthracene	1060	1700	ug/kg	J
50-32-8	Benzo(a)pyrene	1330	350	ug/kg	
205-99-2	Benzo(b)fluoranthene	800	350	ug/kg	
191-24-2	Benzo(g,h,i)perylene	1280	350	ug/kg	
207-08-9	Benzo(k)fluoranthene	625	350	ug/kg	
218-01-9	Chrysene	1000	1700	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	350	ug/kg	
206-44-0	Fluoranthene	1180	1700	ug/kg	J
86-73-7	Fluorene	ND	1700	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	850	350	ug/kg	
91-20-3	Naphthalene	ND	1700	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1700	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1700	ug/kg	
85-01-8	Phenanthrene	ND	1700	ug/kg	
129-00-0	Pyrene	1300	1700	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	101%		37-158%
92-94-4	p-Terphenyl	112%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-724B		
Lab Sample ID:	F10200-8	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	81.3
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	EE004231.D	4	07/07/01	MRE	07/02/01	OP3417	GEE194
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3300	ug/kg	
208-96-8	Acenaphthylene	ND	3300	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	517	330	ug/kg	
205-99-2	Benzo(b)fluoranthene	351	330	ug/kg	
191-24-2	Benzo(g,h,i)perylene	585	330	ug/kg	
207-08-9	Benzo(k)fluoranthene	364	330	ug/kg	
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	330	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	374	330	ug/kg	
91-20-3	Naphthalene	ND	1600	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene	ND	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	105%		37-158%
92-94-4	p-Terphenyl	111%		59-149%

(a) All hits confirmed by spectral match using a diode array detector. Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-001		
Lab Sample ID:	F10146-2	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	74.2
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	AA008081.D	100	07/02/01	MRE	06/28/01	OP3397	GAA337
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	90000	ug/kg	
208-96-8	Acenaphthylene	ND	90000	ug/kg	
120-12-7	Anthracene	ND	45000	ug/kg	
56-55-3	Benzo(a)anthracene	74200	45000	ug/kg	
50-32-8	Benzo(a)pyrene	72200	9000	ug/kg	
205-99-2	Benzo(b)fluoranthene	54400	9000	ug/kg	
191-24-2	Benzo(g,h,i)perylene	40600	9000	ug/kg	
207-08-9	Benzo(k)fluoranthene	38600	9000	ug/kg	
218-01-9	Chrysene	79600	45000	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	8030	9000	ug/kg	J
206-44-0	Fluoranthene	97300	45000	ug/kg	
86-73-7	Fluorene	ND	45000	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	47200	9000	ug/kg	
91-20-3	Naphthalene	ND	45000	ug/kg	
90-12-0	1-Methylnaphthalene	ND	45000	ug/kg	
91-57-6	2-Methylnaphthalene	ND	45000	ug/kg	
85-01-8	Phenanthrene	20800	45000	ug/kg	J
129-00-0	Pyrene	87800	45000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [a]		37-158%
92-94-4	p-Terphenyl	0% [a]		59-149%

(a) Outside control limits due to dilution.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707		
Lab Sample ID:	F10146-8	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	67.1
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008073.D	5	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	5000	ug/kg	
208-96-8	Acenaphthylene	ND	5000	ug/kg	
120-12-7	Anthracene	ND	2500	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2500	ug/kg	
50-32-8	Benzo(a)pyrene	ND	500	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	500	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	500	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	500	ug/kg	
218-01-9	Chrysene	ND	2500	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	500	ug/kg	
206-44-0	Fluoranthene	ND	2500	ug/kg	
86-73-7	Fluorene	ND	2500	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	500	ug/kg	
91-20-3	Naphthalene	ND	2500	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2500	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2500	ug/kg	
85-01-8	Phenanthrene	ND	2500	ug/kg	
129-00-0	Pyrene	ND	2500	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		37-158%
92-94-4	p-Terphenyl	95%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707A		
Lab Sample ID:	F10146-7	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	68.4
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008072.D	5	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4900	ug/kg	
208-96-8	Acenaphthylene	ND	4900	ug/kg	
120-12-7	Anthracene	ND	2400	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2400	ug/kg	
50-32-8	Benzo(a)pyrene	ND	490	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	490	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	490	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	490	ug/kg	
218-01-9	Chrysene	ND	2400	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	490	ug/kg	
206-44-0	Fluoranthene	ND	2400	ug/kg	
86-73-7	Fluorene	ND	2400	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	490	ug/kg	
91-20-3	Naphthalene	ND	2400	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2400	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2400	ug/kg	
85-01-8	Phenanthrene	ND	2400	ug/kg	
129-00-0	Pyrene	ND	2400	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	99%		37-158%
92-94-4	p-Terphenyl	101%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708A		
Lab Sample ID:	F10146-3	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	71.9
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008067.D	4	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3700	ug/kg	
208-96-8	Acenaphthylene	ND	3700	ug/kg	
120-12-7	Anthracene	ND	1800	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1800	ug/kg	
50-32-8	Benzo(a)pyrene	ND	370	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	370	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	370	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	370	ug/kg	
218-01-9	Chrysene	ND	1800	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	370	ug/kg	
206-44-0	Fluoranthene	ND	1800	ug/kg	
86-73-7	Fluorene	ND	1800	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	370	ug/kg	
91-20-3	Naphthalene	ND	1800	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1800	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1800	ug/kg	
85-01-8	Phenanthrene	ND	1800	ug/kg	
129-00-0	Pyrene	ND	1800	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	101%		37-158%
92-94-4	p-Terphenyl	100%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719A		
Lab Sample ID:	F10146-1	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	71.0
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008063.D	5	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4700	ug/kg	
208-96-8	Acenaphthylene	ND	4700	ug/kg	
120-12-7	Anthracene	ND	2300	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2300	ug/kg	
50-32-8	Benzo(a)pyrene	292	470	ug/kg	J
205-99-2	Benzo(b)fluoranthene	368	470	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	470	ug/kg	
207-08-9	Benzo(k)fluoranthene	152	470	ug/kg	J
218-01-9	Chrysene	ND	2300	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	470	ug/kg	
206-44-0	Fluoranthene	ND	2300	ug/kg	
86-73-7	Fluorene	ND	2300	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	305	470	ug/kg	J
91-20-3	Naphthalene	ND	2300	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2300	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2300	ug/kg	
85-01-8	Phenanthrene	ND	2300	ug/kg	
129-00-0	Pyrene	ND	2300	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	98%		37-158%
92-94-4	p-Terphenyl	97%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-739		
Lab Sample ID:	F10146-4	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	66.2
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008068.D	4	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4000	ug/kg	
208-96-8	Acenaphthylene	ND	4000	ug/kg	
120-12-7	Anthracene	ND	2000	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2000	ug/kg	
50-32-8	Benzo(a)pyrene	ND	400	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	400	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	400	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	400	ug/kg	
218-01-9	Chrysene	ND	2000	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	400	ug/kg	
206-44-0	Fluoranthene	ND	2000	ug/kg	
86-73-7	Fluorene	ND	2000	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	400	ug/kg	
91-20-3	Naphthalene	ND	2000	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2000	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2000	ug/kg	
85-01-8	Phenanthrene	ND	2000	ug/kg	
129-00-0	Pyrene	ND	2000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	100%		37-158%
92-94-4	p-Terphenyl	103%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

045

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-740		
Lab Sample ID:	F10146-5	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	77.6
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008069.D	5	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4300	ug/kg	
208-96-8	Acenaphthylene	ND	4300	ug/kg	
120-12-7	Anthracene	ND	2100	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2100	ug/kg	
50-32-8	Benzo(a)pyrene	ND	430	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	430	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	430	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	430	ug/kg	
218-01-9	Chrysene	ND	2100	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	430	ug/kg	
206-44-0	Fluoranthene	ND	2100	ug/kg	
86-73-7	Fluorene	ND	2100	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	430	ug/kg	
91-20-3	Naphthalene	ND	2100	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2100	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2100	ug/kg	
85-01-8	Phenanthrene	ND	2100	ug/kg	
129-00-0	Pyrene	ND	2100	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	86%		37-158%
92-94-4	p-Terphenyl	89%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-741		
Lab Sample ID:	F10146-6	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	69.2
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008071.D	2	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	1900	ug/kg	
208-96-8	Acenaphthylene	ND	1900	ug/kg	
120-12-7	Anthracene	ND	960	ug/kg	
56-55-3	Benzo(a)anthracene	ND	960	ug/kg	
50-32-8	Benzo(a)pyrene	ND	190	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	190	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	190	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	190	ug/kg	
218-01-9	Chrysene	ND	960	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	190	ug/kg	
206-44-0	Fluoranthene	ND	960	ug/kg	
86-73-7	Fluorene	ND	960	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	190	ug/kg	
91-20-3	Naphthalene	ND	960	ug/kg	
90-12-0	1-Methylnaphthalene	ND	960	ug/kg	
91-57-6	2-Methylnaphthalene	ND	960	ug/kg	
85-01-8	Phenanthrene	ND	960	ug/kg	
129-00-0	Pyrene	ND	960	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		37-158%
92-94-4	p-Terphenyl	95%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP3		
Lab Sample ID:	F10146-9	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	75.6
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008074.D	5	06/29/01	MRE	06/28/01	OP3397	GAA336
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4400	ug/kg	
208-96-8	Acenaphthylene	ND	4400	ug/kg	
120-12-7	Anthracene	ND	2200	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2200	ug/kg	
50-32-8	Benzo(a)pyrene	282	440	ug/kg	J
205-99-2	Benzo(b)fluoranthene	424	440	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	ND	440	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	440	ug/kg	
218-01-9	Chrysene	ND	2200	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	440	ug/kg	
206-44-0	Fluoranthene	ND	2200	ug/kg	
86-73-7	Fluorene	ND	2200	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	313	440	ug/kg	J
91-20-3	Naphthalene	ND	2200	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2200	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2200	ug/kg	
85-01-8	Phenanthrene	ND	2200	ug/kg	
129-00-0	Pyrene	ND	2200	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	99%		37-158%
92-94-4	p-Terphenyl	94%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 3, 2001**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – LEAD, CEC & TOC**
CTO-039 NAS CECIL FIELD
SAMPLE DELIVERY GROUP (SDG) – F10146

SAMPLES: 9/Soils/

CEF-015-SS-001	CEF-015-SS-707	CEF-015-SS-707A
CEF-015-SS-708A	CEF-015-SS-719A	CEF-015-SS-739
CEF-015-SS-740	CEF-015-SS-741	CEF-015-SS-DUP3

Overview

The sample set for CTO 039, NAS Cecil Field, SDG F10146, consists of nine (9) soil environmental samples. One field duplicate pair (CEF-015-SS-DUP3 / CEF-015-SS-719A) is included in this SDG.

All samples except CEF-015-SS-DUP3 were analyzed for lead, cation exchange capacity (CEC) and total organic carbon (TOC). Sample CEF-015-SS-DUP3 was analyzed for lead only. The samples were collected by TetraTech NUS from June 23-25, 2001 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Lead analyses were conducted using SW 846 method 6010B. CEC analyses were conducted using SW 846 method 9081. TOC analyses were conducted using the Army Corps of Engineering's test method 81M.

Lead analyses were conducted using Inductively Coupled Plasma (ICP) methodologies.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Lead	2.2 µg/L	1.1 mg/kg

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. No qualification of results was necessary because all reported results were greater than the action level.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
N01 = Internal Standard Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-~~0~~7 01			CEF-015-SS-707			CEF-015-SS-707A			CEF-015-SS-708A		
SAMPLE DATE:	06/23/01			06/25/01			06/25/01			06/23/01		
LABORATORY ID:	F10146-2			F10146-8			F10146-7			F10146-3		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	74.2 %			67.1 %			67.1 %			68.4 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	419			3080			672			894		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-719A			CEF-015-SS-739			CEF-015-SS-740			CEF-015-SS-741		
SAMPLE DATE:	06/23/01			06/24/01			06/24/01			06/24/01		
LABORATORY ID:	F10146-1			F10146-4			F10146-5			F10146-6		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	71.0 %			66.2 %			77.6 %			69.2 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	109			11.4			9.3			7.8		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-DUP3			
SAMPLE DATE:	06/23/01	/ /	/ /	/ /
LABORATORY ID:	F10146-9			
QC_TYPE:	NORMAL			
% SOLIDS:	4.0 %	100.0 %	100.0 %	100.0 %
UNITS:	MG/KG			
FIELD DUPLICATE OF:	CEF-015-SS-719A			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	86.6											

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-001	CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708A
SAMPLE DATE:	06/23/01	06/25/01	06/25/01	06/23/01
LABORATORY ID:	F10146-2	F10146-8	F10146-7	F10146-3
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	74.2 %	67.1 %	67.1 %	68.4 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	5350			7820			9610			7830		
TOTAL ORGANIC CARBON(MG/KG)	63300			121000			119000			98600		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10146

SAMPLE NUMBER:	CEF-015-SS-719A			CEF-015-SS-739			CEF-015-SS-740			CEF-015-SS-741		
SAMPLE DATE:	06/23/01			06/24/01			06/24/01			06/24/01		
LABORATORY ID:	F10146-1			F10146-4			F10146-5			F10146-6		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	71.0 %			66.2 %			77.6 %			69.2 %		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	9840			5440			5810			6610		
TOTAL ORGANIC CARBON(MG/KG)	80500			59700			55000			71500		

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-001 = SS-701		
Lab Sample ID:	F10146-2	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	74.2
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	419	12	0.15	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707		
Lab Sample ID:	F10146-8	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	67.1
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	3080	15	0.18	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707A		
Lab Sample ID:	F10146-7	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	68.4
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	672	14	0.16	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708A		
Lab Sample ID:	F10146-3	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	71.9
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	894	13	0.15	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719A		
Lab Sample ID:	F10146-1	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	71.0
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	109	14	0.16	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-739		
Lab Sample ID:	F10146-4	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	66.2
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	11.4 B	16	0.18	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-740		
Lab Sample ID:	F10146-5	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	77.6
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method
Lead	9.3 B	13	0.16	mg/kg	1	06/27/01	07/02/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-741		
Lab Sample ID:	F10146-6	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	69.2
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	7.8 B	14	0.16	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP3		
Lab Sample ID:	F10146-9	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	75.6
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	86.6	13	0.15	mg/kg	1	06/27/01	07/02/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-001 (= SS-701)		
Lab Sample ID:	F10146-2	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5350	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 23.3 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-001 = SS-701		
Lab Sample ID:	F10146-2	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	74.2
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Total Organic Carbon	63300	1300	mg/kg	1	06/30/01	LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707		
Lab Sample ID:	F10146-8	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	7820	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 34 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707		
Lab Sample ID:	F10146-8	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	67.1
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	121000	1500	mg/kg	1	07/02/01 VL	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707A		
Lab Sample ID:	F10146-7	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	9610	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 41.8 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-707A		
Lab Sample ID:	F10146-7	**Date Sampled:**	06/25/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	68.4
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	119000	1500	mg/kg	1	06/30/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708A		
Lab Sample ID:	F10146-3	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	7830	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 34 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708A		
Lab Sample ID:	F10146-3	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	71.9
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	98600	1400	mg/kg	1	06/30/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719A		
Lab Sample ID:	F10146-1	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	9840	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 42.8 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719A		
Lab Sample ID:	F10146-1	**Date Sampled:**	06/23/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	71.0
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	80500	1400	mg/kg	1	06/30/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-739		
Lab Sample ID:	F10146-4	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5440	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 23.7 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-739		
Lab Sample ID:	F10146-4	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	66.2
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	59700	1500	mg/kg	1	06/30/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-740		
Lab Sample ID:	F10146-5	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5810	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 25.3 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-740		
Lab Sample ID:	F10146-5	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	77.6
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	55000	1300	mg/kg	1	06/30/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-741		
Lab Sample ID:	F10146-6	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/28/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	6610	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 29.2 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-741		
Lab Sample ID:	F10146-6	**Date Sampled:**	06/24/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	69.2
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Total Organic Carbon	71500	1400	mg/kg	1	06/30/01	LCH	CORP ENG 81 M

RL = Reporting Limit

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 3, 2001**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – LEAD, CEC & TOC**
CTO-039 NAS CECIL FIELD
SAMPLE DELIVERY GROUP (SDG) – F10200

SAMPLES: 8/Soils/

CEF-015-SS-703	CEF-015-SS-704	CEF-015-SS-706
CEF-015-SS-708	CEF-015-SS-709	CEF-015-SS-717
CEF-015-SS-719	CEF-015-SS-724B	

Overview

The sample set for CTO 039, NAS Cecil Field, SDG F10200, consists of eight (8) soil environmental samples.

All samples except CEF-015-SS-724B were analyzed for lead, cation exchange capacity (CEC) and total organic carbon (TOC). Sample CEF-015-SS-724B was analyzed for lead only. The samples were collected by TetraTech NUS from June 26-27, 2001 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Lead analyses were conducted using SW 846 method 6010B. CEC analyses were conducted using SW 846 method 9081. TOC analyses were conducted using the Army Corps of Engineering's test method 81M.

Lead analyses were conducted using Inductively Coupled Plasma (ICP) methodologies.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Lead[1]	0.26 mg/kg	1.3 mg/kg

[1] Maximum contamination present in a solid preparation blank.

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. No qualification of results was necessary because all reported results were greater than the action level.

Notes

The Contract Required Detection Limit (CRDL) percent recovery for lead was > 120% quality control limit. No validation action was taken, as per functional guidance.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
N01 = Internal Standard Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-703			CEF-015-SS-704			CEF-015-SS-706			CEF-015-SS-708		
SAMPLE DATE:	06/27/01			06/26/01			06/27/01			06/26/01		
LABORATORY ID:	F10200-7			F10200-4			F10200-6			F10200-2		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	79.4 %			81.2 %			81.7 %			59.6 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	1400			3380			5470			2200		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-709			CEF-015-SS-717			CEF-015-SS-719			CEF-015-SS-724B		
SAMPLE DATE:	06/26/01			06/27/01			06/26/01			06/27/01		
LABORATORY ID:	F10200-3			F10200-5			F10200-1			F10200-8		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	83.4 %			84.1 %			77.0 %			81.3 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	709			120			66.3			31.0		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-703			CEF-015-SS-704			CEF-015-SS-706			CEF-015-SS-708		
SAMPLE DATE:	06/27/01			06/26/01			06/27/01			06/26/01		
LABORATORY ID:	F10200-7			F10200-4			F10200-6			F10200-2		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	79.4 %			81.2 %			81.7 %			59.6 %		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	5010			5840			4730			8950		
TOTAL ORGANIC CARBON(MG/KG)	40700			53700			25300			93000		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10200

SAMPLE NUMBER:	CEF-015-SS-709	CEF-015-SS-717	CEF-015-SS-719	/ /
SAMPLE DATE:	06/26/01	06/27/01	06/26/01	
LABORATORY ID:	F10200-3	F10200-5	F10200-1	
QC_TYPE:	NORMAL	NORMAL	NORMAL	
% SOLIDS:	83.4 %	84.1 %	77.0 %	100.0 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	5360			5310			4190					
TOTAL ORGANIC CARBON(MG/KG)	30400			32900			37100					

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-703		
Lab Sample ID:	F10200-7	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	79.4
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	1400	12	0.14	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-704		
Lab Sample ID:	F10200-4	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	81.2
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	3380	11	0.13	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-706		
Lab Sample ID:	F10200-6	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	81.7
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	5470	11	0.13	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708		
Lab Sample ID:	F10200-2	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	59.6
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method
Lead	2200	14	0.16	mg/kg	1	07/03/01	07/06/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-709		
Lab Sample ID:	F10200-3	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	83.4
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	709	12	0.14	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-717		
Lab Sample ID:	F10200-5	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	84.1
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	120	7.8	0.091	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719		
Lab Sample ID:	F10200-1	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	77.0
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	66.3	8.5	0.099	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-724B		
Lab Sample ID:	F10200-8	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	81.3
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	31.0	9.1	0.11	mg/kg	1	07/03/01	07/06/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-703		
Lab Sample ID:	F10200-7	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5010	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 21.8 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-703		
Lab Sample ID:	F10200-7	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	79.4
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	40700	1200	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-704		
Lab Sample ID:	F10200-4	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5840	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 25.4 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-704		
Lab Sample ID:	F10200-4	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	81.2
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	53700	1200	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-706		
Lab Sample ID:	F10200-6	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	4730	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 20.6 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-706		
Lab Sample ID:	F10200-6	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	81.7
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	25300	1200	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708		
Lab Sample ID:	F10200-2	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	8950	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 38.9 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-708		
Lab Sample ID:	F10200-2	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	59.6
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	93000	1700	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-709		
Lab Sample ID:	F10200-3	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5360	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 23.3 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-709		
Lab Sample ID:	F10200-3	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	83.4
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Total Organic Carbon	30400	1200	mg/kg	1	07/05/01	LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-717		
Lab Sample ID:	F10200-5	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5310	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 23.1 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-717		
Lab Sample ID:	F10200-5	**Date Sampled:**	06/27/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	84.1
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	32900	1200	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719		
Lab Sample ID:	F10200-1	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	4190	120	mg/kg	5	07/12/01 JA	SW846 9081

(a) 18.2 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-719		
Lab Sample ID:	F10200-1	**Date Sampled:**	06/26/01
Matrix:	SO - Soil	**Date Received:**	06/29/01
		Percent Solids:	77.0
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	37100	1300	mg/kg	1	07/05/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. M. SPERANZA**	**DATE:**	**AUGUST 7, 2001**
FROM:	**ANGELA SCHEETZ**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC AND INORGANIC DATA VALIDATION- /PAH/LEAD/TOC/CEC**
CTO 039, NAS CECIL FIELD
SDG F10089

SAMPLES: 7/Soil

CEF-015-SS-721	CEF-015-SS-722	CEF-015-SS-724
CEF-015-SS-732	CEF-015-SS-733	CEF-015-SS-734
CEF-015-SS-737		

OVERVIEW

The sample set for CTO 039, NAS Cecil Field, SDG F10089 consists of seven (7) soil environmental samples. The samples were analyzed for polynuclear aromatic hydrocarbons (PAHs), lead, total organic carbon (TOC), and cation exchange capacity (CEC). No sample duplicates were included in this SDG.

The samples were collected by TetraTech NUS on June 19 and 20, 2001 and analyzed by Accutest. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. PAHs were conducted using SW-846 Methods 8310. Lead analyses were conducted using SW 846 6010B. CEC analyses were conducted using SW 846 method 9081. TOC analyses were conducted using method CORP ENG 81 M.

Lead analyses were conducted using Inductively Coupled Plasma (ICP) methodologies. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
* • Initial and continuing calibration
• Laboratory method and field quality control blank results
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Polynuclear aromatic hydrocarbons

No qualifications were made for this fraction.

Lead

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Lead	1.9 μg/L	0.95 mg/kg

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. No qualification of results was necessary because all reported results were greater than the action level.

TOC & CEC

No qualifications were made to these fractions.

Notes

Dilution factors were used in the PAH fraction for the following samples:

CEF-015-SS-721	40X	CEF-015-SS-722	4X
CEF-015-SS-724	4X	CEF-015-SS-732	4X
CEF-015-SS-733	10X	CEF-015-SS-734	80X
CEF-015-SS-737	4X		

A dilution factor of 5X was used in the CEC analysis for all samples. No qualifications were made on this basis.

EXECUTIVE SUMMARY

Laboratory Performance Issues: None.

Other Factors Affecting Data Quality: Dilution factors were used in the PAH and CEC fractions.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99), the NFESC guidelines (September, 1999), and the National Functional Guidelines for Inorganic Review (February, 1994). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Angela Scheetz
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-721			CEF-015-SS-722			CEF-015-SS-724			CEF-015-SS-732		
SAMPLE DATE:	06/19/01			06/20/01			06/20/01			06/20/01		
LABORATORY ID:	F10089-1			F10089-5			F10089-6			F10089-4		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	76.3 %			71.3 %			73.5 %			77.5 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	17000	U		1900	U		1800	U		1700	U	
2-METHYLNAPHTHALENE	17000	U		1900	U		1800	U		1700	U	
ACENAPHTHENE	35000	U		3700	U		3600	U		3400	U	
ACENAPHTHYLENE	35000	U		3700	U		3600	U		3400	U	
ANTHRACENE	17000	U		1900	U		1800	U		1700	U	
BENZO(A)ANTHRACENE	36500			1900	U		1800	U		863	J	P
BENZO(A)PYRENE	43300			370	U		460			576		
BENZO(B)FLUORANTHENE	31400			370	U		629			489		
BENZO(G,H,I)PERYLENE	29800			370	U		390			432		
BENZO(K)FLUORANTHENE	19500			370	U		214	J	P	271	J	P
CHRYSENE	43100			1900	U		1800	U		566	J	P
DIBENZO(A,H)ANTHRACENE	3000	J	P	370	U		360	U		340	U	
FLUORANTHENE	70500			1900	U		1800	U		783	J	P
FLUORENE	17000	U		1900	U		1800	U		1700	U	
INDENO(1,2,3-CD)PYRENE	30700			370	U		468			577		
NAPHTHALENE	17000	U		1900	U		1800	U		1700	U	
PHENANTHRENE	26800			1900	U		1800	U		1700	U	
PYRENE	61100			1900	U		1800	U		846	J	P

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-733			CEF-015-SS-734			CEF-015-SS-737					
SAMPLE DATE:	06/19/01			06/19/01			06/20/01			/ /		
LABORATORY ID:	F10089-3			F10089-2			F10089-7					
QC_TYPE:	NORMAL			NORMAL			NORMAL					
% SOLIDS:	81.5 %			80.3 %			70.8 %			100.0 %		
UNITS:	UG/KG			UG/KG			UG/KG					
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	4100	U		33000	U		1900	U				
2-METHYLNAPHTHALENE	4100	U		33000	U		1900	U				
ACENAPHTHENE	8200	U		66000	U		3800	U				
ACENAPHTHYLENE	8200	U		66000	U		3800	U				
ANTHRACENE	4100	U		33000	U		1900	U				
BENZO(A)ANTHRACENE	8520			59900			1900	U				
BENZO(A)PYRENE	10000			71300			739					
BENZO(B)FLUORANTHENE	7090			49200			696					
BENZO(G,H,I)PERYLENE	6880			44400			578					
BENZO(K)FLUORANTHENE	4510			29800			366	J	P			
CHRYSENE	9680			71600			1900	U				
DIBENZO(A,H)ANTHRACENE	927			3650	J	P	380	U				
FLUORANTHENE	15600			113000			972	J	P			
FLUORENE	4100	U		33000	U		1900	U				
INDENO(1,2,3-CD)PYRENE	6820			47100			638					
NAPHTHALENE	4100	U		33000	U		1900	U				
PHENANTHRENE	6290			35200			1900	U				
PYRENE	13400			104000			969	J	P			

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-721			CEF-015-SS-722			CEF-015-SS-724			CEF-015-SS-732		
SAMPLE DATE:	06/19/01			06/20/01			06/20/01			06/20/01		
LABORATORY ID:	F10089-1			F10089-5			F10089-6			F10089-4		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	76.3 %			71.3 %			73.5 %			77.5 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	102			23.4			48.5			214		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-733	CEF-015-SS-734	CEF-015-SS-737	
SAMPLE DATE:	06/19/01	06/19/01	06/20/01	/ /
LABORATORY ID:	F10089-3	F10089-2	F10089-7	
QC_TYPE:	NORMAL	NORMAL	NORMAL	
% SOLIDS:	81.5 %	80.3 %	70.8 %	100.0 %
UNITS:	MG/KG	MG/KG	MG/KG	
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	336			73.0			45.8					

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-721	CEF-015-SS-722	CEF-015-SS-724	CEF-015-SS-732
SAMPLE DATE:	06/19/01	06/20/01	06/20/01	06/20/01
LABORATORY ID:	F10089-1	F10089-5	F10089-6	F10089-4
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	76.3 %	71.3 %	73.5 %	77.5 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	5470			6800			4970			4590		
TOTAL ORGANIC CARBON(MG/KG)	58600			68600			49200			53600		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10089

SAMPLE NUMBER:	CEF-015-SS-733	CEF-015-SS-734	CEF-015-SS-737	
SAMPLE DATE:	06/19/01	06/19/01	06/20/01	/ /
LABORATORY ID:	F10089-3	F10089-2	F10089-7	
QC_TYPE:	NORMAL	NORMAL	NORMAL	
% SOLIDS:	81.5 %	80.3 %	70.8 %	100.0 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	7130			6140			6580					
TOTAL ORGANIC CARBON(MG/KG)	43000			48500			42100					

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-721		
Lab Sample ID:	F10089-1	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	76.3
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008146.D	40	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	35000	ug/kg	
208-96-8	Acenaphthylene	ND	35000	ug/kg	
120-12-7	Anthracene	ND	17000	ug/kg	
56-55-3	Benzo(a)anthracene	36500	17000	ug/kg	
50-32-8	Benzo(a)pyrene	43300	3500	ug/kg	
205-99-2	Benzo(b)fluoranthene	31400	3500	ug/kg	
191-24-2	Benzo(g,h,i)perylene	29800	3500	ug/kg	
207-08-9	Benzo(k)fluoranthene	19500	3500	ug/kg	
218-01-9	Chrysene	43100	17000	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	3000	3500	ug/kg	J
206-44-0	Fluoranthene	70500	17000	ug/kg	
86-73-7	Fluorene	ND	17000	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	30700	3500	ug/kg	
91-20-3	Naphthalene	ND	17000	ug/kg	
90-12-0	1-Methylnaphthalene	ND	17000	ug/kg	
91-57-6	2-Methylnaphthalene	ND	17000	ug/kg	
85-01-8	Phenanthrene	26800	17000	ug/kg	
129-00-0	Pyrene	61100	17000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		37-158%
92-94-4	p-Terphenyl	0% [b]		59-149%

(a) All hits confirmed by spectral match using a diode array detector.
(b) Outside control limits due to dilution.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-722		
Lab Sample ID:	F10089-5	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	71.3
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008150.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3700	ug/kg	
208-96-8	Acenaphthylene	ND	3700	ug/kg	
120-12-7	Anthracene	ND	1900	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1900	ug/kg	
50-32-8	Benzo(a)pyrene	ND	370	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	370	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	370	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	370	ug/kg	
218-01-9	Chrysene	ND	1900	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	370	ug/kg	
206-44-0	Fluoranthene	ND	1900	ug/kg	
86-73-7	Fluorene	ND	1900	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	370	ug/kg	
91-20-3	Naphthalene	ND	1900	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1900	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1900	ug/kg	
85-01-8	Phenanthrene	ND	1900	ug/kg	
129-00-0	Pyrene	ND	1900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		37-158%
92-94-4	p-Terphenyl	93%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-724		
Lab Sample ID:	F10089-6	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	73.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008151.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3600	ug/kg	
208-96-8	Acenaphthylene	ND	3600	ug/kg	
120-12-7	Anthracene	ND	1800	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1800	ug/kg	
50-32-8	Benzo(a)pyrene	460	360	ug/kg	
205-99-2	Benzo(b)fluoranthene	629	360	ug/kg	
191-24-2	Benzo(g,h,i)perylene	390	360	ug/kg	
207-08-9	Benzo(k)fluoranthene	214	360	ug/kg	J
218-01-9	Chrysene	ND	1800	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	360	ug/kg	
206-44-0	Fluoranthene	ND	1800	ug/kg	
86-73-7	Fluorene	ND	1800	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	468	360	ug/kg	
91-20-3	Naphthalene	ND	1800	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1800	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1800	ug/kg	
85-01-8	Phenanthrene	ND	1800	ug/kg	
129-00-0	Pyrene	ND	1800	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	99%		37-158%
92-94-4	p-Terphenyl	102%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-732		
Lab Sample ID:	F10089-4	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	77.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008149.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3400	ug/kg	
208-96-8	Acenaphthylene	ND	3400	ug/kg	
120-12-7	Anthracene	ND	1700	ug/kg	
56-55-3	Benzo(a)anthracene	863	1700	ug/kg	J
50-32-8	Benzo(a)pyrene	576	340	ug/kg	
205-99-2	Benzo(b)fluoranthene	489	340	ug/kg	
191-24-2	Benzo(g,h,i)perylene	432	340	ug/kg	
207-08-9	Benzo(k)fluoranthene	271	340	ug/kg	J
218-01-9	Chrysene	566	1700	ug/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	340	ug/kg	
206-44-0	Fluoranthene	783	1700	ug/kg	J
86-73-7	Fluorene	ND	1700	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	577	340	ug/kg	
91-20-3	Naphthalene	ND	1700	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1700	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1700	ug/kg	
85-01-8	Phenanthrene	ND	1700	ug/kg	
129-00-0	Pyrene	846	1700	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%		37-158%
92-94-4	p-Terphenyl	88%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-733		
Lab Sample ID:	F10089-3	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	81.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008148.D	10	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	8200	ug/kg	
208-96-8	Acenaphthylene	ND	8200	ug/kg	
120-12-7	Anthracene	ND	4100	ug/kg	
56-55-3	Benzo(a)anthracene	8520	4100	ug/kg	
50-32-8	Benzo(a)pyrene	10000	820	ug/kg	
205-99-2	Benzo(b)fluoranthene	7090	820	ug/kg	
191-24-2	Benzo(g,h,i)perylene	6880	820	ug/kg	
207-08-9	Benzo(k)fluoranthene	4510	820	ug/kg	
218-01-9	Chrysene	9680	4100	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	927	820	ug/kg	
206-44-0	Fluoranthene	15600	4100	ug/kg	
86-73-7	Fluorene	ND	4100	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	6820	820	ug/kg	
91-20-3	Naphthalene	ND	4100	ug/kg	
90-12-0	1-Methylnaphthalene	ND	4100	ug/kg	
91-57-6	2-Methylnaphthalene	ND	4100	ug/kg	
85-01-8	Phenanthrene	6290	4100	ug/kg	
129-00-0	Pyrene	13400	4100	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	118%		37-158%
92-94-4	p-Terphenyl	186% [b]		59-149%

(a) All hits confirmed by spectral match using a diode array detector.
(b) Outside control limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-734		
Lab Sample ID:	F10089-2	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	80.3
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008147.D	80	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	66000	ug/kg	
208-96-8	Acenaphthylene	ND	66000	ug/kg	
120-12-7	Anthracene	ND	33000	ug/kg	
56-55-3	Benzo(a)anthracene	59900	33000	ug/kg	
50-32-8	Benzo(a)pyrene	71300	6600	ug/kg	
205-99-2	Benzo(b)fluoranthene	49200	6600	ug/kg	
191-24-2	Benzo(g,h,i)perylene	44400	6600	ug/kg	
207-08-9	Benzo(k)fluoranthene	29800	6600	ug/kg	
218-01-9	Chrysene	71600	33000	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	3650	6600	ug/kg	J
206-44-0	Fluoranthene	113000	33000	ug/kg	
86-73-7	Fluorene	ND	33000	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	47100	6600	ug/kg	
91-20-3	Naphthalene	ND	33000	ug/kg	
90-12-0	1-Methylnaphthalene	ND	33000	ug/kg	
91-57-6	2-Methylnaphthalene	ND	33000	ug/kg	
85-01-8	Phenanthrene	35200	33000	ug/kg	
129-00-0	Pyrene	104000	33000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		37-158%
92-94-4	p-Terphenyl	0% [b]		59-149%

(a) All hits confirmed by spectral match using a diode array detector.
(b) Outside control limits due to dilution.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-737		
Lab Sample ID:	F10089-7	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	70.8
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008152.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3800	ug/kg	
208-96-8	Acenaphthylene	ND	3800	ug/kg	
120-12-7	Anthracene	ND	1900	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1900	ug/kg	
50-32-8	Benzo(a)pyrene	739	380	ug/kg	
205-99-2	Benzo(b)fluoranthene	696	380	ug/kg	
191-24-2	Benzo(g,h,i)perylene	578	380	ug/kg	
207-08-9	Benzo(k)fluoranthene	366	380	ug/kg	J
218-01-9	Chrysene	ND	1900	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	380	ug/kg	
206-44-0	Fluoranthene	972	1900	ug/kg	J
86-73-7	Fluorene	ND	1900	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	638	380	ug/kg	
91-20-3	Naphthalene	ND	1900	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1900	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1900	ug/kg	
85-01-8	Phenanthrene	ND	1900	ug/kg	
129-00-0	Pyrene	969	1900	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	86%		37-158%
92-94-4	p-Terphenyl	95%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-721		
Lab Sample ID:	F10089-1	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	76.3
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	102	14	0.16	mg/kg	1	06/21/01	06/25/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-722		
Lab Sample ID:	F10089-5	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	71.3
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	23.4	13	0.16	mg/kg	1	06/21/01	06/25/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-724		
Lab Sample ID:	F10089-6	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	73.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	48.5	13	0.16	mg/kg	1	06/21/01	06/25/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-732		
Lab Sample ID:	F10089-4	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	77.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	214	13	0.15	mg/kg	1	06/21/01	06/25/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-733		
Lab Sample ID:	F10089-3	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	81.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	336	12	0.14	mg/kg	1	06/21/01	06/25/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-734		
Lab Sample ID:	F10089-2	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	80.3
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	73.0	12	0.15	mg/kg	1	06/21/01	06/25/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-737		
Lab Sample ID:	F10089-7	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	70.8
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	45.8	15	0.17	mg/kg	1	06/21/01	06/25/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-721		
Lab Sample ID:	F10089-1	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	76.3
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	5470	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	5470	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	76.3		%	1	06/25/01	LJR	EPA 160.3 M
Total Organic Carbon	58600	1300	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 23.8 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-722		
Lab Sample ID:	F10089-5	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	71.3
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	6800	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	6800	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	71.3		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	68600	1400	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 29.2 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-724		
Lab Sample ID:	F10089-6	**Date Sampled:**	06/20/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	73.5
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	4970	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	4970	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	73.5		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	49200	1400	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 21.6 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-732	**Date Sampled:**	06/20/01
Lab Sample ID:	F10089-4	**Date Received:**	06/21/01
Matrix:	SO - Soil	**Percent Solids:**	77.5
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	4590	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	4590	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	77.5		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	53600	1300	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 20 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-733	**Date Sampled:**	06/19/01
Lab Sample ID:	F10089-3	**Date Received:**	06/21/01
Matrix:	SO - Soil	**Percent Solids:**	81.5
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	7130	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	7130	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	81.5		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	43000	1200	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 31 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-734		
Lab Sample ID:	F10089-2	**Date Sampled:**	06/19/01
Matrix:	SO - Soil	**Date Received:**	06/21/01
		Percent Solids:	80.3
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	6140	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	6140	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	80.3		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	48500	1200	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 26.7 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-737	**Date Sampled:**	06/20/01
Lab Sample ID:	F10089-7	**Date Received:**	06/21/01
Matrix:	SO - Soil	**Percent Solids:**	70.8
Project:	Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By		Method
Cation Exchange Capacity [a]	6580	120	mg/kg	5	07/13/01	ATX	SW846 9081
Cation Exchange Capacity	6580	120	mg/kg	5	07/13/01	ATX	SW846 9081
Solids, Percent	70.8		%	1	06/25/01	LIR	EPA 160.3 M
Total Organic Carbon	42100	1400	mg/kg	1	06/26/01	ANJ	CORP ENG 81 M

(a) 28.6 meq/100g

RL = Reporting Limit

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. M. SPERANZA**	**DATE:**	**AUGUST 7, 2001**
FROM:	**ANGELA SCHEETZ**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC AND INORGANIC DATA VALIDATION- /PAH/LEAD/TOC/CEC**
CTO 039, NAS CECIL FIELD
SDG F10128

SAMPLES: 7/Soil

CEF-015-SS-726A	CEF-015-SS-727A	CEF-015-SS-728A
CEF-015-SS-735A	CEF-015-SS-736A	CEF-015-SS-DUP1
CEF-015-SS-DUP2		

OVERVIEW

The sample set for CTO 039, NAS Cecil Field, SDG F10128 consists of seven (7) soil environmental samples. All samples were analyzed for polynuclear aromatic hydrocarbons (PAHs), and lead. All samples except, CEF-015-SS-DUP1 and CEF-015-SS-DUP2 were analyzed for total organic carbon (TOC) and cation exchange capacity (CEC). Two sample duplicate pairs were included in this SDG, CEF-015-SS-DUP1 / CEF-015-SS-735A and CEF-015-SS-DUP2 / CEF-015-SS-727A.

The samples were collected by TetraTech NUS on June 21 and 22, 2001 and analyzed by Accutest. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. PAHs were conducted using SW-846 Methods 8310. Lead analyses were conducted using SW 846 6010B. CEC analyses were conducted using SW 846 method 9081. TOC analyses were conducted using method CORP ENG 81 M.

Lead analyses were conducted using Inductively Coupled Plasma (ICP) methodologies. The data contained in this SDG were validated with regard to the following parameters:

*	•	Data completeness
*	•	Holding times
*	•	Initial and continuing calibration
	•	Laboratory method and field quality control blank results
*	•	Detection Limits
*	•	Field duplicate results

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Polynuclear aromatic hydrocarbons

No qualifications were made for this fraction.

Lead

The following contaminants were detected in the laboratory method/preparation blanks at the following

The field duplicate summary is prese fractions.

EXECUTIVE SUMMARY

Laboratory Performance Issues: ted in the PAH fraction because of the following dilution factors:

Other Factors Affecting Data Qu X

X	CEF-015-SS-727A	4X
X	CEF-015-SS-735A	4X
X	CEF-015-SS-DUP1	4X
X		

the CEC analysis for all samples. No qualifications were made on thi

ented in Appendix C.

None.

lity: Dilution factors were used in the PAH and CEC fractions.

TO: **M. SPERANZA – PAGE**
DATE: **AUGUST 7, 2001**

maximum concentrations:

Analyte
Lead

An action level of 5X the r
contamination. Sample a
consideration when eval
qualified as nondetected.

2

TOC & CEC

No qualifications were made to the

Notes	Maximum Concentration	Action Level
Elevated reporting limits were repo	1.8 µg/L	0.90 mg/kg

CEF-015-SS-726A 8
CEF-015-SS-728A 5
CEF-015-SS-736A 4
CEF-015-SS-DUP2 4

maximum concentration was used to evaluate the sample data for blan
liquot, percent solids and dilution factors, if applicable, were taken int
uating for blank contamination. Results below the action level wer

A dilution factor of 5X was used in

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99), the NFESC guidelines (September, 1999), and the National Functional Guidelines for Inorganic Review (February, 1994). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Angela Scheetz

Tetra Tech NUS

Angela Scheetz
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-726A			CEF-015-SS-727A			CEF-015-SS-728A			CEF-015-SS-735A		
SAMPLE DATE:	06/21/01			06/22/01			06/21/01			06/21/01		
LABORATORY ID:	F10128-3			F10128-4			F10128-1			F10128-2		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	84.8 %			84.6 %			77.5 %			81.4 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	31000	U		1600	U		2200	U		1600	U	
2-METHYLNAPHTHALENE	31000	U		1600	U		2200	U		1600	U	
ACENAPHTHENE	63000	U		3200	U		4300	U		3300	U	
ACENAPHTHYLENE	63000	U		3200	U		4300	U		3300	U	
ANTHRACENE	23700	J	P	1600	U		2200	U		1600	U	
BENZO(A)ANTHRACENE	111000			1440	J	P	4560			1600	U	
BENZO(A)PYRENE	116000			1610			5500			291	J	P
BENZO(B)FLUORANTHENE	83300			1250			4150			327	J	P
BENZO(G,H,I)PERYLENE	63300			1190			3890			280	J	P
BENZO(K)FLUORANTHENE	56000			768			2560			330	U	
CHRYSENE	116000			1610			5130			1600	U	
DIBENZO(A,H)ANTHRACENE	9220			167	J	P	497			330	U	
FLUORANTHENE	211000			2660			8790			1600	U	
FLUORENE	31000	U		1600	U		2200	U		1600	U	
INDENO(1,2,3-CD)PYRENE	65400			1260			4050			360		
NAPHTHALENE	31000	U		1600	U		2200	U		1600	U	
PHENANTHRENE	87600			1220	J	P	3590			1600	U	
PYRENE	179000			2380			7620			1600	U	

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-736A			CEF-015-SS-DUP1			CEF-015-SS-DUP2					
SAMPLE DATE:	06/22/01			06/21/01			06/22/01			/ /		
LABORATORY ID:	F10128-5			F10128-6			F10128-7					
QC_TYPE:	NORMAL			NORMAL			NORMAL					
% SOLIDS:	63.5 %			88.9 %			87.5 %			100.0 %		
UNITS:	UG/KG			UG/KG			UG/KG					
FIELD DUPLICATE OF:				CEF-015-SS-735A			CEF-015-SS-727A					
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	2100	U		1500	U		1500	U				
2-METHYLNAPHTHALENE	2100	U		1500	U		1500	U				
ACENAPHTHENE	4200	U		3000	U		3000	U				
ACENAPHTHYLENE	4200	U		3000	U		3000	U				
ANTHRACENE	2100	U		1500	U		1500	U				
BENZO(A)ANTHRACENE	2100	U		1500	U		1570					
BENZO(A)PYRENE	420	U		298	J	P	1810					
BENZO(B)FLUORANTHENE	420	U		276	J	P	1430					
BENZO(G,H,I)PERYLENE	420	U		211	J	P	1460					
BENZO(K)FLUORANTHENE	420	U		152	J	P	878					
CHRYSENE	2100	U		1500	U		1770					
DIBENZO(A,H)ANTHRACENE	420	U		300	U		180	J	P			
FLUORANTHENE	2100	U		1500	U		2870					
FLUORENE	2100	U		1500	U		1500	U				
INDENO(1,2,3-CD)PYRENE	420	U		270	J	P	1430					
NAPHTHALENE	2100	U		1500	U		1500	U				
PHENANTHRENE	2100	U		1500	U		1260	J	P			
PYRENE	2100	U		1500	U		2580					

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-726A	CEF-015-SS-727A	CEF-015-SS-728A	CEF-015-SS-735A
SAMPLE DATE:	06/21/01	06/22/01	06/21/01	06/21/01
LABORATORY ID:	F10128-3	F10128-4	F10128-1	F10128-2
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	84.8 %	84.6 %	77.5 %	81.4 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	5540			3580			5530			5480		
TOTAL ORGANIC CARBON(MG/KG)	28000			31300			54100			53900		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-736A			
SAMPLE DATE:	06/22/01	/ /	/ /	/ /
LABORATORY ID:	F10128-5			
QC_TYPE:	NORMAL			
% SOLIDS:	63.5 %	100.0 %	100.0 %	100.0 %
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
MISCELLANEOUS PARAMETERS												
CATION EXCHANGE CAPACITY(MG/KG)	10200											
TOTAL ORGANIC CARBON(MG/KG)	137000											

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-726A	CEF-015-SS-727A	CEF-015-SS-728A	CEF-015-SS-735A
SAMPLE DATE:	06/21/01	06/22/01	06/21/01	06/21/01
LABORATORY ID:	F10128-3	F10128-4	F10128-1	F10128-2
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	84.8 %	84.6 %	77.5 %	81.4 %
UNITS:	MG/KG	MG/KG	MG/KG	MG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	532			276			84.8			40.5		

CTO039-NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F10128

SAMPLE NUMBER:	CEF-015-SS-736A			CEF-015-SS-DUP1			CEF-015-SS-DUP2					
SAMPLE DATE:	06/22/01			06/21/01			06/22/01			/ /		
LABORATORY ID:	F10128-5			F10128-6			F10128-7					
QC_TYPE:	NORMAL			NORMAL			NORMAL					
% SOLIDS:	63.5 %			88.9 %			87.5 %			100.0 %		
UNITS:	MG/KG			MG/KG			MG/KG					
FIELD DUPLICATE OF:				CEF-015-SS-735A			CEF-015-SS-727A					
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
LEAD	0.73	U	A	40.7			290					

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-726A		
Lab Sample ID:	F10128-3	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	84.8
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008156.D	80	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	63000	ug/kg	
208-96-8	Acenaphthylene	ND	63000	ug/kg	
120-12-7	Anthracene	23700	31000	ug/kg	J
56-55-3	Benzo(a)anthracene	111000	31000	ug/kg	
50-32-8	Benzo(a)pyrene	116000	6300	ug/kg	
205-99-2	Benzo(b)fluoranthene	83300	6300	ug/kg	
191-24-2	Benzo(g,h,i)perylene	63300	6300	ug/kg	
207-08-9	Benzo(k)fluoranthene	56000	6300	ug/kg	
218-01-9	Chrysene	116000	31000	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	9220	6300	ug/kg	
206-44-0	Fluoranthene	211000	31000	ug/kg	
86-73-7	Fluorene	ND	31000	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	65400	6300	ug/kg	
91-20-3	Naphthalene	ND	31000	ug/kg	
90-12-0	1-Methylnaphthalene	ND	31000	ug/kg	
91-57-6	2-Methylnaphthalene	ND	31000	ug/kg	
85-01-8	Phenanthrene	87600	31000	ug/kg	
129-00-0	Pyrene	179000	31000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	0% [b]		37-158%
92-94-4	p-Terphenyl	0% [b]		59-149%

(a) All hits confirmed by spectral match using a diode array detector.
(b) Outside control limits due to dilution.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-727A		
Lab Sample ID:	F10128-4	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	84.6
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008157.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3200	ug/kg	
208-96-8	Acenaphthylene	ND	3200	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	1440	1600	ug/kg	J
50-32-8	Benzo(a)pyrene	1610	320	ug/kg	
205-99-2	Benzo(b)fluoranthene	1250	320	ug/kg	
191-24-2	Benzo(g,h,i)perylene	1190	320	ug/kg	
207-08-9	Benzo(k)fluoranthene	768	320	ug/kg	
218-01-9	Chrysene	1610	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	167	320	ug/kg	J
206-44-0	Fluoranthene	2660	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	1260	320	ug/kg	
91-20-3	Naphthalene	ND	1600	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	1220	1600	ug/kg	J
129-00-0	Pyrene	2380	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		37-158%
92-94-4	p-Terphenyl	103%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-728A		
Lab Sample ID:	F10128-1	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	77.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008154.D	5	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4300	ug/kg	
208-96-8	Acenaphthylene	ND	4300	ug/kg	
120-12-7	Anthracene	ND	2200	ug/kg	
56-55-3	Benzo(a)anthracene	4560	2200	ug/kg	
50-32-8	Benzo(a)pyrene	5500	430	ug/kg	
205-99-2	Benzo(b)fluoranthene	4150	430	ug/kg	
191-24-2	Benzo(g,h,i)perylene	3890	430	ug/kg	
207-08-9	Benzo(k)fluoranthene	2560	430	ug/kg	
218-01-9	Chrysene	5130	2200	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	497	430	ug/kg	
206-44-0	Fluoranthene	8790	2200	ug/kg	
86-73-7	Fluorene	ND	2200	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	4050	430	ug/kg	
91-20-3	Naphthalene	ND	2200	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2200	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2200	ug/kg	
85-01-8	Phenanthrene	3590	2200	ug/kg	
129-00-0	Pyrene	7620	2200	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	81%		37-158%
92-94-4	p-Terphenyl	119%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-735A		
Lab Sample ID:	F10128-2	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	81.4
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008155.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3300	ug/kg	
208-96-8	Acenaphthylene	ND	3300	ug/kg	
120-12-7	Anthracene	ND	1600	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1600	ug/kg	
50-32-8	Benzo(a)pyrene	291	330	ug/kg	J
205-99-2	Benzo(b)fluoranthene	327	330	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	280	330	ug/kg	J
207-08-9	Benzo(k)fluoranthene	ND	330	ug/kg	
218-01-9	Chrysene	ND	1600	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	330	ug/kg	
206-44-0	Fluoranthene	ND	1600	ug/kg	
86-73-7	Fluorene	ND	1600	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	360	330	ug/kg	
91-20-3	Naphthalene	ND	1600	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1600	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1600	ug/kg	
85-01-8	Phenanthrene	ND	1600	ug/kg	
129-00-0	Pyrene	ND	1600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	104%		37-158%
92-94-4	p-Terphenyl	106%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-736A		
Lab Sample ID:	F10128-5	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	63.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008158.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	4200	ug/kg	
208-96-8	Acenaphthylene	ND	4200	ug/kg	
120-12-7	Anthracene	ND	2100	ug/kg	
56-55-3	Benzo(a)anthracene	ND	2100	ug/kg	
50-32-8	Benzo(a)pyrene	ND	420	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	420	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	420	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	420	ug/kg	
218-01-9	Chrysene	ND	2100	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	420	ug/kg	
206-44-0	Fluoranthene	ND	2100	ug/kg	
86-73-7	Fluorene	ND	2100	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	420	ug/kg	
91-20-3	Naphthalene	ND	2100	ug/kg	
90-12-0	1-Methylnaphthalene	ND	2100	ug/kg	
91-57-6	2-Methylnaphthalene	ND	2100	ug/kg	
85-01-8	Phenanthrene	ND	2100	ug/kg	
129-00-0	Pyrene	ND	2100	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%		37-158%
92-94-4	p-Terphenyl	93%		59-149%

(a) Dilution required due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP1		
Lab Sample ID:	F10128-6	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	88.9
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008159.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3000	ug/kg	
208-96-8	Acenaphthylene	ND	3000	ug/kg	
120-12-7	Anthracene	ND	1500	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1500	ug/kg	
50-32-8	Benzo(a)pyrene	298	300	ug/kg	J
205-99-2	Benzo(b)fluoranthene	276	300	ug/kg	J
191-24-2	Benzo(g,h,i)perylene	211	300	ug/kg	J
207-08-9	Benzo(k)fluoranthene	152	300	ug/kg	J
218-01-9	Chrysene	ND	1500	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	300	ug/kg	
206-44-0	Fluoranthene	ND	1500	ug/kg	
86-73-7	Fluorene	ND	1500	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	270	300	ug/kg	J
91-20-3	Naphthalene	ND	1500	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1500	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1500	ug/kg	
85-01-8	Phenanthrene	ND	1500	ug/kg	
129-00-0	Pyrene	ND	1500	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	102%		37-158%
92-94-4	p-Terphenyl	112%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP2		
Lab Sample ID:	F10128-7	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
Method:	EPA 8310 SW846 3550B	**Percent Solids:**	87.5
Project:	Cecil Field-Site 15		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	AA008160.D	4	07/04/01	MRE	06/29/01	OP3411	GAA341
Run #2							

Polynuclear Aromatic Hydrocarbons

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	ND	3000	ug/kg	
208-96-8	Acenaphthylene	ND	3000	ug/kg	
120-12-7	Anthracene	ND	1500	ug/kg	
56-55-3	Benzo(a)anthracene	1570	1500	ug/kg	
50-32-8	Benzo(a)pyrene	1810	300	ug/kg	
205-99-2	Benzo(b)fluoranthene	1430	300	ug/kg	
191-24-2	Benzo(g,h,i)perylene	1460	300	ug/kg	
207-08-9	Benzo(k)fluoranthene	878	300	ug/kg	
218-01-9	Chrysene	1770	1500	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	180	300	ug/kg	J
206-44-0	Fluoranthene	2870	1500	ug/kg	
86-73-7	Fluorene	ND	1500	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	1430	300	ug/kg	
91-20-3	Naphthalene	ND	1500	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1500	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1500	ug/kg	
85-01-8	Phenanthrene	1260	1500	ug/kg	J
129-00-0	Pyrene	2580	1500	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	122%		37-158%
92-94-4	p-Terphenyl	137%		59-149%

(a) All hits confirmed by spectral match using a diode array detector.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-726A		
Lab Sample ID:	F10128-3	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	84.8
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	532	12	0.14	mg/kg	1	06/27/01	06/28/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-727A		
Lab Sample ID:	F10128-4	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	84.6
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	276	12	0.14	mg/kg	1	06/27/01	07/02/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-728A		
Lab Sample ID:	F10128-1	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	77.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	84.8	12	0.15	mg/kg	1	06/27/01	06/28/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID: CEF-015-SS-735A
Lab Sample ID: F10128-2
Matrix: SO - Soil
Project: Cecil Field-Site 15

Date Sampled: 06/21/01
Date Received: 06/25/01
Percent Solids: 81.4

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	40.5	12	0.14	mg/kg	1	06/27/01	06/28/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-736A		
Lab Sample ID:	F10128-5	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	63.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By	Method
Lead	0.73	0.16	0.0018	mg/kg	1	06/27/01	07/02/01 JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP1		
Lab Sample ID:	F10128-6	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	88.9
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed By		Method
Lead	40.7	11	0.13	mg/kg	1	06/27/01	07/02/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-DUP2		
Lab Sample ID:	F10128-7	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	87.5
Project:	Cecil Field-Site 15		

Metals Analysis

Analyte	Result	RL	IDL	Units	DF	Prep	Analyzed	By	Method
Lead	290	11	0.13	mg/kg	1	06/27/01	07/02/01	JK	SW846 6010B

RL = Reporting Limit
IDL = Instrument Detection Limit

U = Indicates a result < IDL
B = Indicates a result >= IDL but < RL

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-726A		
Lab Sample ID:	F10128-3	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	84.8
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	28000	1200	mg/kg	1	06/28/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-727A		
Lab Sample ID:	F10128-4	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	84.6
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	31300	1200	mg/kg	1	06/27/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-728A		
Lab Sample ID:	F10128-1	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	77.5
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	54100	1300	mg/kg	1	06/27/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-735A		
Lab Sample ID:	F10128-2	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	81.4
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	53900	1200	mg/kg	1	06/27/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-736A		
Lab Sample ID:	F10128-5	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/25/01
		Percent Solids:	63.5
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Total Organic Carbon	137000	1600	mg/kg	1	06/27/01 LCH	CORP ENG 81 M

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-726A		
Lab Sample ID:	F10128-3	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5540	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 24.1 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-727A		
Lab Sample ID:	F10128-4	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	3580	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 15.6 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-728A		
Lab Sample ID:	F10128-1	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5530	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 24.1 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-735A		
Lab Sample ID:	F10128-2	**Date Sampled:**	06/21/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	5480	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 23.8 meq/100g

RL = Reporting Limit

Accutest Laboratories

Report of Analysis

Client Sample ID:	CEF-015-SS-736A		
Lab Sample ID:	F10128-5	**Date Sampled:**	06/22/01
Matrix:	SO - Soil	**Date Received:**	06/26/01
		Percent Solids:	n/a
Project:	TETRSCAI: Cecil Field-Site 15		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed By	Method
Cation Exchange Capacity [a]	10200	120	mg/kg	5	07/13/01 JA	SW846 9081

(a) 44.8 meq/100g

RL = Reporting Limit

B-3

SOIL GRAIN SIZE ANALYSIS RESULTS

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 14

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 14

Sample Location: CEF-015-SS-~~001~~ 701

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-23-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	89.0
No.100	34.0
No.200	1.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 26

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 26

Sample Location: CEF-015-SS-703

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 7-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.0
No.100	39.0
No.200	4.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 20

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 20

Sample Location: CEF-015-SS-~~726~~ 704

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 7-18-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.0
No.100	38.0
No.200	2.0

Reviewed By: Sam Davis

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 27

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 27

Sample Location: CEF-015-SS-706

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 7-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	96.0
No.100	46.0
No.200	7.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 19

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 19

Sample Location: CEF-015-SS-707

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 7-18-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	88.0
No.100	32.5
No.200	1.50

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 18

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 18

Sample Location: CEF-015-SS-707 A

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 7-16-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	87.0
No.100	32.0
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 22

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 22

Sample Location: CEF-015-SS-708

Soil Description: Dark gray silty sand with trace of roots

Date Sampled: 7-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	90.0
No.100	37.0
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 13

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 13

Sample Location: CEF-015-SS-708 A

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 6-23-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	75.0
No.100	35.0
No.200	10.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 23

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 23

Sample Location: CEF-015-SS-709

Soil Description: Gray fine sand with trace of roots

Date Sampled: 7-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	82.0
No.100	46.0
No.200	8.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 25

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 25

Sample Location: CEF-015-SS-717

Soil Description: Gray fine sand with trace of roots

Date Sampled: 7-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	95.0
No.100	42.0
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 21

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 21

Sample Location: CEF-015-SS-719

Soil Description: Gray fine sand with trace of roots

Date Sampled: 7-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.0
No.100	39.0
No.200	2.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 15

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 15

Sample Location: CEF-015-SS-719 A

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 6-23-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	89.0
No.100	35.0
No.200	4.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 01

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 1

Sample Location: CEF-015-SS-721

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	93.0
No.100	38.0
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 06
Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 6

Sample Location: CEF-015-SS-722

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.0
No.100	37.0
No.200	2.0

Reviewed By: Sai [illegible]

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 07
Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 7

Sample Location: CEF-015-SS-724

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	91.0
No.100	35.0
No.200	2.0

Reviewed By: Sai [illegible]

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 08
Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 8

Sample Location: CEF-015-SS-726 A

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-21-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	92.5
No.100	36.2
No.200	3.1

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 12

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 12

Sample Location: CEF-015-SS-727 A

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-22-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	95.3
No.100	39.5
No.200	2.8

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 10
Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 10

Sample Location: CEF-015-SS-728 A

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-21-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.0
No.100	41.0
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 05

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 5

Sample Location: CEF-015-SS-732

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 6-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	85.0
No.100	36.0
No.200	6.0

Reviewed By: Sam Dorsey

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 02

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 2

Sample Location: CEF-015-SS-733

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	94.5
No.100	37.5
No.200	2.50

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 03

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 3

Sample Location: CEF-015-SS-734

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-19-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	94.0
No.60	86.0
No.100	37.0
No.200	2.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 09
Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 9

Sample Location: CEF-015-SS-735 A

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 6-21-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	95.0
No.100	40.5
No.200	3.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 11

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 11

Sample Location: CEF-015-SS-736 A

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 6-22-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	77.0
No.100	19.0
No.200	1.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 04

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 4

Sample Location: CEF-015-SS-737

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	90.0
No.100	34.1
No.200	1.50

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 24

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 24

Sample Location: CEF-015-SS-739

Soil Description: Light gray fine sand with trace of roots

Date Sampled: 7-20-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	88.0
No.100	34.8
No.200	1.70

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 16

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 16

Sample Location: CEF-015-SS-740

Soil Description: Gray fine sand with trace of roots

Date Sampled: 6-24-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	91.0
No.100	41.0
No.200	2.0

Reviewed By: _____

Civil Services, Inc.

P.O.BOX 8185, JACKSONVILLE, FLORIDA 32239/(904)641-1834

LABORATORY SOIL TEST RESULT

Client: Tetra Tech Nus. Inc. Report No: 17

Project: Laboratory Services - Cecil Field CSI Project No: 9363-01

Project Location: Jacksonville, Florida

****

Sample No: 17

Sample Location: CEF-015-SS-741

Soil Description: Dark gray fine sand with trace of roots

Date Sampled: 6-24-01

****

TEST RESULTS

Sieve Size	% Passing
No.4	100
No.10	100
No.60	84.0
No.100	36.0
No.200	2.0

Reviewed By: _____

APPENDIX C

TOXICITY TEST REPORT

TOXICITY OF SOIL SAMPLES COLLECTED AT NAVAL AIR STATION CECIL FIELD

Springborn Laboratories

SUMMARY REPORT

TOXICITY OF SOIL SAMPLES COLLECTED AT NAVAL AIR STATION CECIL FIELD

Submitted to:

Tetra Tech NUS, Inc.
900 Trail Ridge Road
Aiken, South Carolina 29803

SLI Report No.: 13764.6100

Study Director: Debra Teixeira

Prepared by:

Springborn Laboratories, Inc.
790 Main Street
Wareham, Massachusetts 02571-1075

30 July 2001

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SIGNATURES AND APPROVALS

SUBMITTED BY:

Springborn laboratories, Inc.
790 Main Street
Wareham, Massachusetts 02571-1075

Debra Teixeira
Study Director

7/30/01
Date

Susan M. Hamel
Technical Report Writer

7/30/01
Date

Ronald C. Biever
Manager,
Environmental Toxicology

7-30-01
Date

EXECUTIVE SUMMARY

Springborn Laboratories was contracted to define the toxicity of 27 soil samples to the earthworm, *Eisenia fetida*. Twenty-eight samples were collected between 19 and 27 June 2001 from Site 15 at Naval Air Station Cecil Field, Jacksonville, Florida. All samples were collected by personnel from Tetra Tech NUS, Inc. The objective of the study was to determine the survival of earthworms in the soil samples after 14 days. The procedures used in this study were based on methodologies in the ASTM E-1676-97 Guidelines for Bioassessment of Soil Samples.

Samples 721, 734, 733, 732, 722, 724, 737, 728A, 735A and 726A were received at Springborn on 25 June 2001. Sample 724 was not tested due to excessive water and was recollected. Samples 736A, 727A, 741, 708A, 001, 719A and 739 were received at Springborn on 26 June 2001. Samples 708, 719, 704, 717, 703, 724B, 709, 740, 707, 707A and 706 were received at Springborn on 29 June 2001. Upon receipt, the soil samples were refrigerated at approximately 4°C until use. The 14-day exposures were initiated in two groups beginning on 29 June and 2 July 2001 and terminated on 13 and 16 July 2001.

Table 1 summarizes the day 14 percent survival for each sample received. Tables 2 to 29 present more detailed information on a per sample basis relative to sample receipt and test dates, testing conditions and percent survival data.

Survival of earthworms exposed to all but two soil samples, 703 and 706, was 100% on day 14. Mean survival in the laboratory controls was also 100% after 14 days.

CONCLUSION

Based on the survival rates of earthworms exposed to soil samples collected from Naval Air Station Cecil Field, little acute toxicity was observed. A significant reduction in survival was observed in two of the soil samples tested from this site. Samples 703 and 706 were highly toxic to earthworms, where a survival of 0% was recorded among earthworms exposed for 14 days.

Table 1. Summary of the 14-day survival of earthworms (*Eisenia fetida*) exposed to soil samples collected at Naval Air Station Cecil Field.

Sample Identification	Day 14 Mean Survival[a] (%)
Control 1	100
Control 2	100
Control 3	100
721	100
734	100[b]
733	100[c]
732	100
722	100[b]
737	100[b]
728A	100[c]
735A	100[b]
726A	100[c]
736A	100[b]
727A	100
741	100[b]
708A	100[b]
001	100[b]
719A	100
739	100
708	100
719	100
704	100[b]
717	100[b]
703	0
724B	100[b]
709	100[b]
740	100[b]
707	100[b]
707A	100[b]
706	0

[a] Mean survival of four replicate vessels, 10 earthworms per replicate.
[b] All earthworms were observed to be lethargic.
[c] Several earthworms were observed to be lethargic

TABLE 2. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 721

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	721
COLLECTION DATE:	19 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.7 to 4.3 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 721
	14-Day Mean Survival (%)
Earthworm	100

TABLE 3. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 734

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	734
COLLECTION DATE:	19 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.4 to 3.9 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 734
	14-Day Mean Survival (%)
Earthworm	100

TABLE 4. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 733

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	733
COLLECTION DATE:	19 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 4.1 to 4.2 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 733
	14-Day Mean Survival (%)
Earthworm	100

TABLE 5. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 732

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	732
COLLECTION DATE:	20 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.7 to 3.9 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	**Sample ID: 732**
	14-Day Mean Survival (%)
Earthworm	100

TABLE 6. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 722

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	722
COLLECTION DATE:	20 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.5 to 3.9 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 722
	14-Day Mean Survival (%)
Earthworm	100

TABLE 7. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 737

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	737
COLLECTION DATE:	20 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH: 3.4 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 737
	14-Day Mean Survival (%)
Earthworm	100

TABLE 8. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 728A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	728A
COLLECTION DATE:	21 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 4.0 to 4.2 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 728A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 9. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 735A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	735A
COLLECTION DATE:	21 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.3 to 4.1 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 735A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 10. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 726A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	726A
COLLECTION DATE:	21 June 2001
DATE RECEIVED:	25 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 4.9 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (10 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 726A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 11. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 736A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	736A
COLLECTION DATE:	22 June 2001
DATE RECEIVED:	26 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.3 to 3.5 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 736A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 12. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 727A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	727A
COLLECTION DATE:	22 June 2001
DATE RECEIVED:	26 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.6 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 727A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 13. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 741

STUDY NUMBER: 13764.6100

SAMPLE I.D.: 741

COLLECTION DATE: 24 June 2001

DATE RECEIVED: 26 June 2001

STORAGE CONDITIONS: refrigerated (approximately 4°C)

EXPERIMENTAL DATES: 29 June to 13 July 2001

TEST ORGANISM: earthworm (*Eisenia fetida*)

SAMPLE CHARACTERIZATION: soil

TEST CONDITIONS: temperature: 21°C
pH range: 3.2 to 3.4
light intensity: 70 to 80 footcandles

TEST VESSELS: 500 mL glass jars

SAMPLE SIZE: 200 g (dry weight)

NUMBER EXPOSED: 10 earthworms per vessel, four vessels per sample (8 control vessels)

LAB CONTROL MEDIUM: artificial soil

LAB CONTROL RESPONSE: 14-day mean survival: 100%

Test Organism	Sample ID: 741
	14-Day Mean Survival (%)
Earthworm	100

TABLE 14. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 708A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	708A
COLLECTION DATE:	23 June 2001
DATE RECEIVED:	26 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.2 to 3.6 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 708A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 15. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 001

STUDY NUMBER: 13764.6100

SAMPLE I.D.: 001

COLLECTION DATE: 23 June 2001

DATE RECEIVED: 26 June 2001

STORAGE CONDITIONS: refrigerated (approximately 4°C)

EXPERIMENTAL DATES: 29 June to 13 July 2001

TEST ORGANISM: earthworm (*Eisenia fetida*)

SAMPLE CHARACTERIZATION: soil

TEST CONDITIONS:
temperature: 21°C
pH range: 3.3 to 3.6
light intensity: 70 to 80 footcandles

TEST VESSELS: 500 mL glass jars

SAMPLE SIZE: 200 g (dry weight)

NUMBER EXPOSED: 10 earthworms per vessel, four vessels per sample (8 control vessels)

LAB CONTROL MEDIUM: artificial soil

LAB CONTROL RESPONSE: 14-day mean survival: 100%

Test Organism	Sample ID: 001
	14-Day Mean Survival (%)
Earthworm	100

TABLE 16. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 719A

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	719A
COLLECTION DATE:	23 June 2001
DATE RECEIVED:	26 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 4.0 to 4.4 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 719A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 17. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 739

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	739
COLLECTION DATE:	24 June 2001
DATE RECEIVED:	26 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	29 June to 13 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.2 to 3.5 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (8 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 739
	14-Day Mean Survival (%)
Earthworm	100

TABLE 18. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 708

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	708
COLLECTION DATE:	26 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.4 to 3.9 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	**Sample ID: 708**
	14-Day Mean Survival (%)
Earthworm	100

TABLE 19. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 719

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	719
COLLECTION DATE:	26 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 2.7 to 6.4 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 719
	14-Day Mean Survival (%)
Earthworm	100

TABLE 20. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 704

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	704
COLLECTION DATE:	26 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.0 to 3.6 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 704
	14-Day Mean Survival (%)
Earthworm	100

TABLE 21. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 717

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	717
COLLECTION DATE:	27 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.0 to 3.7 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 717
	14-Day Mean Survival (%)
Earthworm	100

TABLE 22. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 703

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	703
COLLECTION DATE:	27 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.0 to 3.5 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 703
	14-Day Mean Survival (%)
Earthworm	0

TABLE 23. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 724B

STUDY NUMBER: 13764.6100

SAMPLE I.D.: 724B

COLLECTION DATE: 27 June 2001

DATE RECEIVED: 29 June 2001

STORAGE CONDITIONS: refrigerated (approximately 4°C)

EXPERIMENTAL DATES: 2 to 16 July 2001

TEST ORGANISM: earthworm (*Eisenia fetida*)

SAMPLE CHARACTERIZATION: soil

TEST CONDITIONS:
temperature: 21°C
pH range: 3.0 to 3.6
light intensity: 70 to 80 footcandles

TEST VESSELS: 500 mL glass jars

SAMPLE SIZE: 200 g (dry weight)

NUMBER EXPOSED: 10 earthworms per vessel, four vessels per sample (4 control vessels)

LAB CONTROL MEDIUM: artificial soil

LAB CONTROL RESPONSE: 14-day mean survival: 100%

Test Organism	Sample ID: 724B
	14-Day Mean Survival (%)
Earthworm	100

TABLE 24. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 709

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	709
COLLECTION DATE:	26 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.0 to 3.2 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 709
	14-Day Mean Survival (%)
Earthworm	100

TABLE 25. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 740

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	740
COLLECTION DATE:	24 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.0 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 740
	14-Day Mean Survival (%)
Earthworm	100

TABLE 26. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 707

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	707
COLLECTION DATE:	25 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 2.7 to 3.0 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 707
	14-Day Mean Survival (%)
Earthworm	100

TABLE 27. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 707A

STUDY NUMBER: 13764.6100

SAMPLE I.D.: 707A

COLLECTION DATE: 25 June 2001

DATE RECEIVED: 29 June 2001

STORAGE CONDITIONS: refrigerated (approximately 4°C)

EXPERIMENTAL DATES: 2 to 16 July 2001

TEST ORGANISM: earthworm (*Eisenia fetida*)

SAMPLE CHARACTERIZATION: soil

TEST CONDITIONS:
temperature: 21°C
pH range: 2.9 to 3.0
light intensity: 70 to 80 footcandles

TEST VESSELS: 500 mL glass jars

SAMPLE SIZE: 200 g (dry weight)

NUMBER EXPOSED: 10 earthworms per vessel, four vessels per sample (4 control vessels)

LAB CONTROL MEDIUM: artificial soil

LAB CONTROL RESPONSE: 14-day mean survival: 100%

Test Organism	Sample ID: 707A
	14-Day Mean Survival (%)
Earthworm	100

TABLE 28. 14-DAY EARTHWORM SCREENING TOXICITY TEST WITH SAMPLE 706

STUDY NUMBER:	13764.6100
SAMPLE I.D.:	706
COLLECTION DATE:	27 June 2001
DATE RECEIVED:	29 June 2001
STORAGE CONDITIONS:	refrigerated (approximately 4°C)
EXPERIMENTAL DATES:	2 to 16 July 2001
TEST ORGANISM:	earthworm (*Eisenia fetida*)
SAMPLE CHARACTERIZATION:	soil
TEST CONDITIONS:	temperature: 21°C pH range: 3.5 to 4.0 light intensity: 70 to 80 footcandles
TEST VESSELS:	500 mL glass jars
SAMPLE SIZE:	200 g (dry weight)
NUMBER EXPOSED:	10 earthworms per vessel, four vessels per sample (4 control vessels)
LAB CONTROL MEDIUM:	artificial soil
LAB CONTROL RESPONSE:	14-day mean survival: 100%

Test Organism	Sample ID: 706
	14-Day Mean Survival (%)
Earthworm	0

REFERENCES

ASTM, 1999. Conducting Laboratory Soil Toxicity or Bioaccumulation Tests with the Lumbricid Earthworm *Eisenia fetida*. ASTM E 1676-91. Adopted 10 May 1997.

U.S. EPA. 1989. Protocols for the Short Term Toxicity Screening of Hazardous Waste Sites EPA 600/3-88/029.

BENCH DATA

Study Number: 13764.6100
Sponsor: Tetra Tech
Test Substance: Waste Site Soils
Test Type: 14 Day Earthworm Acute
Study Director: Debra Teixeira

13764.6100

TEST METHOD SOLID - ASTM E-1676-97

14-Day Earthworm Subacute Toxicity Test to Meet ASTM E-1676-97 Guidelines for Bioassessment of Soil Sample.

1.0 OBJECTIVE

The objective of this study will be to determine the toxicity of a soil sample to earthworms (*Eisenia fetida*) during a 14-day exposure. Earthworms will be exposed to either 100% soil sample (screening test) or a range of soil concentrations (test soil sample mixed with artificial soil, or a reference soil; expressed as a percentage weight/weight). Assessment of mortality will be performed on test day 14 (test termination) to estimate the lethal concentration to 50% of the test organisms (LC50). The test medium will be monitored at test initiation and termination for pH, percent moisture and temperature. The methods described generally meet the standard procedures described for short-term toxicity screening of hazardous waste site soil (Greene, et. al. 1989) and ASTM E-1676-97.

2.0 MATERIALS AND METHODS

2.1 Test System

2.1.1 Species

Earthworms (*Eisenia fetida*) will be either cultured at Springborn Laboratories or obtained from an outside supplier and acclimated to laboratory conditions for at least two weeks prior to testing. The source of the test system will be identified in the raw data and final report. Species verification will be conducted using Reynolds (1977) taxonomic key, or provided by the supplier. The maintenance medium will be a mixture of peat, composted cattle manure and Bed-A-Beast™. Earthworms used for testing will be isolated from the culture and acclimated in artificial soil for approximately 24 to 48 hours prior to testing. During culturing, earthworms will be fed composted cattle manure and may also be fed certified organic cornmeal. Earthworms will not be fed during the test. Adult earthworms at least two months old (with clitellum), with a minimum wet weight of approximately 300 mg, will be used for testing.

2.1.2 Justification of Test System

Earthworms have demonstrated sensitivity to chemical challenges which, combined with their importance to the terrestrial ecosystem, support the use of this organism to evaluate the acute toxicity of chemical substances to soil fauna (Gilman and Vardanis, 1974; Karnak and Hamelink, 1982; Neuhauser and Callahan, 1990; Roberts and Dorough, 1984).

2.2 Physical System:

2.2.1 Soil

A minimum of 1 kilogram of soil is required for a screening test, and 6 kg of soil is needed for a test with dilutions. Solid samples will be stored at approximately 4°C. The test is generally initiated within three days of receipt, but storage will not exceed 14-days from receipt. The exposure in a screening test will consist of 100% soil sample and a negative control. In a test with dilutions, five test concentrations (i.e., 100, 50, 25, 13 and 6.3% soil sample) will be prepared, as well as a control. The appropriate proportions of soil sample will be blended with artificial soil (see section 2.2.2) or reference soil using a mechanical mixer. The negative control is prepared with 100% artificial soil which will be useful to evaluate survival of the test species in a standard medium.

2.2.2 Artificial Soil Medium

The medium utilized for dilution of the soil sample may consist of reference soil or the following components on a weight basis:

70 % Industrial sand (≥50% of particles are 50 to 100 µm)
20 % Kaolin clay
10 % Sphagnum peat (finely ground)
$CaCO_3$ or phosphoric acid to adjust pH to 6.0 ± 0.5 if necessary

The dry ingredients will be thoroughly mixed in a suitable mixer. A measured quantity of deionized water will be added during mixing to yield approximately 75% water holding capacity. Moisture content will be determined by drying a pre-weighed sample at approximately 105 °C and reweighing, or on a moisture analyzer.

2.2.3 Test Vessels

Four, 500-mL polypropylene or four, 1-L glass beakers will be used as test vessels. The vessels will be covered with a perforated lids that allow air exchange. Test vessels will be cleaned following standard laboratory procedures to removed contaminants prior to use.

2.3 Test Procedures

2.3.1 Test Concentrations

A screening test is conducted with 100% test soil sample and a negative control. For a test with dilutions, the test sample will be mixed with artificial soil or a reference soil in a mechanical mixer to produce five concentrations (i.e., 100, 50, 25, 13 and 6.3%). For example, the 50% sample will contain 50% soil sample and 50% artificial soil or reference soil on a per weight basis. Four replicates per concentration will be prepared for either a screening test or one with dilutions. Each replicate contains 200 g of soil (dry weight). The negative control consist of 100% artificial soil.

2.3.2 Test Initiation

Twenty-four to forty-eight hours prior to test initiation, earthworms will be isolated from the culture and placed in an acclimation vessel containing artificial soil. This procedure allows the earthworms sufficient time to eliminate the culture medium and take up artificial soil so the medium within the earthworms will be equivalent at test initiation and termination. To initiate the test, the earthworms will be removed from the acclimation vessel and placed in an empty isolation vessel. Ten mature earthworms will be impartially selected from the isolation vessel. The earthworms (n=10) will be randomly assigned to a replicate test vessel using a computer-generated random number table. This procedure will be repeated until ten earthworms are selected for each replicate test vessel. Earthworm burrowing and/or avoidance behavior will be recorded for each replicate.

2.3.3 Sample Preparation

One day prior to initiation, test soil will be hydrated and mixed well. Soil will be separated into replicate vessels and placed into the test chamber or waterbath for overnight equilibration. Soil samples will be hydrated to approximately 75% of its water holding capacity or 25 to 35% moisture.

2.3.4 Environmental Conditions

Testing and acclimation of earthworms will be conducted at 20 ± 2 °C. Light will be provided continuously with an intensity at the soil surface of about 400-800 lux (37 - 74 footcandles) and will be measured at initiation and day 14 (termination).

2.3.5 Monitoring of Test System

On day 14, earthworm mortality and health assessments will be performed. Soil moisture content, pH and temperature will be measured in one replicate vessel per sample or control(s) at the initiation and termination, day 14. Mortality will be assessed on day 14 by emptying the test medium onto a tray, sorting the earthworms from the medium and testing their reaction to a mechanical stimulus at the anterior end. Mortality will be defined as a lack of visible movement after gentle mechanical stimulation is applied. The general health of the earthworms will be assessed and recorded (for example, by observing color changes, lethargy, softness, lesions and/or the presence of cocoons).

2.3.6 Acceptability Criteria

The percent mortality among the negative control organisms (100% artificial soil) must not exceed 10 percent at the end of the test.

3.0 CALCULATIONS

Test data will be presented in tabular form which includes observation period, number of organisms per replicate, health assessments and mortality. Data will be summarized in the form of a mean and standard deviation for control(s) and exposure replicate measurements.

For a screening test, a t-Test will be used to determine if the test data is significantly different ($p \leq 0.05$) from the negative control or reference soil site data.

Mortality data from a multi-concentration test will be subjected to Dunnett's Test (Dunnett, 1955, 1964) to determine the No-Observed-Effect Concentration (NOEC). Dunnett's Test will be preceded by a Shapiro-Wilks' and Bartlett's test which test for normality and homogeneity of the data set. Mean values will be transformed using arcsine square root procedure, if possible. If either Shapiro-Wilks' or Bartlett's tests continue to fail after these conversions, Dunn's Test, a non-parametric procedure, will be used to establish the NOEC. All comparisons will be made at 95% level of certainty ($P \leq 0.05$) except Shapiro Wilks' and Bartlett's Tests, where 99% level of certainty will be applied ($P \leq 0.01$).

The 14 day mortality data will be used to estimate a median lethal concentration (LC50) and its 95% confidence interval. The LC50 is the estimated nominal concentration of the test sample that produces death in 50% of the test population at the stated exposure time. A computer program estimates the LC50 values using one of three statistical methods: probit analysis, moving average angle analysis or non-linear interpolation. The method selected is determined by the data (e.g., presence or absence of 100% mortality, number of partial responses etc.). An LC50 value can not be calculated if the data derived is insufficient according to any of the three statistical methods. The probit method provides values of slope, including 95% confidence intervals, as well as appropriate statistical tests to evaluate goodness-of-fit. If less than a 50% response is observed in the 100% solid sample, the LC50 is empirically estimated to be >100% soil.

4.0 RECORDS TO BE MAINTAINED

Records to be maintained will include, but will not be limited to, correspondence and other documents relating to the interpretation and evaluation of data as well as all raw data and documentation generated as a result of the study.

5.0 REPORTING

The raw data and the final report will be reviewed by the Study Director. The test results will be presented in an outline format on a per sample basis.

6.0 REFERENCES

ASTM, 1999. Conducting Laboratory Soil Toxicity or Bioaccumulation Tests With the Lumbricid Earthworm *Eisenia Fetida*. ASTM E 1676-91. Adopted 10 May 1997.

Dunnett, C.W. 1955. *A Multiple Comparison Procedure for Comparing Several Treatments with Control. J. Amer. Stat. Assoc.* 50: 1096-1121.

Dunnett, C.W. 1964. New Tables for Multiple Comparisons with a Control. *Biometrics* 20: 482-291.

Gilman, A. and A. Vardanis. 1974. Carbofuran: Comparative toxicity and metabolism in the worms *Lumbricus terrestris* and *Eisenia foetida*. *S.J. Agric. Food Chem.* 22: 625-6218.

Greene, J.C., C.L. Bartels, W.J. Warren-Hicks, B.R. Parkhurst, G.L. Linder, S.A. Peterson and W.E. Miller. 1989. Protocols for the Short Term Toxicity Screening of Hazardous Waste Sites. EPA 600/3-88/029.

Karnak, R. E. and J. L. Hamelink. 1982. A standardized method for determining the acute toxicity of chemicals to earthworms. *Ecotoxicol. Environ. Safety* 6: 216-221.

Neuhauser, E.F. and C.A. Callahan. 1990. Growth and reproduction of the earthworm *Eisenia foetida* exposed to sublethal concentrations of organic chemicals. *Soil Biol. Biochem.* 22: pp. 175 - 179.

Roberts, B.L. and H.W. Dorough. 1984. Relative toxicities of chemicals to the earthworm *Eisenia foetida*. *Environ. Toxicol. Chem.* 3: 67-78.

Reynolds, J.W. 1977. The Earthworms (Lumricidae and Sparganophilidae) of Ontario. Royal Ontario Museum, Ontario, Canada. 141 pp.

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER PAGE 1 OF 1

PROJECT NO: Cent Field	SITE NAME: Site 15	PROJECT MANAGER AND PHONE NUMBER: Mike Whitten 803-649-7963	LABORATORY NAME AND CONTACT: Springborn Laboratories
SAMPLERS (SIGNATURE): M L Whitten		FIELD OPERATIONS LEADER AND PHONE NUMBER:	ADDRESS: 790 Main Street
		CARRIER/WAYBILL NUMBER: FEDEX	CITY, STATE: Wareham MA 02571-1075

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ~~☐ 7 day~~ ☐ 14 day

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Metals, Cadmium, Toxicity								COMMENTS
						CONTAINER TYPE PLASTIC (P) or GLASS (G)								
						PRESERVATIVE USED	none							
6/19/01	1005	CEF-015-SS-721	S	C	1	✓								Cool to 4°C.
6-19-01	1230	CEF-015-SS-734	S	C	1	✓								
6-19-01	1515	CEF-015-SS-733	S	C	1	✓								All samples
6/20/01	0930	CEF-015-SS-732	S	C	1	✓								were at
	1045	CEF-015-SS-722	S	C	1	✓								~~5°C~~ 5°C
	1215	CEF-015-SS-724 *	S	C	1	✓								on reciept
	1320	CEF-015-SS-737	S	C	1	✓								AEP 6/25/01
6/21/01	0923	CEF-015-SS-728A	S	C	1	✓								
	1205	CEF-015-SS-735A	S	C	1	✓								
	1510	CEF-015-SS-726A	S	C	1	✓								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: M.L. Whitten	6/21/01	1730	1. RECEIVED BY: Delivered to FedEx		
2. RELINQUISHED BY: FedEx	6/25/01	1230	2. RECEIVED BY: Springborn	6/25/01	1230
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

* Sample discarded excessive water, sample to be recollected. 6/21/01

3/99
FORM NO. TtNUS-001

15164.6MN

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TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
CECIL FIELD	SITE 15	MIKE WHITTEN 803-649-7963	Springborn Labs - Arthur Putt
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS 790 Main Street
M L Whitten		CARRIER/WAYBILL NUMBER FedEx	CITY, STATE Wareham, MA 02571-1075

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P
PRESERVATIVE USED: ice cool to 4°C

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: 14-day earthworm toxicity								COMMENTS
6/22	1150	CEF-015-SS-736A	Soil	C		✓								Cool to 4°C
6/22	0920	CEF-015-SS-727A	Soil	C		✓								received @ 5°C 6/26
~~6/25~~	~~0920~~	MLW 707A												
6/24	1220	CEF-015-SS-741	Soil	C		✓								
~~6/24~~	~~1013~~	740												MLW
6/23	1245	CEF-015-SS-708A	Soil	C		✓								
6/23	1030	CEF-015-SS-001	Soil	C		✓								
6/23	0830	CEF-015-SS-719A	Soil	C		✓								
6/24	0745	CEF-015-SS-739	Soil	C		✓								
~~6/25~~	~~1215~~	MLW 707												MLW

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY M. L. Whitten	6/25/01	1830	1. RECEIVED BY Delivered to FedEx		
2. RELINQUISHED BY			2. RECEIVED BY Nelson Sullivan	6/26/01	1120
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

13764.6100

Study Number: 13764.6100 Page:

ARTIFICIAL SOIL PREPARATION 3.0 Kg

TOTAL AMOUNT OF SOIL (DRY WEIGHT) NEEDED: 3.0 Kg (Controls)
Test Soil

Dry Components	Theoretical[a] Dry Weight (g)	%[b] Moisture	Ambient Dry[c] Weight (g)	Net Weight (g)
Coarse Sand: 35% Wedron Silica Co.	1050	0.3	1053	1053
Fine Sand: 35% Wedron Silica Co.	1050	0.3	1053	1053
Kaolin Clay: 20% Engelhard Corp.	600	1.0	606	606
Peat Moss: 10% Magic Products, Inc.	300	10.1	334	334

a/(1 - b(as decimal)) = c Approved by:

Balance Used: Mettler PE6 F50070		
Mixer Used Hobart A200 1742668	Start Time: 1045	End Time: 1055
pH meter: LAMOTTE 46116-5551	Initial pH: 6.4	Adjusted pH: N/A
pH adjusted with calcium carbonate/phosphoric acid (circle one) amount used: N/A		
Date/Initials: EKP 6/27/01		

COMMENTS:
Moistened with 900 ml DI Water. EKP 6/27/01

9 13764.6100

test soil

M	105 C	60 m	
1:00	57 C		12.43g
0.3%M	99.7%S		
2:00	104 C		12.33g
1.1%M	98.9%S		
3:00	103 C		12.28g
1.5%M	98.5%S		
4:00	104 C		12.25g
1.8%M	98.2%S		
5:00	106 C		12.24g
1.8%M	98.2%S		
6:00	105 C		12.24g
1.8%M	98.2%S		
7:00	106 C		12.23g
1.9%M	98.1%S		
8:00	106 C		12.23g
1.9%M	98.1%S		
9:00	105 C		12.23g
1.9%M	98.1%S		
10:00	105 C		12.23g
1.9%M	98.1%S		
11:00	105 C		12.23g
1.9%M	98.1%S		
12:00	106 C		12.23g
1.9%M	98.1%S		
13:00	106 C		12.23g
1.9%M	98.1%S		
14:00	106 C		12.23g
1.9%M	98.1%S		

ERP 6/27/01

ARTIFICIAL SOIL PREPARATION

TOTAL AMOUNT OF SOIL (DRY WEIGHT) NEEDED: 1.0 Kg

Acclimation Soil

Dry Components	Theoretical[a] Dry Weight (g)	%[b] Moisture	Ambient Dry[c] Weight (g)	Net Weight (g)
Coarse Sand: 35% Wedron Silica Co.	2450	0.3	2457	2457
Fine Sand: 35% Wedron Silica Co.	2450	0.3	2457	2457
Kaolin Clay: 20% Engelhard Corp.	1400	1.0	~~1401~~ 1414 ①	1414
Peat Moss: 10% Magic Products, Inc.	700	10.1	779	779

a/(1 - b(as decimal)) = c

Approved by: [illegible] 6/19/01

Balance Used: Mettler PE6 F50070		
Mixer Used Hobart A200 1742668	Start Time: 1130	End Time: 1140
pH meter: LAMOTTE 46116-5551	Initial pH: 6.8 ②	Adjusted pH: N/A
pH adjusted with calcium carbonate/phosphoric acid (circle one) amount used: N/A		
Date/Initials: EKP 6/20/01		

COMMENTS:

Moistened with 2000mL DI water. EKP 6/19/01
bringing % moisture from 2.2 to 28. EKP 6/19/01

2 batches were made and combined 6/20/01
② pH dropped to 6.4 when combined with other batch of Acclimation Soil. EKP 6/20/01

① c.e. ekp 6/19/01

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13164.6100

Clay EKP 6/18/01

N 105 C 60 m

1:00	93 C	3.13g
1.0%M	99.0%S	
2:00	107 C	3.13g
1.0%M	99.0%S	
3:00	103 C	3.13g
1.0%M	99.0%S	
4:00	103 C	3.13g
1.0%M	99.0%S	
5:00	106 C	3.13g
1.0%M	99.0%S	
6:00	105 C	3.13g
1.0%M	99.0%S	
7:00	105 C	3.13g
1.0%M	99.0%S	
8:00	106 C	3.13g
1.0%M	99.0%S	
9:00	106 C	3.13g
1.0%M	99.0%S	

Coarse Sand EKP 6/18/01

1:00	85 C	3.54g
0.3%M	99.7%S	
2:00	106 C	3.54g
0.3%M	99.7%S	
3:00	102 C	3.54g
0.3%M	99.7%S	
4:00	105 C	3.54g
0.3%M	99.7%S	
5:00	106 C	3.54g
0.3%M	99.7%S	
6:00	105 C	3.54g
0.3%M	99.7%S	
7:00	106 C	3.54g
0.3%M	99.7%S	
8:00	106 C	3.54g
0.3%M	99.7%S	
9:00	105 C	3.54g
0.3%M	99.7%S	
10:00	106 C	3.54g
0.3%M	99.7%S	
11:00	105 C	3.54g
0.3%M	99.7%S	
12:00	105 C	3.54g
0.3%M	99.7%S	
13:00	106 C	3.54g
0.3%M	99.7%S	
14:00	106 C	3.54g
0.3%M	99.7%S	

N 105 C 60 m

1:00	57 C	5.04g
0.4%M	99.6%S	
2:00	103 C	4.96g
2.0%M	98.0%S	
3:00	104 C	4.95g
2.2%M	97.8%S	
4:00	103 C	4.95g
2.2%M	97.8%S	
5:00	107 C	4.95g
2.2%M	97.8%S	
6:00	105 C	4.95g
2.2%M	97.8%S	
7:00	105 C	4.95g
2.2%M	97.8%S	
8:00	107 C	4.95g
2.2%M	97.8%S	
9:00	106 C	4.95g
2.2%M	97.8%S	
10:00	105 C	4.95g
2.2%M	97.8%S	

Acclimation Soil EKP 6/19/01

Peat EKP 6/18/01

N 105 C 60 m

1:00	101 C	3.60g
2.2%M	97.8%S	
2:00	106 C	3.52g
4.3%M	95.7%S	
3:00	102 C	3.47g
5.7%M	94.3%S	
4:00	106 C	3.42g
7.1%M	92.9%S	
5:00	106 C	3.39g
7.9%M	92.1%S	
6:00	105 C	3.36g
8.7%M	91.3%S	
7:00	106 C	3.34g
9.2%M	90.8%S	
8:00	106 C	3.33g
9.5%M	90.5%S	
9:00	106 C	3.32g
9.8%M	90.2%S	
10:00	106 C	3.32g
9.8%M	90.2%S	
11:00	106 C	3.31g
10.1%M	89.9%S	
12:00	106 C	3.31g
10.1%M	89.9%S	
13:00	106 C	3.31g
10.1%M	89.9%S	
14:00	106 C	3.31g
10.1%M	89.9%S	
15:00	106 C	3.31g
10.1%M	89.9%S	

Fine Sand EKP 6/18/01

N 105 C 60 m

1:00	102 C	3.61g
0.3%M	99.7%S	
2:00	107 C	3.61g
0.3%M	99.7%S	
3:00	102 C	3.61g
0.3%M	99.7%S	
4:00	104 C	3.61g
0.3%M	99.7%S	
5:00	106 C	3.61g
0.3%M	99.7%S	
6:00	105 C	3.61g
0.3%M	99.7%S	
7:00	105 C	3.61g
0.3%M	99.7%S	
8:00	105 C	3.61g
0.3%M	99.7%S	
9:00	105 C	3.61g
0.3%M	99.7%S	
10:00	105 C	3.61g
0.3%M	99.7%S	
11:00	105 C	3.61g
0.3%M	99.7%S	
12:00	105 C	3.61g
0.3%M	99.7%S	

Study Number: 13764.6100

ARTIFICIAL SOIL PREPARATION

TOTAL AMOUNT OF SOIL (DRY WEIGHT) NEEDED: 7.0kg

Acclimation Soil

Dry Components	Theoretical [a] Dry Weight (g)	% [b] Moisture	Ambient Dry [c] Weight (g)	Net Weight (g)
Coarse Sand: 35% Wedron Silica Co.	2450	0.3	2457	2457
Fine Sand: 35% Wedron Silica Co.	2450	0.3	2457	2457
Kaolin Clay: 20% Engelhard Corp.	1400	1.0	1414	1414
Peat Moss: 10% Magic Products, Inc.	700	10.1	779	779

a/(1 - b(as decimal)) = c

Approved by:

Balance Used: Mettler PE6 F50070		
Mixer Used Hobart A200 1742668	Start Time: 1102	End Time: 1112
pH meter: LAMOTTE 46116 - 5551	Initial pH: 6.4	Adjusted pH: N/A
pH adjusted with calcium carbonate/phosphoric acid (circle one) amount used: N/A		
Date/Initials: EWP 6/20/01		

COMMENTS:
Moistened with 1900ml DI Water. EWP 6/20/01
2 batches were made and combined EWP 6/20/01

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13764.6100

acclimation soil

N 105 C 60 m

1:00	56 C	4.18g
0.5%M	99.5%S	
2:00	104 C	4.13g
1.7%M	98.3%S	
3:00	103 C	4.12g
1.9%M	98.1%S	
4:00	104 C	4.12g
1.9%M	98.1%S	
5:00	106 C	4.12g
1.9%M	98.1%S	
6:00	105 C	4.12g
1.9%M	98.1%S	
7:00	105 C	4.12g
1.9%M	98.1%S	
8:00	105 C	4.12g
1.9%M	98.1%S	
9:00	106 C	4.12g
1.9%M	98.1%S	

EAP 6/20/01

13764.6100

Clay

EKP 6/18/01

N 105 C 60 m		
1:00	93 C	3.13g
1.0%M	99.0%S	
2:00	107 C	3.13g
1.0%M	99.0%S	
3:00	103 C	3.13g
1.0%M	99.0%S	
4:00	103 C	3.13g
1.0%M	99.0%S	
5:00	106 C	3.13g
1.0%M	99.0%S	
6:00	105 C	3.13g
1.0%M	99.0%S	
7:00	105 C	3.13g
1.0%M	99.0%S	
8:00	106 C	3.13g
1.0%M	99.0%S	
9:00	106 C	3.13g
1.0%M	99.0%S	

Coarse Sand

EKP 6/18/01

1:00	85 C	3.54g
0.3%M	99.7%S	
2:00	106 C	3.54g
0.3%M	99.7%S	
3:00	102 C	3.54g
0.3%M	99.7%S	
4:00	105 C	3.54g
0.3%M	99.7%S	
5:00	106 C	3.54g
0.3%M	99.7%S	
6:00	105 C	3.54g
0.3%M	99.7%S	
7:00	106 C	3.54g
0.3%M	99.7%S	
8:00	106 C	3.54g
0.3%M	99.7%S	
9:00	105 C	3.54g
0.3%M	99.7%S	
10:00	106 C	3.54g
0.3%M	99.7%S	
11:00	105 C	3.54g
0.3%M	99.7%S	
12:00	105 C	3.54g
0.3%M	99.7%S	
13:00	106 C	3.54g
0.3%M	99.7%S	
14:00	106 C	3.54g
0.3%M	99.7%S	

N 105 C 60 m		
1:00	57 C	5.04g
0.4%M	99.6%S	
2:00	103 C	4.96g
2.0%M	98.0%S	
3:00	104 C	4.95g
2.2%M	97.8%S	
4:00	103 C	4.95g
2.2%M	97.8%S	
5:00	107 C	4.95g
2.2%M	97.8%S	
6:00	105 C	4.95g
2.2%M	97.8%S	
7:00	105 C	4.95g
2.2%M	97.8%S	
8:00	107 C	4.95g
2.2%M	97.8%S	
9:00	106 C	4.95g
2.2%M	97.8%S	
10:00	105 C	4.95g
2.2%M	97.8%S	

Acclimation Soil
EKP 6/19/01

Peat

EKP 6/18/01

N 105 C 60 m		
1:00	101 C	3.60g
2.2%M	97.8%S	
2:00	106 C	3.52g
4.3%M	95.7%S	
3:00	102 C	3.47g
5.7%M	94.3%S	
4:00	106 C	3.42g
7.1%M	92.9%S	
5:00	106 C	3.39g
7.9%M	92.1%S	
6:00	105 C	3.36g
8.7%M	91.3%S	
7:00	106 C	3.34g
9.2%M	90.8%S	
8:00	106 C	3.33g
9.5%M	90.5%S	
9:00	106 C	3.32g
9.8%M	90.2%S	
10:00	106 C	3.32g
9.8%M	90.2%S	
11:00	106 C	3.31g
10.1%M	89.9%S	
12:00	106 C	3.31g
10.1%M	89.9%S	
13:00	106 C	3.31g
10.1%M	89.9%S	
14:00	106 C	3.31g
10.1%M	89.9%S	
15:00	106 C	3.31g
10.1%M	89.9%S	

Fine Sand

EKP 6/18/01

N 105 C 60 m		
1:00	102 C	3.61g
0.3%M	99.7%S	
2:00	107 C	3.61g
0.3%M	99.7%S	
3:00	102 C	3.61g
0.3%M	99.7%S	
4:00	104 C	3.61g
0.3%M	99.7%S	
5:00	106 C	3.61g
0.3%M	99.7%S	
6:00	105 C	3.61g
0.3%M	99.7%S	
7:00	105 C	3.61g
0.3%M	99.7%S	
8:00	105 C	3.61g
0.3%M	99.7%S	
9:00	105 C	3.61g
0.3%M	99.7%S	
10:00	105 C	3.61g
0.3%M	99.7%S	
11:00	105 C	3.61g
0.3%M	99.7%S	
12:00	105 C	3.61g
0.3%M	99.7%S	

STUDY NUMBER: 13764-6100

MONITORING OF TEST SYSTEM

HEALTH ASSESSMENT DAY - 0

	Sample ID	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Date/Initials
	Control - 1	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
	Control - 2	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#1	721	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#2	734	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#3	733	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#4	732	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#5	722	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#7	737	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#8	728 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#9	735 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#10	726 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#11	736 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#12	727 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#13	741	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#14	708 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#15	001	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#16	719 A	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#17	739	10 H - B	10 H - B	10 H - B	10 H - B	6/29/01 LCB
#						/ /

H = Healthy L = Lethargic D = Dead M = Missing
C = Cocoons LE = Lesions S = Segmental constriction
B = Burrowed

STUDY NUMBER: 13764.6100

PAGE: 16

MONITORING OF TEST SYSTEM

HEALTH ASSESSMENT DAY - 14

Sample ID	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Date/Initials
Control - 1	10 H	10 H	10 H	10 H	DJ 7/13/01
Control - 2	10 H	10 H	10 H	10 H	DJ 7/13/01
721	10 H	10 H	10 H	10 H	7/13/01 LCB
734	10 ~~H~~ ① L	10 L	10 L	10 L	7/13/01 LCB
733	10 H	4 L 6 H	4 L 6 H	5 L 5 H	7/13/01 LCB
732	10 H	10 H	10 H	10 H	7/13/01 LCB
722	10 L	10 L	10 L	10 L	7/13/01 LCB
737	10 L	10 L	10 L	10 L	7/13/01 LCB
728A	8 L / 2 H	6 L / 4 H	4 L / 6 H	3 L / 7 H	7/13/01 LCB
735A	10 L	10 L	10 L	10 L	7/13/01 DJ
726A	10 L	10 L	10 L	9 L, 1 H	7/13/01 DJ
736A	10 L	10 L	10 L	10 L	7/13/01 LCB
727A	10 H	10 H	10 H	10 H	7/13/01 LCB
741	10 L	10 L	10 L	10 L	7/13/01 LCB
708A	10 L	10 L	10 L	10 L	7/13/01 LCB
001	10 L	10 L	10 L	10 L	7/13/01 LCB
719A	10 H	10 H	10 H	10 H	7/13/01 LCB
739	10 H	10 H	10 H	10 H	7/13/01 LCB
			DJ		
			7/13/01 DJ		

① 1 C LCB 7/13/01

H = Healthy L = Lethargic D = Dead M = Missing
C = Cocoons LE = Lesions S = Segmental constriction

Study Number: 13764-6100

TEST DAY - 0

pH and Temperature

Sample ID	Rep	ph	temperature °C
		Date/Initials 6/29/01 DJ	Date/Initials DJ 6/29/01
721	1	3.7	21
734	1	3.4	21
733	1	4.1	21
732	1	3.7	21
722	1	3.5	21
~~724~~		(1)	21
737	1	3.4	21
728A	1	4.0	21
735A	1	3.3	21
726A	1	4.9	21
736A	1	3.5	21
727A	1	3.6	21
741	1	3.4	21
708A	1	3.6	21
001	1	3.6	21
719A	1	4.4	21
739	1	3.5	21
Control 142	1	6.4	21
~~708~~	1	3.4	21
719	1	3.1	21 (2)
704	1	3.0	21

pH meter Used: LaMotte 46116-5551 Thermometer #: 857

(1) Sample not used sample uncollected.

Springborn Laboratories, Inc.

DJ 7/2/01

ph & temperature HW

(2) recorded on wrong sheet 7/2/01

Study Number: 13764.6100

TEST DAY - 14

pH and Temperature

Sample ID	Rep	ph	temperature °C
		Date/Initials 7/13/01 LCB	Date/Initials 7/16/01 PD
Control -1	1	6.5	21
Control - 2	1	6.5	21
721	1	4.3	21
734	1	3.9	21
733	1	4.2	21
732	1	3.9	21
722	1	3.9	21
737	1	3.4	21
728A	1	4.2	21
735A	1	4.1	21
726A	1	4.9	21
736A	1	3.3	21
727A	1	3.6	21
741	1	3.2	21
708A	1	3.2	21
001	1	3.3	21
719A	1	4.0	21
739	1	3.2	21
		NA 7/16/01 PD	

pH meter Used: LaMotte 46116-5551 Thermometer #: ~~859~~ ① 897

① 1e LCB 7/16/01

Study Number: 1364-6100

Set #1 received 6/26/01

PERCENT MOISTURE DETERMINATION Day -1

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
735A	1.2415	6.7512	5.4597	5.7928	18
728A	1.3111	6.1487	4.8376	5.0021	24
734	1.2862	6.3020	5.0158	5.4044	18
722	1.3042	8.0968	6.7924	6.4038	25
732	1.3074	8.2772	6.9698	5.7578	36
721	1.2683	6.9580	5.6897	5.8321	20
733	1.2792	6.6605	5.3813	5.6188	19
737	1.3105	7.7143	6.4038	6.2239	23
726A	(1) ~~1.2907~~ 1.2865	6.8794	5.5889	5.6092	23
Control	(1) ~~1.2905~~ 1.2866	6.3466	5.0618	6.3258	0.41
			NA		
			7/6/01		

(1) ie

Balance Used (wet weight): Fisher B027883 Date/Initials: 6/26/01

Balance Used (dry weight): Fisher B027883 Date/Initials: 6/27/01

Oven #3 Lab-Line Imperial III therm. 726 @ 105°C

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: _____ Date: 6/27/01

Study Number: 13764-6100

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Set 2 Received 6/26/01 26 7/10/01 DJ

PERCENT MOISTURE DETERMINATION

Day -1

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
727 A	1.2670	8.4872	7.2202	7.5817	13
719 A	1.2822	5.1418	3.8596	3.9534	31
736 A	1.2825	5.0447	3.7642	3.6989	36
708 A	1.2830	6.5614	5.2784	5.1880	24
739	1.2910	6.5445	5.2535	4.4271	31
741	1.2813	7.6809	6.3996	5.4230	35
001	1.2522	7.5453	6.2931	6.1970	21
			NA 7/10/01 DJ		

Balance Used (wet weight): Ashen B02783 Date/Initials: DJ 6/27/01

Balance Used (dry weight): Ashen B02783 Date/Initials: DJ 6/28/01

oven #3 lab Line Imperial II therm. 726 @ 105°C

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: DJ Date: 6/28/01

Study Number: 13764-6102

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PERCENT MOISTURE DETERMINATION Samples on Day 0

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
735A	2.2600	10.4658	8.2058	7.9326	31
728A	2.2422	8.1782	5.9360	6.3090	31
734	2.2539	12.2313	9.9774	9.5836	27
722	2.2534	8.0345	5.7811	6.2038	32
732	2.2328	7.3679	5.1351	5.3045	40
721	2.2635	12.7492	10.4857	9.5258	31
733	2.2931	8.7583	6.4652	7.6205	18
737	2.2596	7.4643	5.2047	5.0456	46
726A	2.2809	9.1132	6.8323	7.1778	28
727A	2.2712	8.9204	6.6492	7.6960	18
719A	2.2658	10.1630	7.8972	7.1746	38
736A	2.2511	8.1640	5.9129	5.8126	40
708A	2.2468	8.7376	6.4908	6.7716	30
739	2.2553	8.0436	5.7883	6.4396	28
741	2.5770	10.3646	7.7876	7.5330	36
001	2.2793	8.3420	6.0627	6.3226	33
Controls	~~2.2922~~ 2.2583	10.5321	8.2738	8.5550	24

in 4/28/01 DJ

Balance Used (wet weight): Fisher 6027883 Date/Initials: 6/28/01 DJ

Balance Used (dry weight): Fisher 5127883 Date/Initials: 6/29/01 DJ

Oven #3 lab line Imperial II Therm-726 @ 105°C

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: DJ Date: 6/30/01

Study Number: 13764-6000

PERCENT MOISTURE DETERMINATION Day 14

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
Control 1	2.2347	7.5762	5.3415	6.3473	23
Control 2	2.2480	7.8461	5.5981	6.5785	23
721	2.2650	6.9986	4.7336	5.6073	29
734	2.2829	7.1209	4.8380	5.8953	25
733	2.2665	6.2794	4.0129	5.1738	28
732	2.2437	6.8702	4.6265	5.0117	46
722	2.2356	7.6248	5.3892	5.9176	32
737	2.2556	(1) ~~7~~ 6.3310	4.0754	5.2957	25
728A	2.2783	7.6511	5.3728	5.7964	35
735A	2.2818	7.5636	5.2818	5.8640	32
726A	2.2637	5.5552	3.2915	4.5283	31
736A	2.2620	6.0027	3.7407	4.5148	40
727A	2.2649	7.4629	5.1980	6.2538	23
741	2.2641	6.4784	4.2143	5.1658	31
708A	2.2815	6.7223	4.4408	5.3616	31
001	2.2480	7.6314	5.3836	5.8441	33

Balance Used (wet weight): Fisher B027883 Date/Initials: 7/13/01 LCB

Balance Used (dry weight): Fisher B027883 Date/Initials: 7/14/01 95

OVEN #3 LAB-LINE IMPERIAL II Therm. # ~~726~~ (2) 744 @ 105°C

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: [illegible] Date: 7/16/01

SPRINGBORN LABORATORIES, INC. Percent moisture

(1) ie LCB 7/13/01

(2) replace thermometer #726 - mercury separated 7/13/01 LCB

Study Number: 13764-6100

PERCENT MOISTURE DETERMINATION Day 14

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
719A	2.2732	6.4100	4.1368	4.9249	36
739	2.2824	6.4790	4.1966	5.3919	24

Balance Used (wet weight): Fisher B027883 Date/Initials: 7/13/01 LCB

Balance Used (dry weight): Fisher B027883 Date/Initials: 7/14/01 95

Oven used: LAB-LINE IMPERIAL II therm # ~~726~~ ① 744

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: [signature] Date: 7/16/01

① replace thermometer # 726 - mercury separated 7/13/01 LCB

Study Number: 13764-6100

Light Intensity (footcandles/lux)

		Footcandles	Lux	Footcandles	Lux	
Day 0	Front	80	860	110	1200	Meter Used: Traceable
	Back	70	750	100	1200	Date/ID: EXP 6/28/01
Day 7	Front					Meter Used:
	Back					Date/ID:
Day 14	Front	70	750	70	750	Meter Used: Traceable
	Back	70	750	70	750	Date/ID: 7/12/01 [illegible]
Day 28	Front					Meter Used:
	Back					Date/ID:
Day 42	Front					Meter Used:
	Back					Date/ID:
Day 56	Front					Meter Used:
	Back					Date/ID:

Set 1

	Foot Candles	LUX	
Day 0 - 7/2/01	70	750	Traceable 7/2/01 [illegible]
Front & Back	70	750	
Day 14 - 7/16/01	70	750	Traceable 7/16/01 [illegible]
Front & Back	80	860	

Set 2

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER | PAGE 1 OF 1

PROJECT NO: CECIL FIELD	SITE NAME: SITE 15	PROJECT MANAGER AND PHONE NUMBER: MIKE WHITTEN 803-649-7963	LABORATORY NAME AND CONTACT: Springborn Labs - Arthur Pitt
SAMPLERS (SIGNATURE): M L Whitten		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS: 790 Main Street
		CARRIER/WAYBILL NUMBER: FedEx	CITY, STATE: Wareham, MA 02571-1075

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P
PRESERVATIVE USED: ice

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: 14 day earthworm toxicity test								COMMENTS
6/26	1020	CEF-015-SS-708	SOIL	C	1	✓								Cool to 4°C
6/26	0756	CEF-015-SS-719	SOIL	C	1	✓								"
6/26	1605	CEF-015-SS-704	SOIL	C	1	✓								"
6/27	0845	CEF-015-SS-717	SOIL	C	1	✓								"
~~6/~~		~~CEF-015-SS~~	~~SOIL~~											~~MLW~~
														received at 4°C

1. RELINQUISHED BY: M.L. Whitten	DATE: 6/28/01	TIME: 1130	1. RECEIVED BY: Delivered to FedEx	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY: Arthur R. Shearer	DATE: 6/29/01	TIME: 1230

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

137G4.6100

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TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER | PAGE ___ OF ___

PROJECT NO: CECIL FIELD	SITE NAME: SITE 15	PROJECT MANAGER AND PHONE NUMBER: MIKE WHITTEN 803-649-7963	LABORATORY NAME AND CONTACT: Springborn Labs - Arthur Pott
SAMPLERS (SIGNATURE): M L Whitten		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS: 790 Main Street
		CARRIER/WAYBILL NUMBER: Fed Ex	CITY, STATE: Wareham, MA 02571-1075

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P
PRESERVATIVE USED: ice

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: 14-day earthworm toxicity test								COMMENTS
6/27	1450	CEF-015-SS-703	SOIL	C	1	✓								Cool to 4°C
6/27	1710	CEF-015-SS-724B	SOIL	C	1	✓								
6/26	1354	CEF-015-SS-709	SOIL	C	1	✓								
6/24	1013	CEF-015-SS-740	SOIL	C	1	✓								
6/25	1215	CEF-015-SS-707	SOIL	C	1	✓								
6/25	0920	CEF-015-SS-707A	SOIL	C	1	✓								
6/27	1200	CEF-015-SS-706	SOIL	C	1	✓								
														received at 4°C

1. RELINQUISHED BY: M.L. Whitten	DATE: 6/28/01	TIME: 1130	1. RECEIVED BY: Delivered to Fed Ex	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY: Arthur R. Thomas	DATE: 6/29/01	TIME: 1230

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

13764.6/00

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STUDY NUMBER: 13764.6100 PAGE: 27

MONITORING OF TEST SYSTEM

HEALTH ASSESSMENT DAY - 0

Sample ID	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Date/Initials
Neg Control-3	10 H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
708	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
719	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
704	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
717	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
703	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
724B	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
709	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
740	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
707	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
707A	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
706	10H-B	10H-B	10 H-B	10 H-B	7/2/01 DJ
			N/A 7/2/01 DJ		

H = Healthy L = Lethargic D = Dead M = Missing
C = Cocoons LE = Lesions S = Segmental constriction
B = Burrowed

STUDY NUMBER: 13764.6100

MONITORING OF TEST SYSTEM

HEALTH ASSESSMENT DAY - 14

Sample ID	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Date/Initials
Neg Control-3	10H	10H	10H	10H	7/16/01 LCB
708	10 H	10 H	10 H	10 H	7/16/01 LCB
719	10 H	10 H	10 H	10 H	7/16/01 LCB
704	10 L	10 L	10 L	10 L	7/16/01 LCB
717	10L	10L	10L	10L	7/16/01 LCB
703 ①	10D	10D	10D	10D	7/16/01 LCB
734B	10 L	10 L	10 L	10 L	7/16/01 LCB
709	10 L	10 L	10 L	10 L	7/16/01 LCB
740	10 L	10 L	10 L	10 L	7/16/01 LCB
707	10 L	10 L	10 L	10 L	7/16/01 LCB
707A	10 L	10 L	10 L	10 L	7/16/01 LCB
706	10D	10D	10D	10D	7/16/01 LCB
		NA	7/16/01		

H = Healthy L = Lethargic D = Dead M = Missing
C = Cocoons LE = Lesions S = Segmental constriction

SPRINGBORN LABORATORIES, INC.

OBSERVATIONS

① sample moldy on surface LCB 7/16/01

Study Number: 13764.6100

TEST DAY - 0

pH and Temperature

Sample ID	Rep	ph	temperature °C
		Date/Initials 7/2/01	Date/Initials 7/2/01
Neg Control-3	1	6.8	21
708	1	3.4	21
719	1	3.1	21
704	1	3.0	21
717	1	3.0	21
703	1	3.0	21
724.5	1	3.0	21
709	1	3.0	21
740	1	3.0	21
707	1	3.0	21
707A	1	3.0	21
706	1	3.5	21
		NA 7/2/01 PJ	

pH meter Used: Lemotte 46116-5551

Thermometer #:

Study Number: 13764.6100

TEST DAY - 14

pH and Temperature

Sample ID	Rep	ph	temperature °C
		Date/Initials 7/16/01 LCB	Date/Initials 7/16/01 LCB
Neg Control-3	1	6.4	21
708	1	3.9	21
719	1	3.7	21
704	1	3.6	21
717	1	3.7	21
703	1	3.5	21
724B	1	3.6	21
709	1	3.2	21
740	1	3.0	21
707	1	2.7	21
707A	1	2.9	21
706	1	4.0	21
		NA 7/16/01	

pH meter Used: LaMotte 46116-5551

Thermometer #: ~~857~~ 897

Springborn Laboratories, Inc.

ph & temperature HW

Date 7/16/01 LCB

Study Number: 13764.6100

PERCENT MOISTURE DETERMINATION

Day -1

Set #3 Received 6/29/01 DJ

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
708	2.2608	9.7823	7.5215	6.3178	46
719	2.2588	7.0584	4.7996	6.1793	① 27/8
704	2.2745	8.0299	5.7554	6.8475	21
717	2.2635	7.1451	6.2920	6.2920	18
703	2.2587	8.4877	6.9883	6.9833	24
724B	2.2567	7.8862	6.9387	6.9387	17
709	2.2580	8.9196	7.6765	7.6765	18
740	2.2417	8.8415	7.2626	7.2624	24
707	2.2473	7.3415	5.6171	5.6171	34
707A	2.2647	7.5097	5.6494	5.6494	36
706	2.2530	10.8930	9.3391	9.3391	18
			NA		
			7/2/01 DJ		

@ 6/29/01 DJ

Balance Used (wet weight): Fisher B027853 Date/Initials: 6/29/01 DJ

Balance Used (dry weight): Fisher B027853 Date/Initials: DJ 6/30/01 DJ

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: DJ Date: 6/30/01

Study Number: 13764.6100

PERCENT MOISTURE DETERMINATION Day-0

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
708	2.2566	9.0389	6.7823	6.0661	44
719	2.2718	9.5842	7.3174	7.7427	25
704	2.2715	10.5241	8.2526	8.4823	25
717	2.2548	10.3829	8.1281	8.6616	21
703	2.2722	9.7474	7.4752	8.0482	23
724B	2.2727	13.7260	11.4533	11.0857	23
709	2.2514	11.9922	9.7408	9.4957	26
740	2.2728	9.6368	7.3640	7.9674	23
707	2.2537	9.9682	7.7145	7.2931	35
707A	2.2733	9.1578	6.8845	6.7029	36
706	2.2566	13.3163	11.0577	10.9883	21
Control 3	2.2605	13.6972	11.4367	10.9926	24
			NA 7/3/01		

Oven #3 Lab Line Imperial II Therm. 726 @ 105°C

Balance Used (wet weight): [illegible] Date/Initials: 7/2/01

Balance Used (dry weight): [illegible] Date/Initials: 7/3/01

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: [illegible] Date: 7/3/01

PERCENT MOISTURE DETERMINATION Day 14

Sample	Tare Weight (g)[a]	Gross Wet Weight (g)[b]	Net Wet Weight (g)	Gross Dry Weight (g)[c]	% Moisture
Neg Control - 3	2.2518	6.1361	3.8843	5.1584	25
708	2.2741	5.6092	3.3351	4.1481	44
719	2.2474	5.0662	2.8188	4.3691	25
704	2.2678	5.0969	2.8291	4.3738	26
717	2.2712	5.9520	3.6808	5.1987	20
703	2.2612	6.3090	4.0478	5.3125	25
724B	2.2702	6.5726	4.3024	5.5987	23
709	2.2480	6.3968	4.1488	5.3984	24
740	2.2622	6.4999	4.2377	5.5238	23
707	2.2656	5.7368	3.4712	4.6381	32
707A	2.2737	5.0701	2.7964	4.0534	36
706	2.2686	5.7789	3.5103	5.1017	19
			MA		
			DJ		
			7/16/01		

Balance Used (wet weight): Fisher Scientific B027883 Date/Initials: 7/16/01 LCB

Balance Used (dry weight): Fisher Scientific B027883 Date/Initials: 7/17/01 LCB

Oven II 3 has Fine Imperial II therm. II 744 @ 105°

percent moisture = ((b - c) / (b - a)) x 100

Percent Moisture calculated by: DJ Date: 7/17/01 DJ

13764-6100
Tetra Tech

Sample	Gross Wet Wt (g)	Tare Wt (g)	Net Wt. (g)	Final Wt (g)	Moisture Fraction	Wet Soil = 200 g dry	WHC Initial Wt (g)	Final Wt (g)	WHC mL/100g	75% WCH	Volume water in 200 g Soil (mL)	Additional water/200 grams (mL)
Control	6.3466	1.2848	5.0618	6.3258	0.004	200.83	131	183	52	78	1	77
735A	6.7512	1.2915	5.4597	5.7928	0.176	242.58	134	187	53	66	35	30
728A	6.1487	1.3111	4.8376	5.0021	0.237	262.13	134	183	49	56	47	9
734	6.302	1.2862	5.0158	5.4044	0.179	243.59	132	168	36	44	36	9
722	8.0968	1.3042	6.7926	6.4038	0.249	266.40	135	176	41	46	50	-4
732	8.2772	1.3074	6.9698	5.7578	0.361	313.22	133	171	38	36	72	-36
721	6.958	1.2683	5.6897	5.8321	0.198	249.34	134	188	54	65	40	25
733	6.6605	1.2792	5.3813	5.6188	0.194	248.01	134	181	47	57	39	18
737	7.7143	1.3105	6.4038	6.2239	0.233	260.67	136	182	46	53	47	6
726A	6.8794	1.2905	5.5889	5.6092	0.227	258.82	133	186	53	61	45	16
727A	8.4872	1.267	7.2202	7.5817	0.125	228.68	133	169	36	47	25	22
719A	5.1418	1.2822	3.8596	3.9534	0.308	288.98	134	206	72	75	62	13
736A	5.0467	1.2825	3.7642	3.6989	0.358	311.55	133	205	72	69	72	-2
708A	6.5614	1.283	5.2784	5.1880	0.260	270.34	133	196	63	70	52	18
739	6.5445	1.291	5.2535	4.9271	0.308	288.96	135	183	48	50	62	-12
741	7.6809	1.2813	6.3996	5.4230	0.353	309.03	132	180	48	47	71	-24
"001"	7.5453	1.2522	6.2931	6.1970	0.214	254.53	135	182	47	55	43	13

10/29/01 34

13764-6100
Tetra Tech

Sample	Gross Wet Wt (g)	Tare Wt (g)	Net Wt. (g)	Final Wt (g)	Moisture Fraction	Wet Soil = 200 g dry	WHC Initial Wt (g)	Final Wt (g)	WHC mL/100g	75% WCH	Volume water in 200 g Soil (mL)	Additional water/200 grams (mL)
708	9.7823	2.2608	7.5215	6.3178	0.461	370.79	133	164	31	25	92	-67
719	7.0584	2.2588	4.7996	6.1793	0.183	244.85	136	184	48	59	37	22
704	8.0299	2.2745	5.7554	6.8475	0.205	251.71	136	183	47	56	41	15
717	7.1451	2.2635	4.8816	6.2920	0.175	242.35	136	173	37	46	35	11
703	8.4877	2.2587	6.2290	6.9833	0.242	263.68	132	174	42	48	48	-1
724B	7.8862	2.2567	5.6295	6.9387	0.168	240.47	133	174	41	51	34	17
709	8.9196	2.258	6.6616	7.6765	0.187	245.88	135	183	48	59	37	21
740	8.8415	2.2417	6.5998	7.2626	0.239	262.89	133	168	35	40	48	-8
707	7.3415	2.2473	5.0942	5.6171	0.339	302.34	134	190	56	56	68	-12
707A	7.5097	2.2647	5.2450	5.6494	0.355	309.92	134	194	60	58	71	-13
706	10.8930	2.2530	8.6400	9.3091	0.183	244.89	137	166	29	36	37	-1

7/4/01

137164-6100

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Weights for determining percent moisture and water holding capacity

Wet wt. Balance Used Mettler PE6 F50070 Init + Date EKP 6/26/01

Dry wt. Balance Used Mettler PE6 F50070 Init + Date EKP 6/26/01

Sample ID	Initial Wet weight (g) Gross	Tare	(Final) Dry weight (g) Gross	Tare
735A	1234	0	187	0
728A	1234	0	183	0
734	1232	0	168	0
722	1235	0	176	0
732	1233	0	171	0
721	1234	0 ~~234~~	188	0
733	1234	0	181	0
737	1236	0	182	0
724	1232	0		NA 6/29/01
726A	1233	0	186	0
Control	1231	0	183	0
741	132	0	180	0
736A	133	0	205	0
727A	133	0	169	0
739	135	0	183	0
001	135	0	182	0
719A	134	0	206	0
708A	133	0	196	0
708	133	0	164	0
704	136	0	184	0
719	136	0	183	0
717	136	0	173	0
703	132	0	174	0
729B	133	0	174	0
729	135	0	183	0
710	133	0	168	0
[illegible]	134	0	190	0
[illegible]A	134	0	194	0
[illegible]	137	0	166	0

EKP 6/26/01

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13764.6100

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Weights for determining percent moisture and water holding capacity

Wet wt. Balance Used_____ Init + Date_____

Dry wt. Balance Used_____ Init + Date_____

Sample ID	Wet weight (g) Gross	Wet weight (g) Tare	Dry weight (g) Gross	Dry weight (g) Tare

edit 1/20/93

SPRINGBORN LABORATORIES, INC.

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13764-6100

Month (year)	JUNE
Location	S11
Therm #	~~857~~ ① 858

DAY	MIN	MAX	INITIALS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29	20	22	ERP
30	21	22	ERP
31			

7/5/01

7/5/01

① 12 LCB 7/13/01

Month (year)	JULY
Location	S11
Therm #	~~857~~ ① 858

DAY	MIN	MAX	INITIALS
1	21	22	ERP
2	20	22	ERP
3	20	21	ERP
4	20	21	[illegible]
5	19	21	ERP
6	20	21	ERP
7	20	21	[illegible]
8	20	21	ERP
9	21	21	ERP
10	21	22	ERP
11	21	22	ERP
12	21	22	ERP
13	20	21	LCB
14	20	21	[illegible]
15	20	21	LCB
16	20	21	LCB
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			

13764.6100

SPRINGBORN LABORATORIES, INC. Page No: 36

RECORD OF TEST ORGANISM RECEIPT

Date of Receipt: 3/21/01 (1)

Designated SLI Lot Number: ~~032101~~ 01A36

Species Name: red wiggler worms

Organisms Collected or Purchased: Collected Purchased (Circle One)

Description of Collection Location (or): N/A

Source of Purchase (Supplier Name, Address, Invoice No.): Merchants Bay, Mt. Laurel, NJ

Approximate Number of Organisms Collected or Received: ~2000

Life Stage of Organisms: adults

Estimated Age of Organisms (i.e. Hatch Date): N/A

Holding Vessel Identification Number: N/A

Water Quality of Original Water Source: Temp N/A °C Salinity N/A (ppt) Other N/A

Water Quality Upon Receipt: Temp N/A °C Salinity N/A (ppt) Other N/A

General Condition of Organisms: Good

Shipping Information (if available, e.g.,Carrier/Courier, Airbill No.): Invoice # 122

Data By: LCB Date: 4/17/01

RECORD OF TEST ORGANISM IDENTIFICATION

Species Name: red wiggler worms

Taxonomic Reference(s) Used: 12 (See Reverse For Bibliographic Info.)

Organisms Identified By: DJ

Date of Verification: 4/17/01

Comments/Notes:

Cir 5/9/01 DJ

ORG-REC1 rev. 1/3/00

Page 39 to 43 Copy of originals, originals located in culture log 2001. DJ

EARTHWORM CULTURE # 01A36 (SIGN AND DATE EACH ENTRY)

3/21/01 DJ

~2000 Earthworms added to culture bedding of 2 Blocks Bed-a-Beast w/ 3.79L Hot water - after 20 minutes pH 6.3 Lamotte 46116-5551 - 1kg lot 56991 Cattle manure & 1kg peat lot 011600 mixed together in Hobart 1742668 w/ 3L water DI Balance Mettler F50070 -

Added to Bricks and mixed by hand

pH - 6.5 lamotte 46116-5551

percent moisture = 71%

tare 1.2451g gross wet 5.5012g Net Wet 4.2561g

Gross dry - 2.4651g

$$\frac{(5.5012g - 2.4651g)}{(5.5012g - 1.2451g)} \times 100 = 71\%$$

balance = Fisher B027883 Oven - lab line Imperial II @ 105°C

thermometer #726

4/4/01 DJ

500g manure lot #56991 added to culture

4/25/01 DJ

500g manure lot 56991 added to culture

pH 6.5 lamotte 46116-5551 moisture = 72%

tare - 1.3482g G-Dry - 2.5947g

Gross wet - 5.8142g

Net wet - 4.4660g

$$\frac{(\overset{5.8142}{\cancel{5.8012g}} - 2.5947g)}{(5.8142g - 1.3482g)} \times 100 = 72\%$$

(in 4/25/01 DJ)

Balance - Fisher B027883

Oven lab line Imperial II @ 105°C thermometer #726

EARTHWORM CULTURE # 01A36 (SIGN AND DATE EACH ENTRY)

5/9/01 DJ

Culture Fed 500g Manure lot # 56991

5/23/01 DJ

Culture Fed 500g Manure lot # 56991

pH 6.5 Moisture = 66.1

Tare - 1.2961g Gross Wet - 5.7623 Net Wet 4.466z

Gross Dry - 2.8162

$$\frac{(5.7623 - 2.8162)}{5.7623 - 1.2961} \times 100 = 66$$

Oven - lab line Impuned II @ 105°C thermometer # 726

Balance - Fisher 5027833

13764.6100

EARTHWORM CULTURE # 01A36 (SIGN AND DATE EACH ENTRY)

SLI # 01A36

6/4/01 culture fed ≈ 100g moist manure

exp 6/4/01 pH = 6.0 LaMotte 46116-5551

6/17/01 EXP culture fed ≈ 250g moist manure lot 4-20-01

6/29/01 culture fed ≈ 250g moist manure Lot 42001 EXP

7/12/01 culture fed ≈ 250 g each moist manure Lot 42001 EXP

6/28/01 ~ 1000 adult worm removed for 13764-6100 placed in artificial soil.

6/28/01 ~ 1000 adult worm removed for 13764-6100 place in artificial soil

13764.6100

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Temperature Monitoring

h (year) June 2001

Location: Weight Room

n # 869

Therm # 869

/	Min.	Max.	Initials
1	19	19	EKP
2	19	19	[illegible]
3	19	19	[illegible]
4	19	20	EKP
5	19	20	EKP
6	20	21	EKP
7	20	20	EKP
8	20	20	EKP
9	20	20	[illegible]
0	19	19	[illegible]
11	19	20	EKP
12	20	20	EKP
13	20	20	EKP
14	20	20	EKP
15	20	20	EKP
16	20	20	[illegible]
17	20	21	EKP
18	20	21	EKP
19	21	21	EKP
20	21	21	EKP
21	21	21	EKP
22	21	21	EKP
23	20	20	EKP
24	20	20	[illegible]
25	20	21	EKP
26	20	21	EKP
27	20	21	EKP
28	21	22	EKP
29	20	21	EKP
30	20	21	[illegible]
31			

July

Day	Min.	Max.	Initials
1	18	22	EKP
2	21	21	EKP
3	20	21	EKP
4	20	21	[illegible]
5	20	21	EKP
6	21	21	EKP
7	20	20	[illegible]
8	20	21	EKP
9	20	20	EKP
10	20	21	EKP
11	20	21	EKP
12	20	21	[illegible]
13	20	21	[illegible]
14	20	20	[illegible]
15	20	20	[illegible]
16	20	20	[illegible]
17	20	20	[illegible]
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			

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APPENDIX D

INVERTEBRATE REPORT

SOIL INVERTEBRATE ASSAY
CECIL FIELD, JACKSONVILLE, FLORIDA

Wade Davidson
University of Florida
Department of Entomology and Nematology

Introduction

Soil invertebrates were sampled from 27 sites. Sites were categorized as either polycyclic aromatic hydrocarbon (PAH) contaminated, lead contaminated, or as a reference (non contaminated). All sites were forested with "high pine" vegetation typical of north Florida. At each site a 10' x 15' plot was established for sampling. Extracted specimens were identified and either preserved in 70% alcohol (PAH sites), or sent away for lead content analyses (Lead and reference sites). The scope of this report is to detail the methods used for soil invertebrate extraction and identification, and to present the data.

Soil Invertebrate Extraction

Soil invertebrates dwelling at the interface between mineral soil and leaf litter were focused on. The logic presented to the author for this bias was that these invertebrates were more likely to be resident to (therefore representative of) the site and not transient. Also, the mineral soil of north Florida has a very high sand content and does not support enough invertebrate activity to be of any use for this assay. Therefore, the surface leaf litter was removed from the plot. The "duff" layer was meticulously sorted by a team of investigators for soil invertebrates large enough to be a food item for birds or rodents (>5mm). Sorting was done with tweezers and gloved hands. Extracted specimens were placed in sample bags and stored in coolers in the field. At the end of each day, samples were placed in jars and either frozen (lead and reference sites) or covered in 70% alcohol (PAH sites).

Soil Invertebrate Identification

Invertebrates were identified to the most detailed taxon possible given the time and facilities the author had to work with. Insects, snails, and earthworms were identified to family. Identification of insects beyond the family level is difficult and requires the attention of specialists for each family. Identification of larva also requires attention from a larva specialist. Non-insect arthropods were identified to order. Identification of non-insect arthropods beyond the order taxon often requires dissection of mouthparts and/or specialists who work exclusively with a specific order or family of arthropod (i.e. spiders).

Functional Roles

The level of identification performed for this assay is detailed enough to categorize the specimens into functional roles. Following is a list of encountered organisms organized by their role in the food web.

Generalist Predators
All arachnids, all centipedes, Hemiptera: Reduviidae, Anthocoridae; Coleoptera: Carabidae, Cicindelidae; Mantodae: Mantidae.

Specialist Predators
Coleoptera: Cleridae (preys on other beetles), some Staphlyinds (prey varies with species).

Omnivores
Coleoptera: Staphylinidae, Melandryidae; Hymenoptera: Formicidae.

Herbivores
Coleoptera: Scarabidae; Orthoptera: Tettigonidae; Hemiptera: Miridae, Lygaeidae; Homoptera: Cicadidae; Gastropoda.

Detritivores
Coleoptera: Helodidae, Staphylindae, Silphidae, Elateridae; Diptera: Tabanidae (only as larva); Orthoptera: Gryllidae; Blatteria: Blatellidae; Annelida; Isopoda; Diplopoda.

ss 721

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			5		Scarab beetles
			Staphylindae			1		Rove beetles
			Silphidae			1		Carrion beetles
			Elateridae			3	larva	Click beetles
			unkown			2	larva	
		Lepidoptera	unkown			1	larva	
		Blattaria	Blatellidae			11		roaches
	Chilopoda	Scolopendromorpha				7		centipedes
	Arachnida	Araneida				12		spiders
		Opiolones				1		daddy longlegs
Annelida	Oligochaeta		Lumbricidae			1		earthworms

ss722

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae				2	Scarab beetles
			Elateridae				2 larva	Click beetles
		Orthoptera	Gryllidae				2	Field Crickets
		Hymenoptera	Formicidae				2	Ants
	Arachnida	Araneida					4 1 eggsack	Spiders
	Chilopoda	Scolopendromorpha					9	Centipedes
		Lithobiomorpha					1	Centipedes

ss724

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			2		Scarab beetles
			Elateridae			3	larva	Click beetles
			unknown			3		
		Hymenoptera	Formicidae			2		Ants
		Blattaria	Blatellidae			1		Roaches
	Arachnida	Araneida				2		Spiders
	Chilopoda	Scolopendromorpha				5		Centipedes
		Lithobiomorpha				2		Centipedes

ss726a

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetles
			Carabidae			1		Ground beetles
			Elateridae			1		click beetles
			Elateridae			1	larva	click beetles
			unknown			1		
			unknown			1		
			unknown			1		
		Diptera	Tabanidae			1	larva	Horse fly
		Lepidoptera	unknown			1	pupa	
			unknown			1	larva	
			unknown			1	larva	
		Hymenoptera	Formicidae			8		Ants
		Blattaria	Blatellidae			7		Roaches
	Arachnida	Araneida				8		Spiders
	Chilopoda	Scolopendromorpha				11		Centipedes
		Lithobiomorpha				1		Centipedes

ss727a

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			2		Scarab beetles
			Silphidae			1		Carrion beetles
			Elateridae			1	larva	Click beetles
		Hymenoptera	Formicidae			6		Ants
		Orthoptera	Gryllidae			1		Field Cricket
			Tettigonidae			1		Bush Katydid
	Arachnida	Araneida				2		Spiders
	Chilopoda	Scolopendromorpha				4		Centipedes
		Lithobiomorpha				4		Centipedes
Annelida	Oligochaeta		Lumbricidae			1		Earthworms

ss728a

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			5		Scarab beetles
			Carabidae			2		Ground beetles
			Staphylinidae			2		Rove beetles
			unknown			1	larva	
		Hemiptera	Anthocoridae			2		Pirate bug
		Blattaria	Blatellidae			6		Roaches
	Arachnida	Araneida				2		Spiders
		Opiolones				3		Daddy longlegs
	Chilopoda	Scolopendromorpha				26		Centipedes
		Lithobiomorpha				2		Centipedes
Annelida	Oligochaeta		Lumbricidae			3		Earthworms

ss732

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	unknown				1 larva	
		Hemiptera	Reduviidae				1	Assassin bug
		Hymenoptera	Formicidae				1	Ants
		Orthoptera	Gryllidae				1	Field Cricket
		Blattaria	Blatellidae				5	Roaches
	Crustacea	Isopoda					2	pill bugs
	Chilopoda	Scolopendromorpha					5	Centipedes
	Arachnida	Araneida					2	Spiders
Annelida	Oligochaeta		Lumbricidae				1	Earthworms

ss733

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Carabidae			3		Ground beetles
			Scarabaeidae			1		Scarab beetles
			Elateridae			2	larva	Click beetles
		Blattaria	Blatellidae			6		Roaches
		Diptera	unknown			1	larva	
		Lepidoptera	unknown			2	larva	
	Chilopoda	Scolopendromorpha				10		Centipedes
		Lithobiomorpha				5		Centipedes
	Diplopoda	unknown				2		Millipedes
	Arachnida	Araneida				4		Spiders
		Scorpiones				1		Scorpion

ss734

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetles
			Carabidae	Brachinus		1		Bombardier beetle
			Carabidae			3		Ground beetles
			Carabidae			1	larva	
			Elateridae			2	larva	
		Hemiptera	Anthocoridae			6		Pirate bugs
		Diptera	unknown			1	larva	
		Lepidoptera	unknown			1	larva	
		Hymenoptera	Formicidae			1		Ant
		Blattaria	Blatellidae			12		Roaches
	Arachnida	Araneida				5		Spiders
		Opiolones				3		Daddy longlegs
	Chilopoda	Scolopendromor				19		Centipedes
		Lithobiomorpha				11		Centipedes

ss735a

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			4		Scarab beetle
			Carabidae	Brachinus		1		Bombardier beetle
			Carabidae			1		Ground beetle
			Staphlynidae			1		Rove beetles
			Elateridae			2	larva	Click beetles
		Hemiptera	Anthocoridae			9		Pirate bugs
		Blattaria	Blatellidae			11		Roaches
	Arachnida	Araneida				6	1w/eggsack	Spiders
		Opiolones				3		Daddy longlegs
	Chilopoda	Scolopendromorpha				12		Centipedes
		Lithobiomorpha				3		Centipedes
Mollusca	Gastropoda		Vitrinidae			1		Vitrinid snail

ss736a

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Cleridae			1		Checkered beetle
			Cicindelidae			1		Tiger beetle
			Scarabaeidae			1		Scarab beetle
			Elateridae			1	larva	Click beetle
			unknown			2	larva	
		Orthoptera	Gryllidae			1		Field Cricket
		Blattaria	Blatellidae			9		Roaches
		Hymenoptera	Formicidae			1		Ant
		Lepidoptera	unknown			1	larva	Caterpillar
	Arachnida	Araneida				3		Spiders
	Chilopoda	Scolopendromorpha				22		Centipedes
		Lithobiomorpha				1		Centipedes

ss737

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Carabidae			2		Ground beetle
			Elateridae			10	larva	Click beetle
		Hemiptera	Anthocoridae			1		Pirate bugs
		Orthoptera	Gryllidae			1		Field cricket
		Hymenoptera	Formicidae			2		Ant
		Blattaria	Blatellidae			3		Roach
		Lepidoptera	unknown			1	pupa	cacoon
	Arachnida	Araneida				3		Spider
		Opiolones				4		Daddy longlegs
	Chilopoda	Scolopendromorpha				21		Centipedes
		Lithobiomorpha				7		Centipedes

CEF 015 SS-701

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			4		Scarab beetle
			Elateridae			4	larva	Click beetle
		Blattaria	Blatellidae			2		Roach
	Arachnida	Opiolones				1		Daddy longlegs
	Chilopoda	Scolopendromorpha				33		Centipede
		Lithobiomorpha				4		Centipede

CEF 015 SS-703

Phylum	Class	Order	Family	Genus	Species	Quantity	Common Name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			2	Scarab beetle
			unknown			1	unknown beetle grub
			unknown			1	unknown beetle grub
		Hemiptera	Anthocoridae			1	Pirate bug
			Lygaeidae			1	Seed bug
		Hymenoptera	Formicidae			1	Ant
	Arachnida	Araneida				4	Spider
	Chilopoda	Scolopendromorpha				12	Centipede
		Lithobiomorpha				10	Centipede

CEF 015 SS-704

Phylum	Class	Order	Family	Genus	Species	Quantity		Common Name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetle
			Elateridae			1	larva	Click beetle
		Hymenoptera	Formicidae			14		Ant
		Lepidoptera	unknown			1	larva	unknown caterpillar
		Blattaria	Blatellidae			2		Roach
	Arachnida	Araneida				3		Spider
	Chilopoda	Scolopendromorpha				10		Centipedes
		Lithobiomorpha				3		Centipedes

CEF 015 SS-706

Phylum	Class	Order	Family	Genus	Species	Quantity		Common Name
Arthropoda	Insecta	Coleoptera	Carabidae			1		Ground beetle
		Hymenoptera	Formicidae			1		Ant
		Orthoptera	Gryllidae			1		Field Cricket
		Blattaria	Blatellidae			2	ootheca	eggsack
	Arachnid	Araneida				4		Spider
		Araneida				1	eggsack	Spider
		Scorpiones				1		Scorpion
	Chilopod	Scolopendromorpha				2		Centipede
		Lithobiomorpha				5		Centipede

CEF 015 SS-707

Phylum	Class	Order	Family	Genus	Species	Quantity		Common Name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetle
			Silphidae			1		Carrion beetle
			Elateridae			3		Click beetle
			Elateridae			3	larva	Click beetle
			Carabidae	Brachinus		3		Ground beetle
			unknown			4	larva	unknown beetle grub
		Orthoptera	Gryllidae			2		Field cricket
		Blattaria	Blatellidae			5	1 ootheca	Roach
		Lepidoptera	unknown			1	larva	unknown caterpillar
		Hemiptera	Anthocoridae			4		Pirate bug
		Hymenoptera	Formicidae			10		Ant
	Arachnida	Araneida				5		Spider
		Opiolones				1		Daddy longlegs
		Scorpiones				1		Scorpion
	Chilopoda	Scolopendromorpha				43		Centipede
		Lithobiomorpha				3		Centipede

CEF 015 SS-707A

Phylum	Class	Order	Family	Genus	Species	Quantity	
Arthropoda	Insecta	Coleoptera	Hydrophilidae			1	!unusual!
			Scarabaeidae			7	
			Carabidae			1	
			Elateridae			1	larva
			unknown			2	larva
			unknown			1	larva
		Diptera	unknown			1	larva
		Hymenoptera	Formicidae			2	
		Blattaria	Blatellidae			4	2 oothec
	Arachnida	Araneida				4	
	Chilopoda	Scolopendromorpha				20	
		Lithobiomorpha				10	

Common Name
Water Scavenger beetle (terrestrial species-no natatorial legs)
Scarab beetle
Ground beetle
Click beetle grub
unknown beetle grub #1
unknown beetle grub #2
unknown fly maggot
Ant
Roach
Spider
Centipede
Centipede

CEF 015 SS-708

Phylum	Class	Order	Family	Genus	Species	Quantity	Common Name
Arhtropoda	Insecta	Coleoptera	Scarabaeidae			1	Scarab beetle
			Carabidae	Brachinus		2	Bombardier beetle
			Staphylinidae			1	Rove beetle
		Hemiptera	Miridae			2	Leaf bug
		Hymenoptera	Formicidae			3	Ant
		Orthoptera	Gryllidae			3	Field cricket
		Blattaria	Blatellidae			9	Roach
	Arachnida	Araneida				4	Spider
	Chilopoda	Scolopendromorpha				6	Centipede
		Lithobiomorpha				21	Centipede

CEF 015 SS-708A

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			3		Scarab beetle
			Elateridae			1	larva	Click beetle
		Blattaria	Blatellidae			3		Roach
	Chilopoda	Scolopendromorha				9		Centipede
		Lithobiomorpha				4		Centipede

CEF 015 SS-709

Phylum	Class	Order	Family	Genus	Species	Quantity		Common Name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			4		Scarab beetle
			Elateridae			2	larva	Click beetle
			unknown			1	larva	
			unknown			1	larva	
			unknown			1	larva	
		Orthoptera	Gryllidae			3		Field cricket
		Blattaria	Blatellidae			3		Roach
		Hemiptera	Anthocoridae			1		Pirate bug
		Hymenoptera	Formicidae			1		Ant
	Arachnida	Araneida				2		Spider
	Chilopoda	Scolopendromorpha				18		Centipede
		Lithobiomorpha				5		Centipede

CEF 015 SS-717

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Helodidae			1		Marsh beetle
			Elateridae			1		Click beetle
			Elateridae			1		Click beetle
			Cicindelidae			1		Tiger beetle
			Scarabaeidae			4		Scarab beetle
		Hemiptera	Reduviidae			1		Assassin bug
			Anthocoridae			1		Pirate bug
		Blattaria	Blatellidae			3		Roach
			Blatellidae			1	ootheca	egg sack
		Hymenoptera	Formicidae			3		Ant
		Lepidoptera	unknown			1	pupa	cacoon
	Arachnida	Araneida				6		Spider
	Chilopoda	Scolopendromorpha				6		Centipede
		Lithobiomorpha				11		Centipede

CEF 015 SS-719

Phylum	Class	Order	Family	Genus	Species	Quantity		Common Name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			3		Scarab beetle
			Elateridae			5	larva	Click beetle
			unknown			1	larva	
		Hymenoptera	Formicidae			2		Ant
		Orthoptera	Gryllidae			1		Field cricket
	Arachnida	Araneida				2		Spider
	Chilopoda	Scolopendromorpha				23		Centipeded
		Lithobiomorpha				1		Centipeded

CEF 015 SS-719A

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			3		Scarab beetle
			Elateridae			1	larva	Click beetle
			unknown			1	larva	
			unknown			1	larva	
		Hymenoptera	Formicidae			2		Ant
		Homoptera	Cicadidae			1	larva	Cicada
		Hemiptera	Anthocoridae			1		Pirate bug
	Arachnida	Araneida				1		Spider
	Chilopoda	Scolopendromorpha				7		Centipede

CEF 015 SS-739

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetle
			Elateridae			1		Click beetle
			Elateridae			1	larva	Click beetle
		Orthoptera	Gryllidae			1		Field cricket
		Blattaria	Blatellidae			1		Roach
		Hymenoptera	Formicidae	Solenopsis		1		Fire ant
		Mantodea	Mantidae			1		Mantis
	Chilopoda	Scolopendromorpha				18		Centipede
		Lithobiomorpha				21		Centipede

CEF 025 SS-740

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Scarabaeidae			1		Scarab beetle
			Melandryidae			1		False Darkling beetle
			Elateridae			5	larva	Click beetle
		Hymenoptera	Formicidae			2		Ant
		Blattaria	Blatellidae			3		Roach
	Arachnida	Araneida				1		Spider
	Chilopoda	Scolopendromorpha				13		Centipede
		Lithobiomorpha				2		Centipede

CEF 015 SS-741

Phylum	Class	Order	Family	Genus	Species	Quantity		common name
Arthropoda	Insecta	Coleoptera	Carabidae			2		Ground beetle
			Elateridae			3		Click beetle
			Elateridae			14	larva	Click beetle
			unknown			1	larva	
		Diptera	unknown			1	larva	Fly larva
		Blattaria	Blatellidae			4		Roach
		Hymenoptera	Formicidae			1		Ant
	Arachnida	Araneida				3		Spider
		Opiolones				2		Daddy longlegs
	Chilopoda	Scolopendromorpha				23		Centipede

APPENDIX E

HABITAT NOTES

DESCRIPTIONS OF SAMPLING PLOTS
(from field notes of M.L. Whitten, Tetra Tech NUS, Inc)

SS-701 6/23/01
understory: 0.2 gallberry, greenbrier, laurel oak
midstory: none
overstory: 0.5 red maple, laurel oak, slash pine, longleaf pine
duff: 1½ to 2 inches

SS-703 6/27/01
understory: 0.2 gallberry, yellow jessamine
midstory: none
overstory: 0.3 slash pine, laurel oak
duff: 3 to 5 inches, mostly 3 inches
Duff in plot is composed of more thickly intertwined small roots than at previous plots; extremely difficult to separate.

SS-704 6/26/01
understory: 0.5 laurel oak, St. John's wort, red maple, yellow jessamine, grasses
midstory: none
overstory: 0.4 slash pine
duff: ½ to 2 inches, mostly 1 to 1½ inches

SS-706 6/27/01
understory: none
midstory: none
overstory: 0.3 slash pine
duff: ½ to 1½ inches, mostly 1 inch
Plot is in area of sparse understory. Soil is light gray sand streaked with dark gray sand, resulting in a "splotchy" appearance.

SS-707 6/25/01
understory: 0.3 gallberry, greenbrier
midstory: 0.2 red maple, water oak
overstory: 0.5 water oak, slash pine
duff: 3 inches

SS-707A 6/25/01
understory: 0.2 gallberry, greenbrier
midstory: 0.2 *Ilex* sp.
overstory: 0.4 slash pine
duff: 2¾ to 3½ inches; mostly 3 inches
Large Ilex (4-5 inch dbh; 12 ft high) 3 feet east of plot provides partial shade in plot.

SS-708 6/25/01
understory: none
midstory: 0.1 bald cypress, slash pine
overstory: 0.4 bald cypress, slash pine, red maple
duff: 2 inches
Soil is darker (more organic) than in previous plots. The plot is located approximately 100 feet from edge of former cypress pond. Although the soil and vegetation is unlike that at any other plot, this location was selected because of expected high lead concentrations.

SS-708A 6/23/01
understory: 0.2 gallberry, wax myrtle, blueberry, greenbrier, yaupon holly
midstory: none
overstory: 0.3 slash pine
duff: 1½ inches
sparse tree cover to south; much of plot in direct sun for most of the day.

SS-709 6/25/01
understory: 0.2 gallberry, greenbrier, slash pine, laurel oak
midstory: none
overstory: 0.3 slash pine
duff: 1½ to 2½ inches (mostly 1½ inches)
numerous slash pines south of the plot provide partial shade for most of the day.

SS-717 6/27/01
understory: 0.2 gallberry, saw palmetto, grasses, red root
midstory: none
overstory: 0.4 slash pine
duff: 1½ inches

SS-719 6/25/01
understory: 0.1 gallberry, St. John's wort, greenbrier, lichens
midstory: 0.1 slash pine, wax myrtle
overstory: 0.4 slash pine, laurel oak
duff: 1½ inches

SS-719A 6/23/01
understory: 0.3 poison ivy, gallberry, wax myrtle, yellow jessamine
midstory: 0.1 wax myrtle
overstory: 0.3 slash pine
duff: ¾ to 3 inches (3 inches beneath mature slash pine, ¾ inch otherwise)

SS-721 6/19/01
understory: 0.3 yellow jessamine
midstory: none
overstory: 0.3 slash pine
duff: ¾ to 1 inch

SS-722 6/20/01
understory: 0.2 gallberry, St. John's wort, *Lyonia* sp., greenbrier
midstory: 0.1 gallberry
overstory: 0.3 slash pine
duff: ½ inch

SS-724 6/27/01
understory: 0.2 gallberry, wild grape, wax myrtle
midstory: none
overstory: 0.1 slash pine
duff: 1½ to 2 inches
plot is at the edge of treeline; shaded by adjacent pines during mornings, in direct sun during afternoons

SS-726A 6/21/01
understory: 0.1 wax myrtle, greenbrier, blackberry
midstory: none
overstory: 0.4 slash pine, wax myrtle
duff: 1 to 1½ inches
large wax myrtle immediately southeast of plot and nearby slash pines provide shade over ½ of plot. numerous clay pigeon fragments in soil, a few specimens of spent ammunition in soil

SS-727A 6/22/01
understory: 0.2 yellow jessamine, grasses, dog fennel, laurel oak, gallberry
midstory: none
overstory: 0.3 slash pine
duff: ¼ to 1 inch
plot is in partial shade for most of the day due to sweet gum trees immediately south of the plot and to overstory of slash pines

SS-728A 6/21/01
understory: 0.3 Virginia creeper, poison ivy, St. John's wort, grassses
midstory: none
overstory: 0.5 slash pine
duff: 1 inch
plot is in partial shade for most of the day due to sweet gum trees immediately south o fthe plot and to overstory of slash pines

SS-732 6/20/01
understory: 0.8 bracken fern
midstory: 0.1 red maple, bracken fern, slash pine
overstory: 0.4 slash pine
duff: ¾ to 1 inch

SS-733 6/19/01
understory: 0.2 laurel oak, greenbrier, American beauty berry, wild grape, poison ivy, yellow jessamine
midstory: 0.1 greenbrier
overstory: 0.3 laurel oak
duff: ½ to 1½ inches

SS-734 6/19/01
understory: 0.4 yellow jessamine, greenbrier, wild grape, red maple, poison ivy
midstory: 0.1 water oak, gallberry
overstory: 0.6 laurel oak, slash pine
duff: 2½ inches beneath the laurel oak, ½ to 1 inch elsewhere

SS-735A 6/21/01
understory: 0.3 greenbrier, yellow jessamine, blackberry, laurel oak
midstory: 0.1 wild grape, Blueberry
overstory: 0.2 slash pine, longleaf pine, laurel oak
duff: 1 to 2 inches; mostly 1½ to 2 inches

SS-736A 6/22/01
understory: 0.4 gallberry, laurel oak, St. John's wort, grasses
midstory: none
overstory: 0.4 slash pine
duff: 2½ to 3 inches

SS-737 6/20/01
understory: 0.1 wild grape, greenbrier
midstory: none
overstory: 0.8 laurel oak, slash pine
duff: 3 to 3½ inches (mostly 3½ inches)
plot is in partial shade most of the day due to 3 nearby laurel oaks

SS-739 (reference location) 6/24/01
understory: 0.5 gallberry, blueberry
midstory: none
overstory: 0.4 laurel oak, slash pine
duff: 1½ to 2½ inches

SS-740 (reference location) 6/24/01
understory: 0.4 gallberry, greenbrier, grasses
midstory: none
overstory: 0.5 laurel oak, slash pine
duff: 1 to 2½ inches (mostly 2 inches)

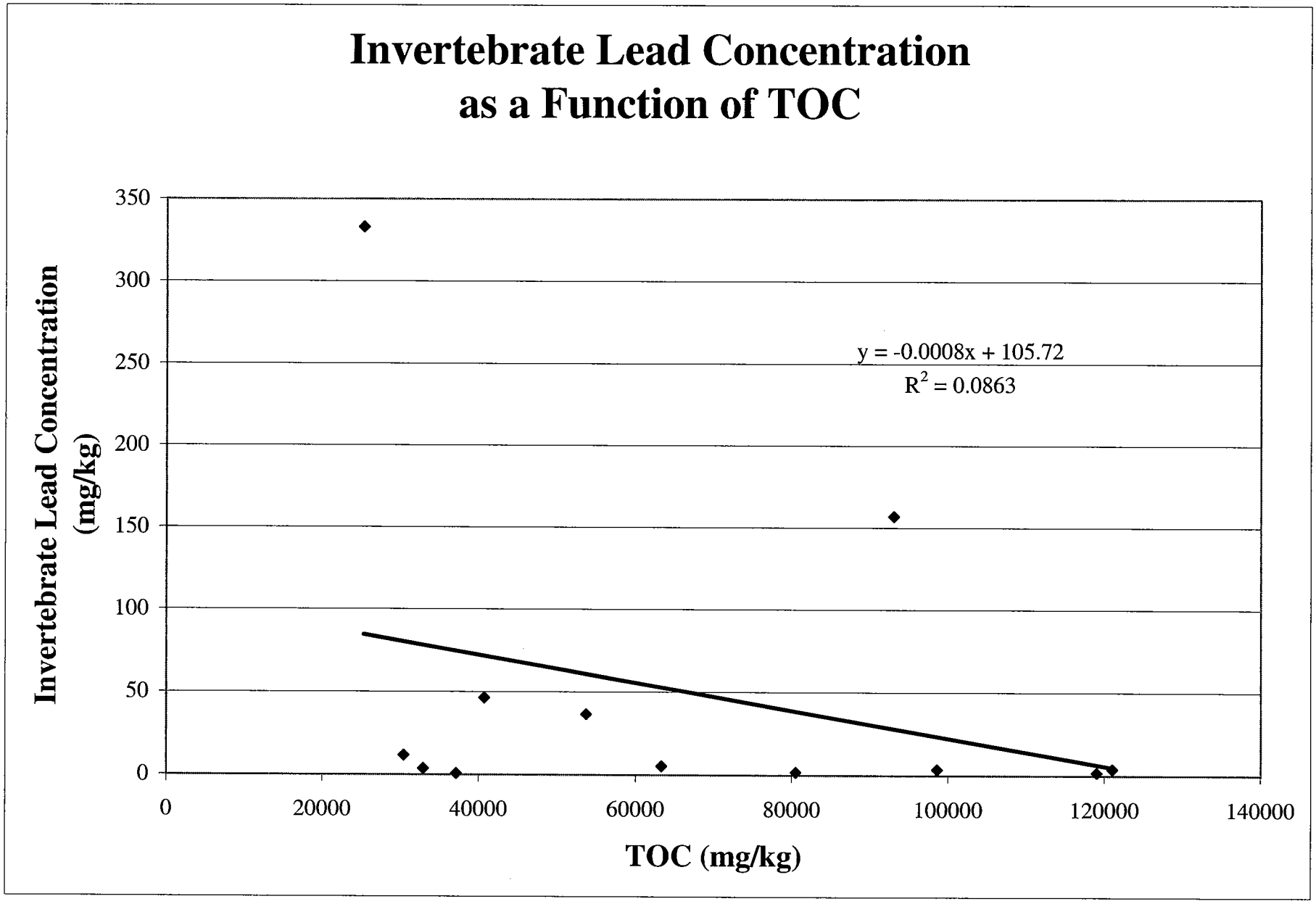
SS-741 (reference location) 6/24/01
understory: 0.1 gallberry, water oak
midstory: none
overstory: 0.7 water oak, slash pine
duff: 2 to 3½ inches (mostly 2 to 2½ inches)
much of plot is beneath the canopy of large water oak; thus in partial shade most of the day

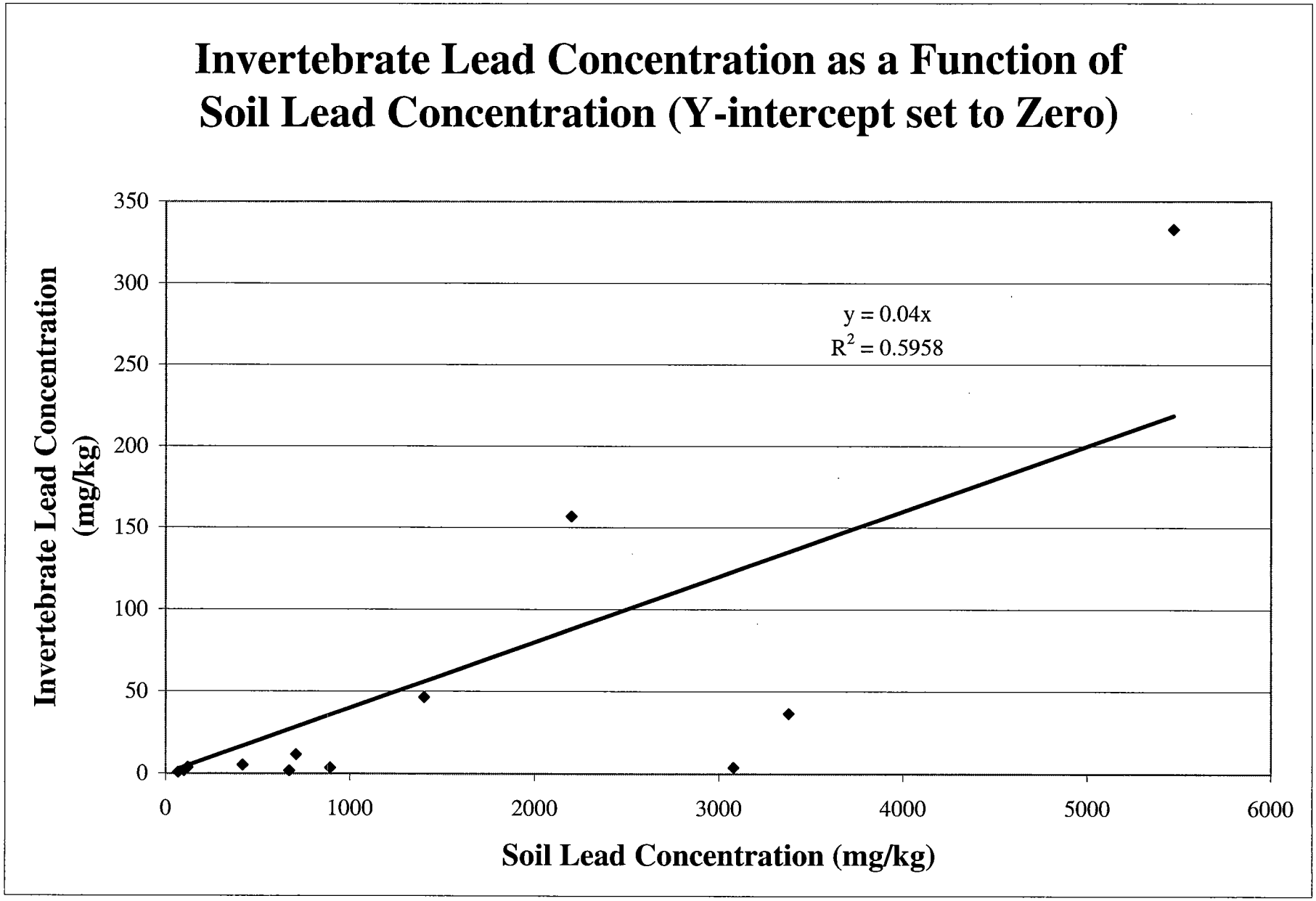
Species names

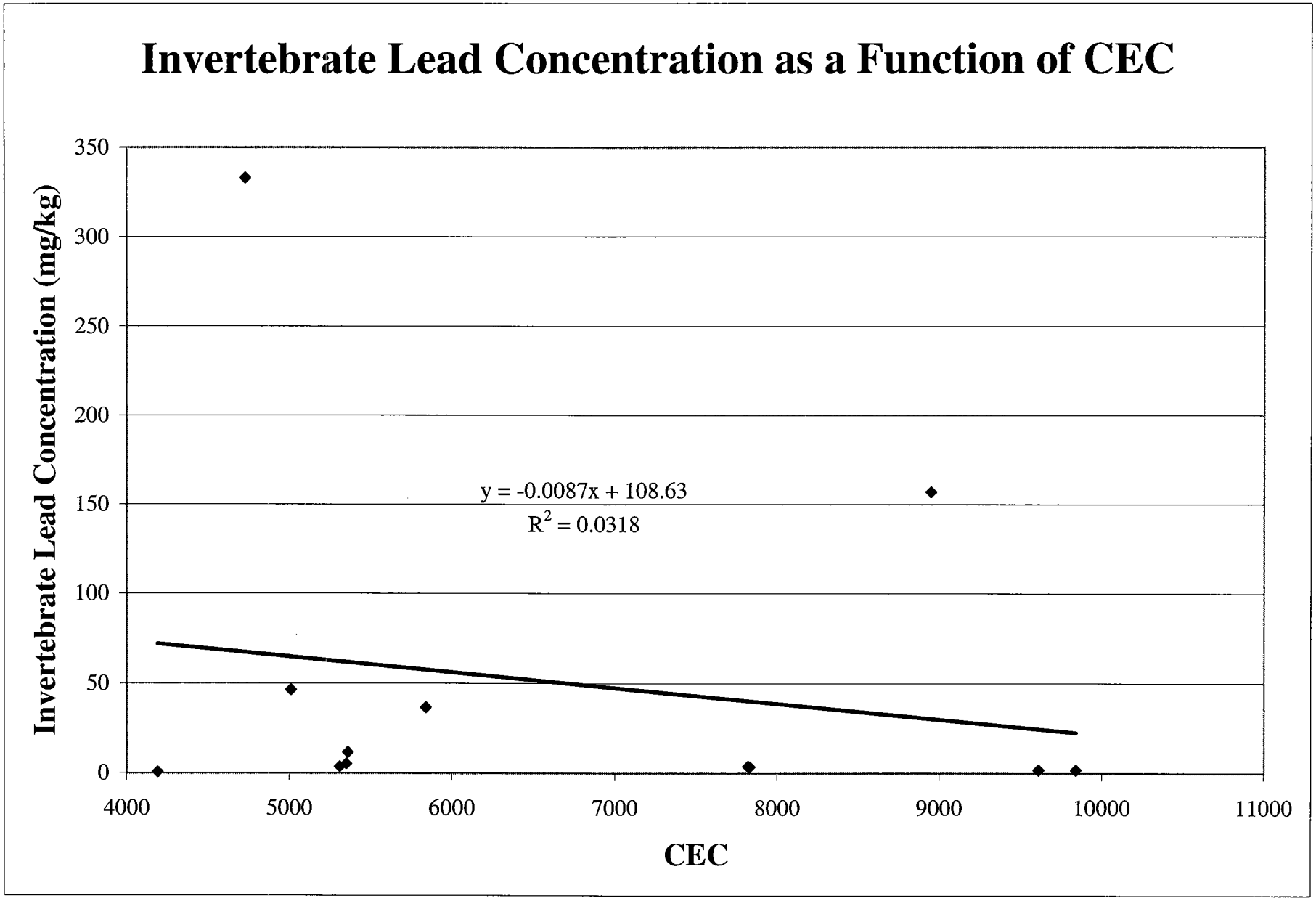
American beauty berry (*Callicarpa americana*)
bald cypress (*Taxodium distichum*)
blackberry (*Rubus sp.*)
blueberry (*Vaccinium* sp.)
bracken fern (*Pteridium aquilinum*)
dog fennel (*Eupatorium capillifolium*)
gallberry (*Ilex glabra*)
greenbrier (*Smilax* sp.)
laurel oak (*Quercus hemisphaerica*)
longleaf pine (*Pinus palustris*)
St. John's wort (*Hypericum* sp.)
poison ivy (*Toxicodendron radicans*)
red root (*Lachnanthes carolina*)
red maple (*Acer rubrum*)
saw palmetto (*Serenoa repens*)
slash pine (*Pinus elliottii*)
water oak (*Quercus nigra*)
wild grape (*Vitis rotundifolia*)
yaupon holly (*Ilex vomitoria*)
yellow jessamine (*Gelsemium sempervirens*)

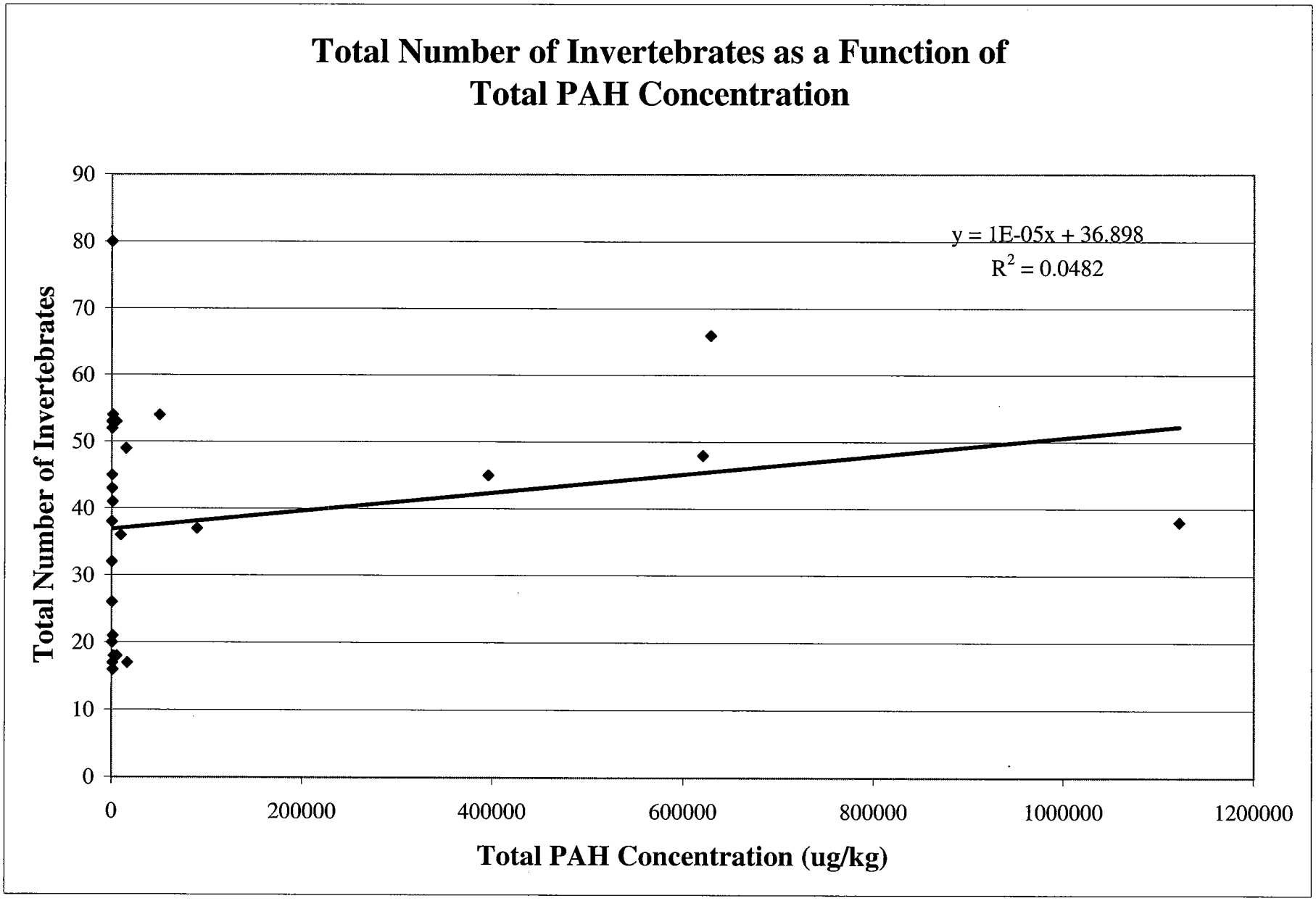
APPENDIX F

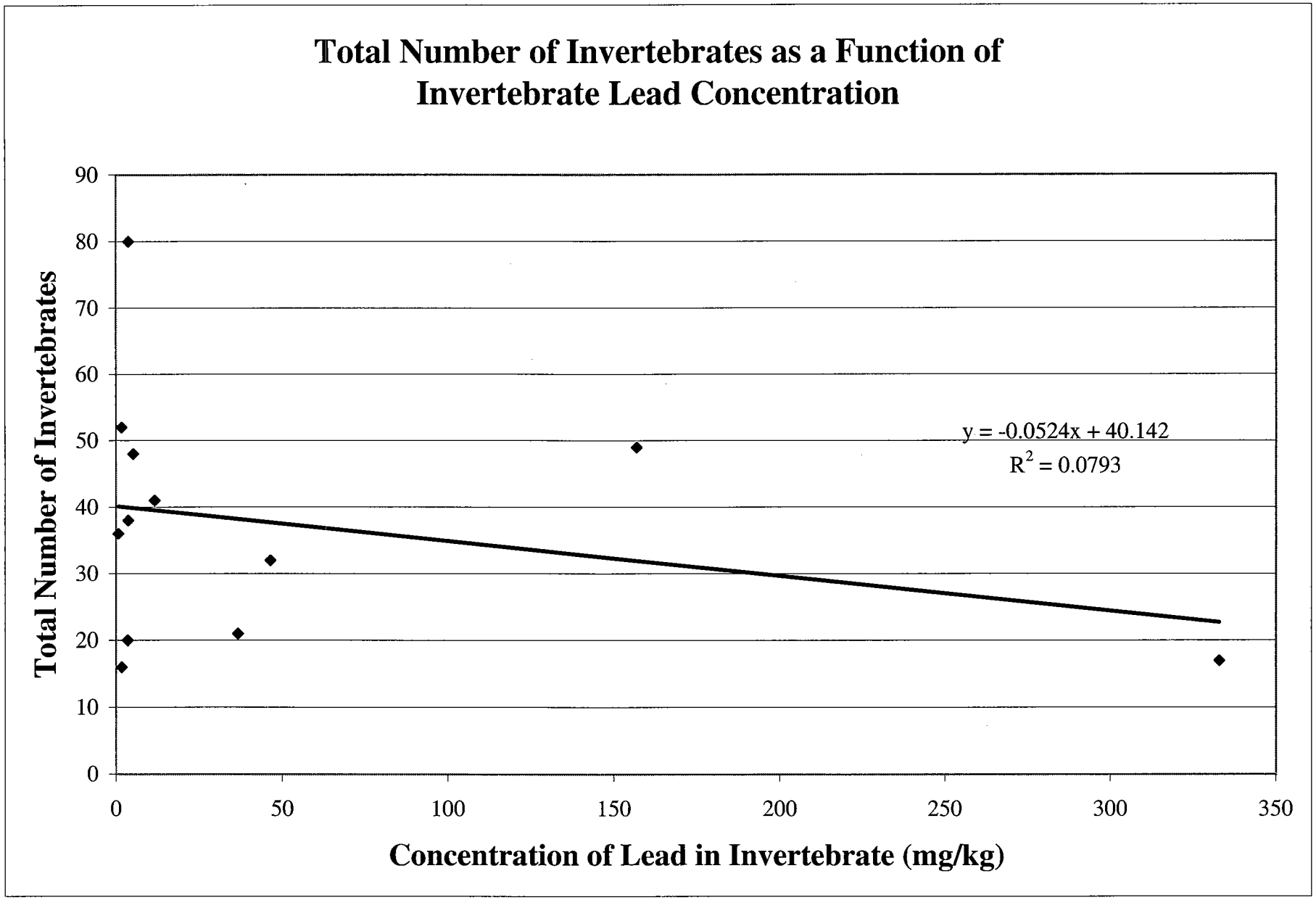
SCATTER PLOTS AND CORRELATION RESULTS

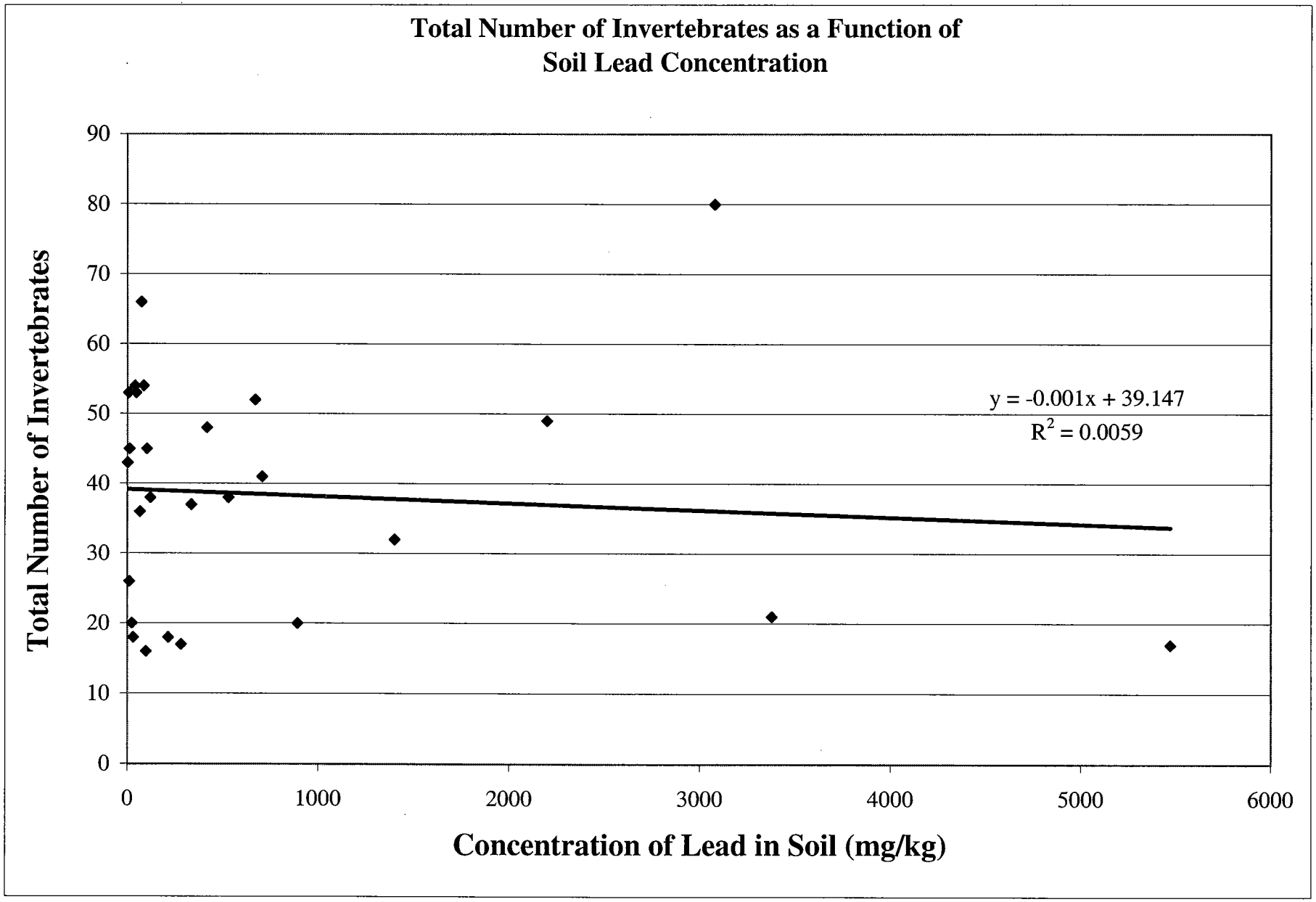

Invertebrate Lead Concentration as a Function of TOC
Invertebrate Lead Concentration (mg/kg)
350
300
250
200
150
100
50
0
y = -0.0008x + 105.72
R2 = 0.0863
0
20000
40000
60000
80000
100000
120000
140000
TOC (mg/kg)

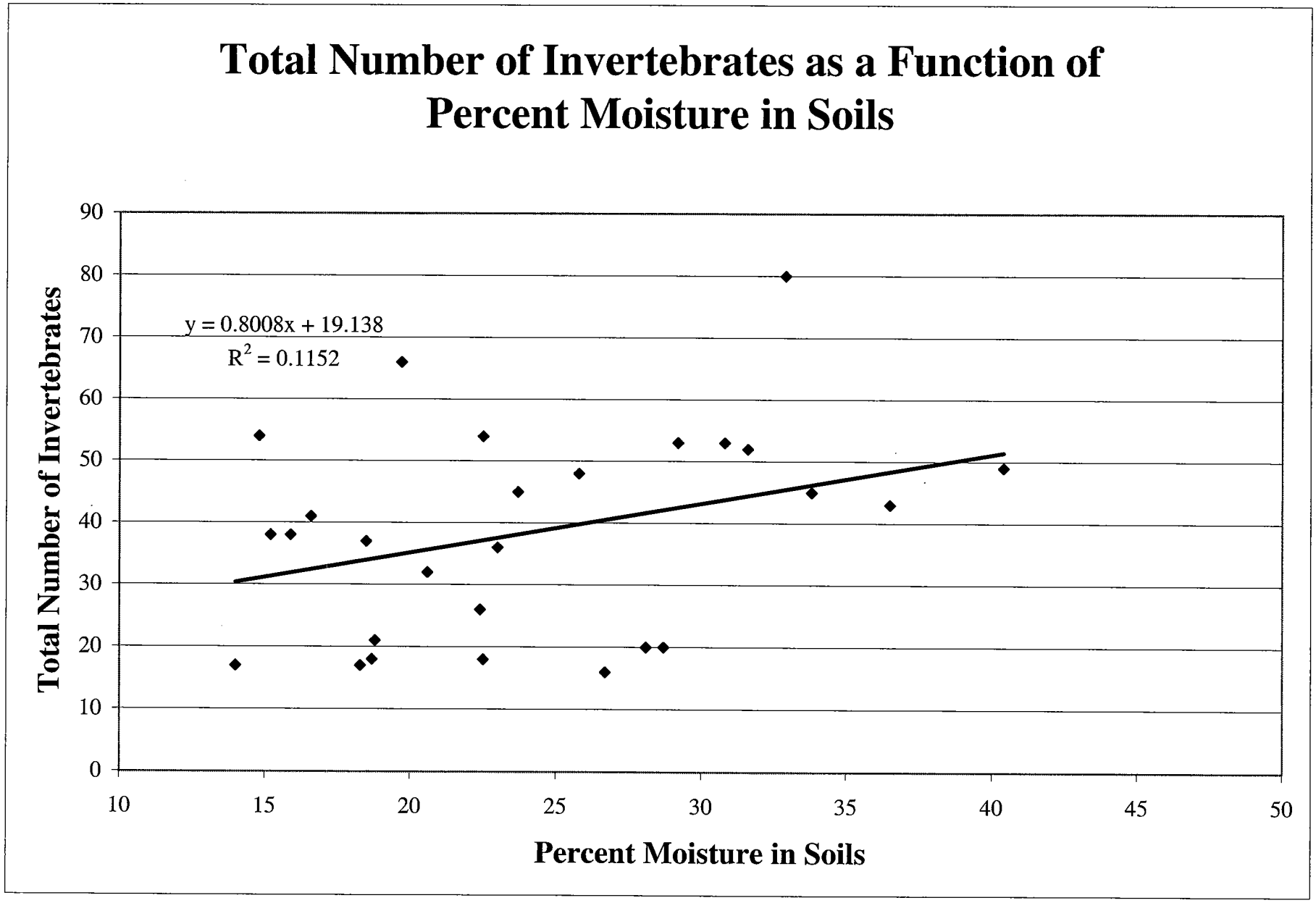

Invertebrate Lead Concentration as a Function of Soil Lead Concentration (Y-intercept set to Zero)
y = 0.04x
R2 = 0.5958
Invertebrate Lead Concentration (mg/kg)
Soil Lead Concentration (mg/kg)
0
50
100
150
200
250
300
350
0
1000
2000
3000
4000
5000
6000

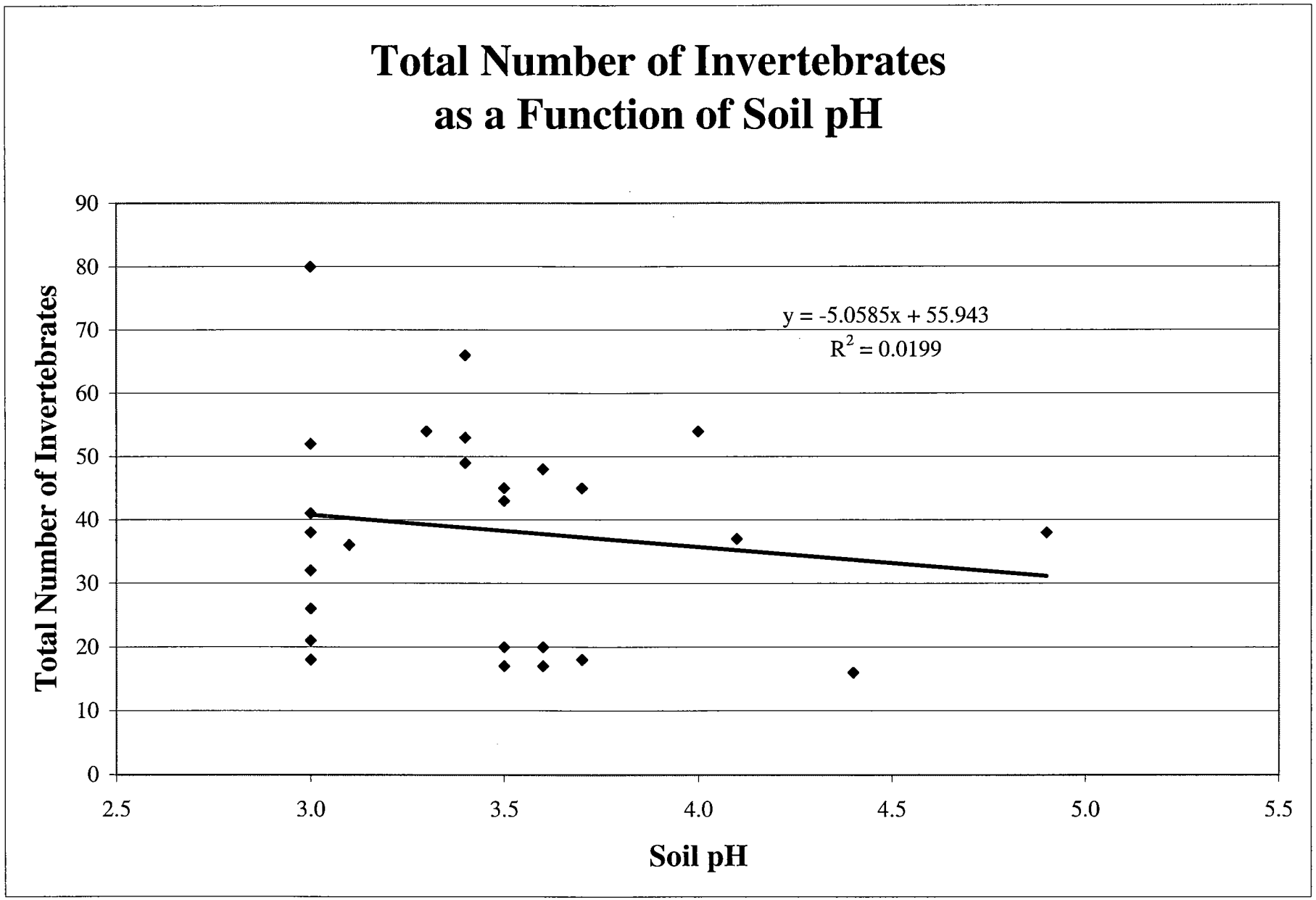

Invertebrate Lead Concentration as a Function of CEC
Invertebrate Lead Concentration (mg/kg)
350
300
250
200
150
100
50
0
y = -0.0087x + 108.63
R2 = 0.0318
4000
5000
6000
7000
8000
9000
10000
11000
CEC

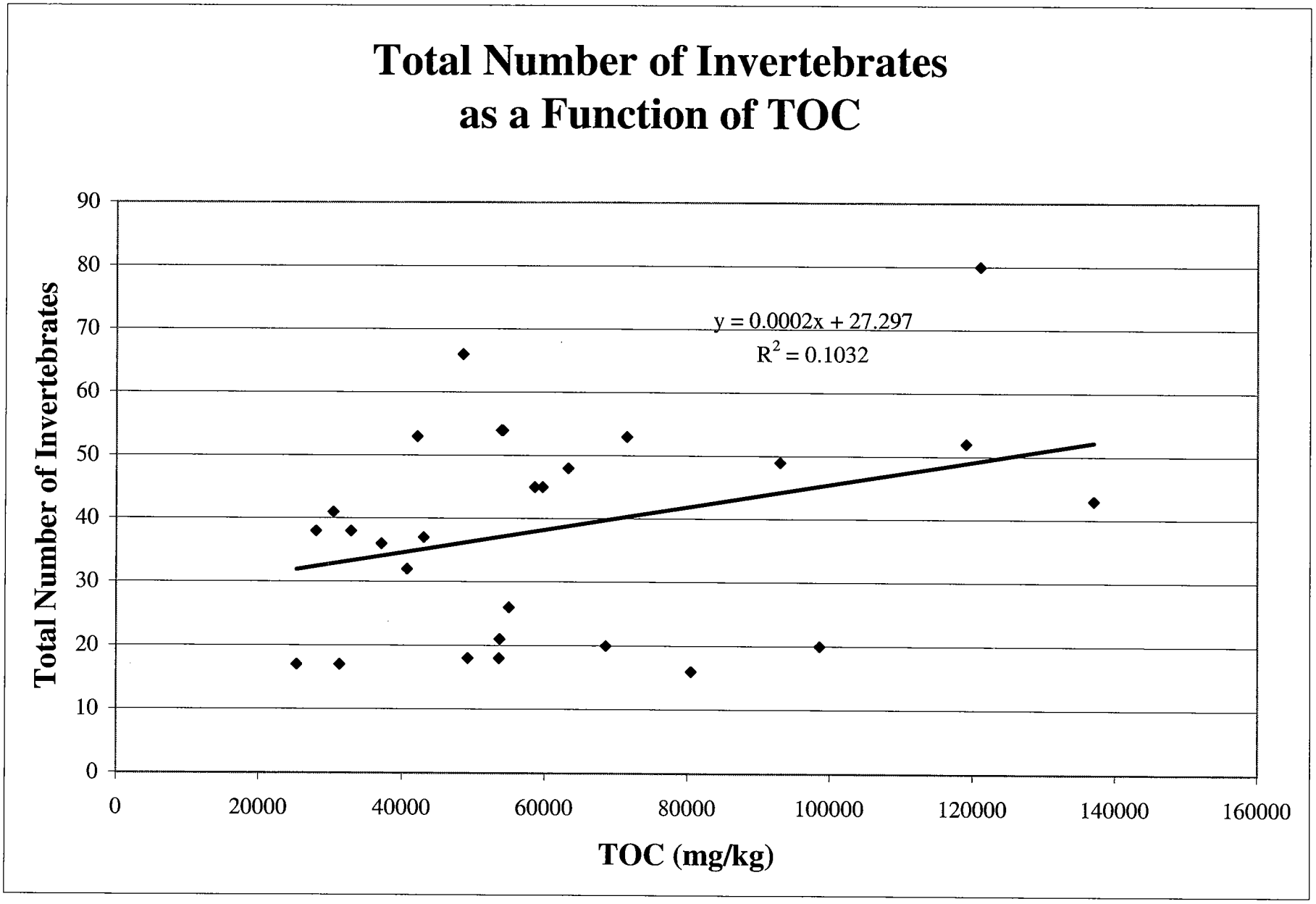

Total Number of Invertebrates as a Function of Total PAH Concentration
y = 1E-05x + 36.898
R2 = 0.0482
Total Number of Invertebrates
0
10
20
30
40
50
60
70
80
90
0
200000
400000
600000
800000
1000000
1200000
Total PAH Concentration (ug/kg)

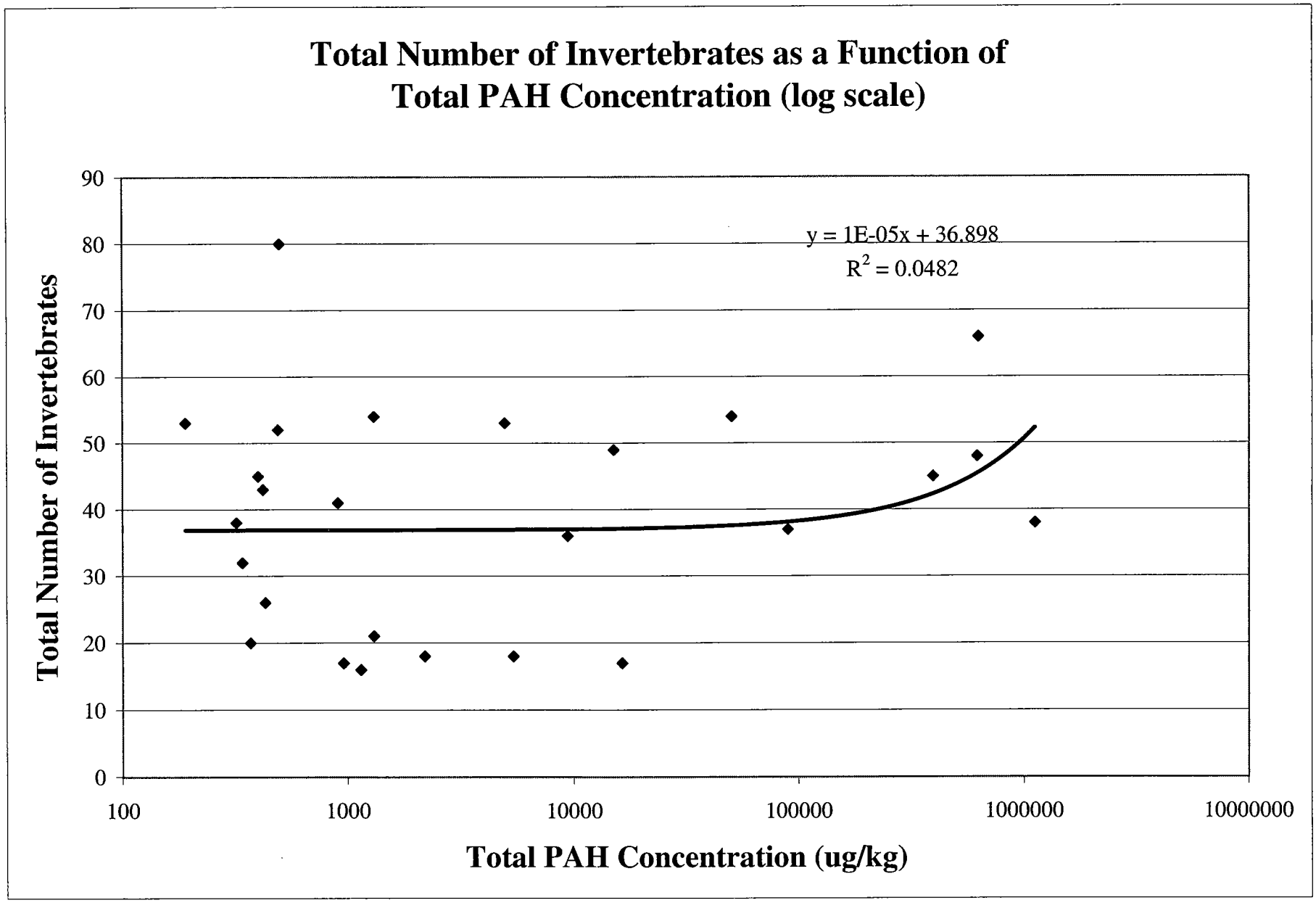

Total Number of Invertebrates as a Function of Invertebrate Lead Concentration
Total Number of Invertebrates
Concentration of Lead in Invertebrate (mg/kg)
y = -0.0524x + 40.142
R2 = 0.0793
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
300
350

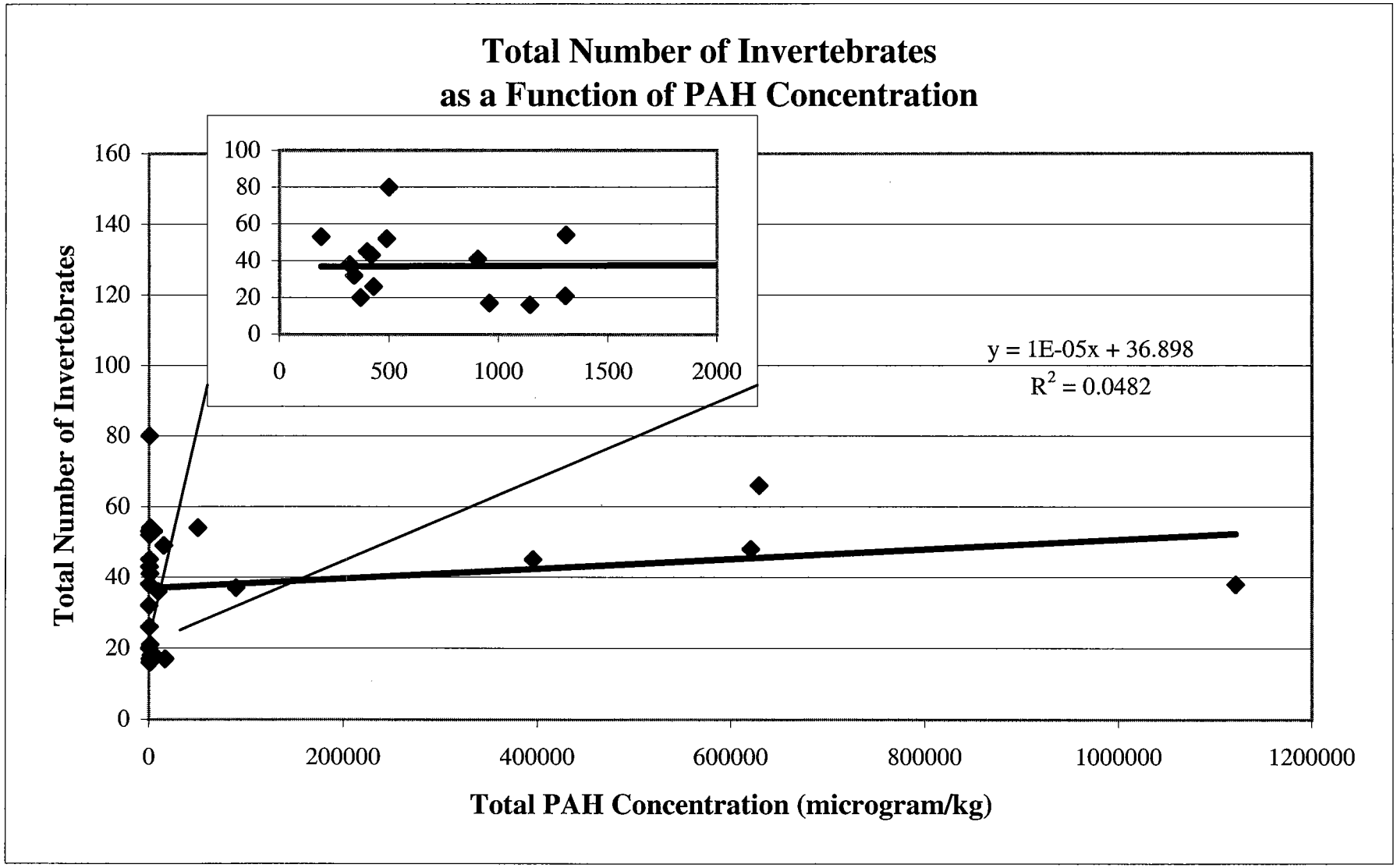

Total Number of Invertebrates as a Function of
Soil Lead Concentration
Total Number of Invertebrates
90
80
70
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
6000
Concentration of Lead in Soil (mg/kg)
y = -0.001x + 39.147
R2 = 0.0059


Total Number of Invertebrates as a Function of Percent Moisture in Soils
y = 0.8008x + 19.138
R2 = 0.1152
Total Number of Invertebrates
Percent Moisture in Soils
0
10
20
30
40
50
60
70
80
90
10
15
20
25
30
35
40
45
50

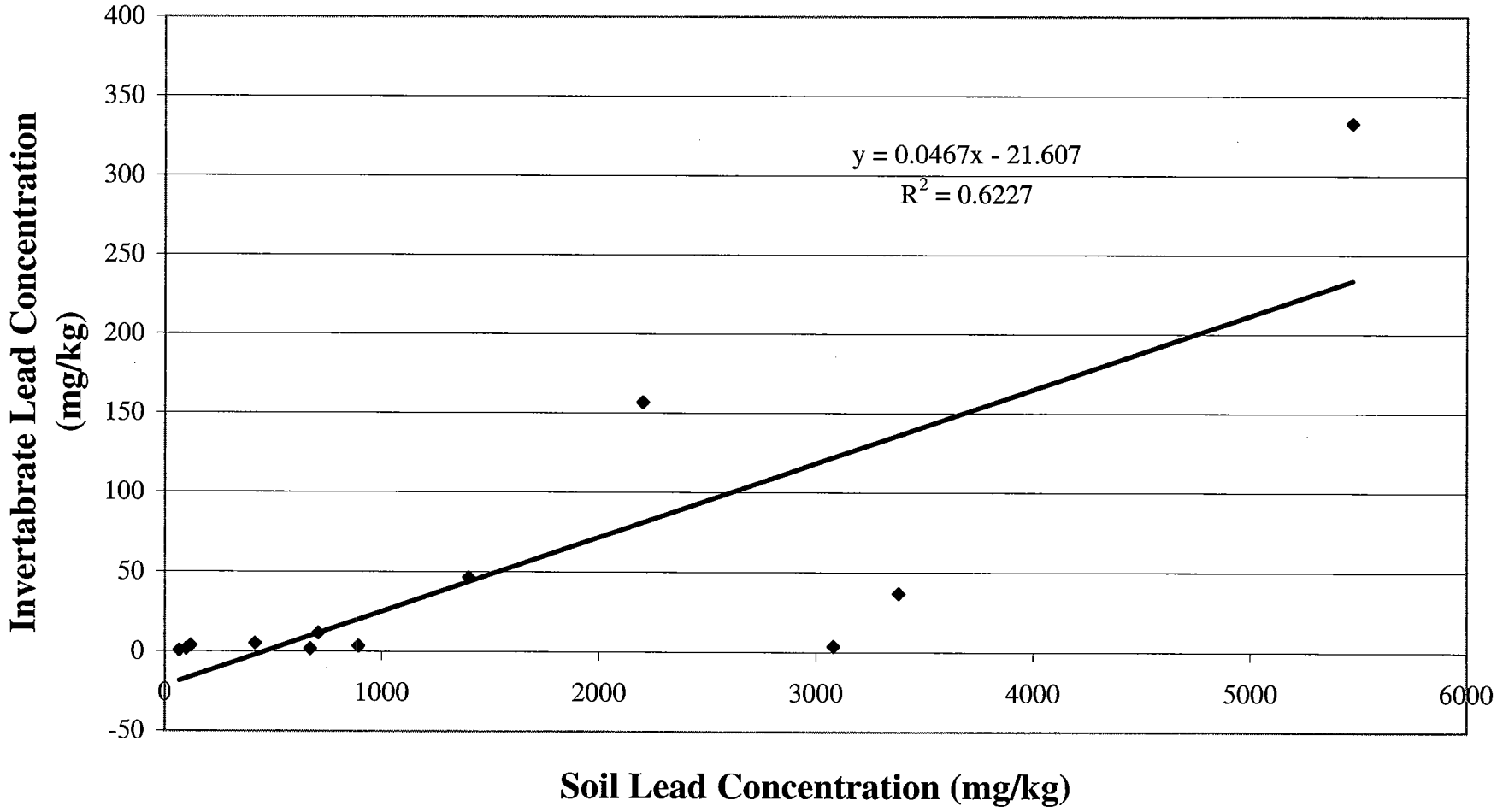

Total Number of Invertebrates
as a Function of Soil pH
y = -5.0585x + 55.943
R2 = 0.0199
Total Number of Invertebrates
Soil pH
0
10
20
30
40
50
60
70
80
90
2.5
3.0
3.5
4.0
4.5
5.0
5.5

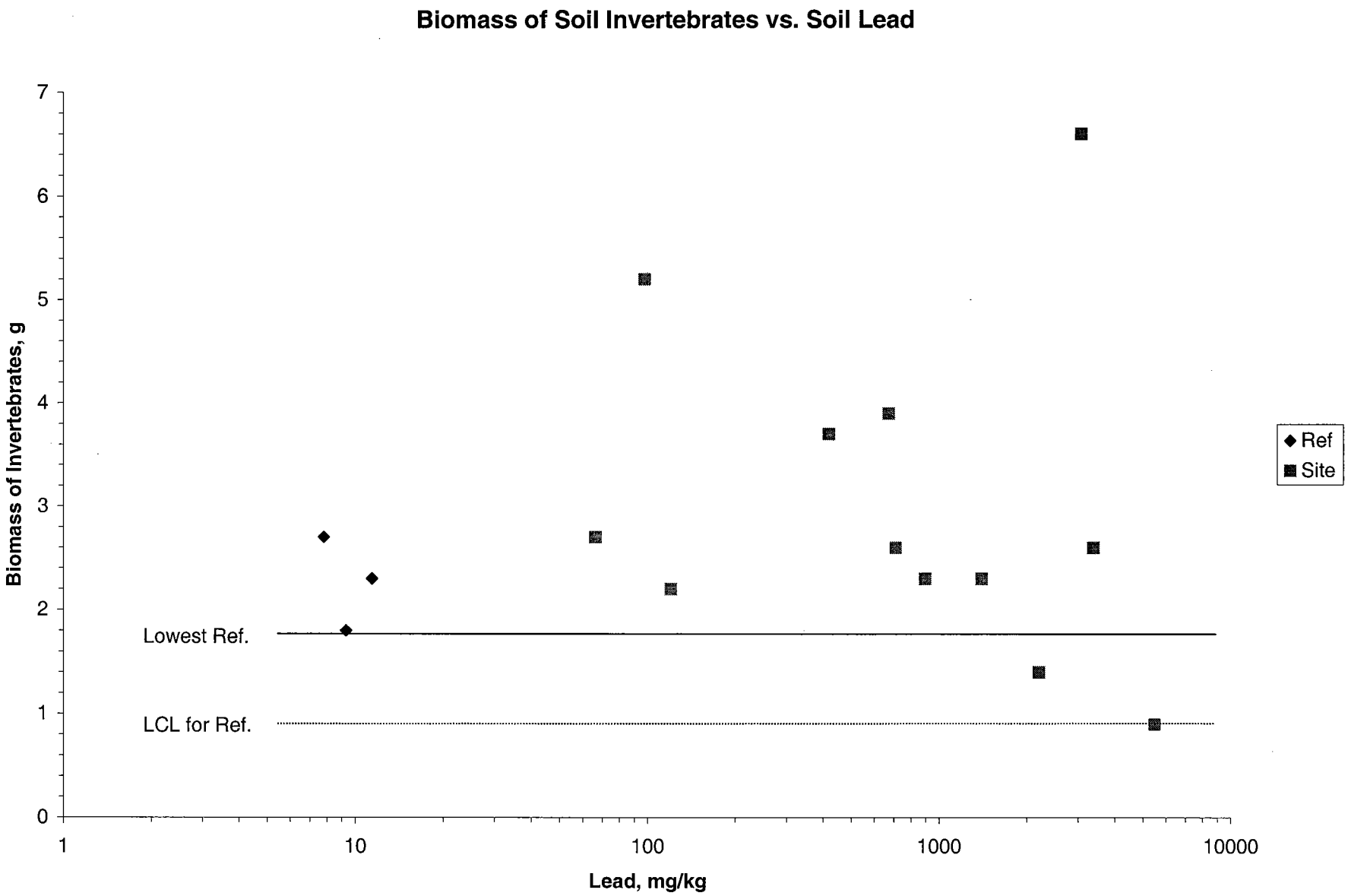

Total Number of Invertebrates
as a Function of TOC
y = 0.0002x + 27.297
R2 = 0.1032
Total Number of Invertebrates
TOC (mg/kg)
0
10
20
30
40
50
60
70
80
90
0
20000
40000
60000
80000
100000
120000
140000
160000

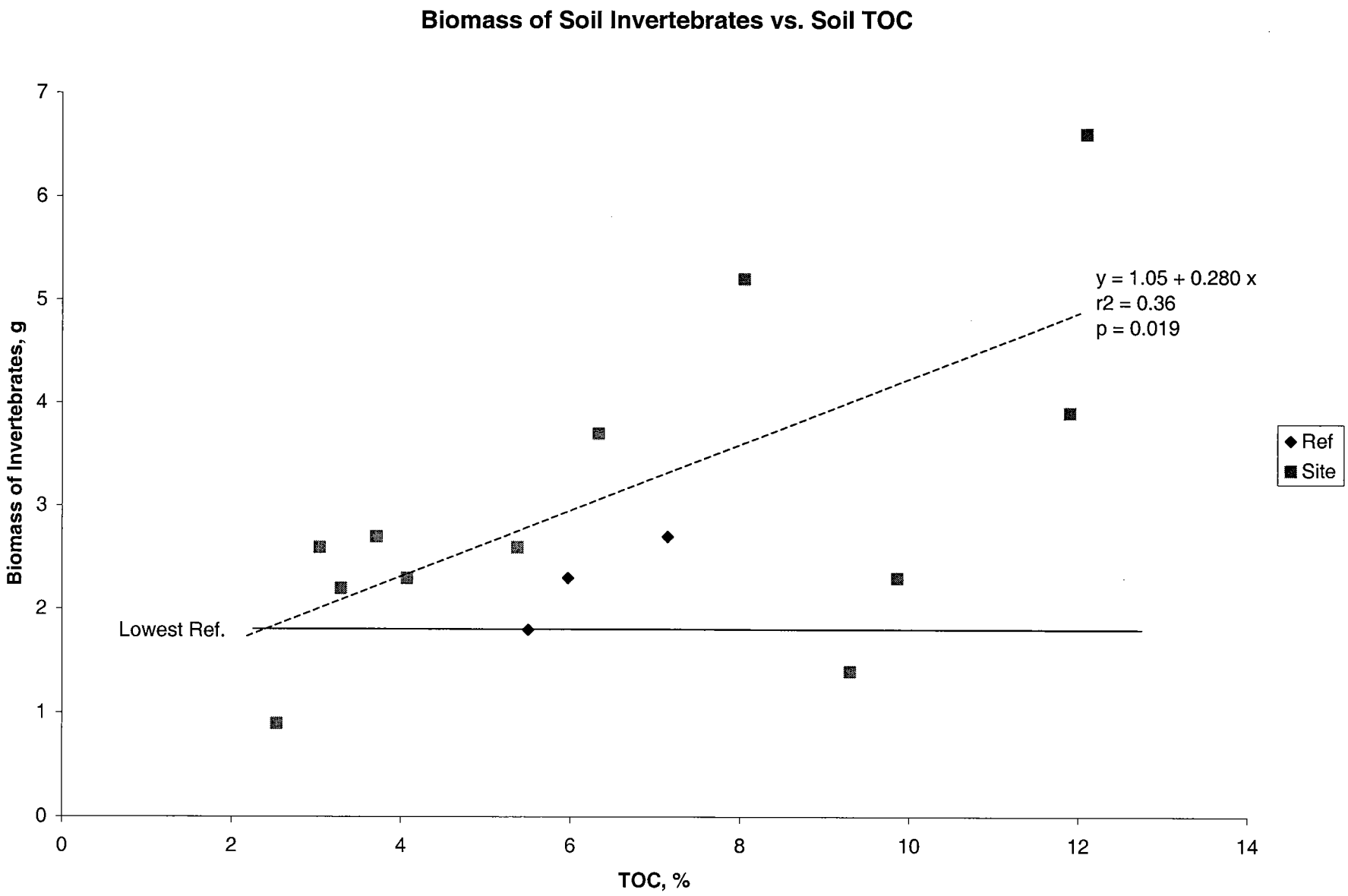

Total Number of Invertebrates as a Function of
Total PAH Concentration (log scale)
y = 1E-05x + 36.898
R2 = 0.0482
Total Number of Invertebrates
0
10
20
30
40
50
60
70
80
90
100
1000
10000
100000
1000000
10000000
Total PAH Concentration (ug/kg)


Total Number of Invertebrates
as a Function of PAH Concentration
Total Number of Invertebrates
Total PAH Concentration (microgram/kg)
y = 1E-05x + 36.898
R2 = 0.0482
0
20
40
60
80
100
120
140
160
0
200000
400000
600000
800000
1000000
1200000
0
500
1000
1500
2000

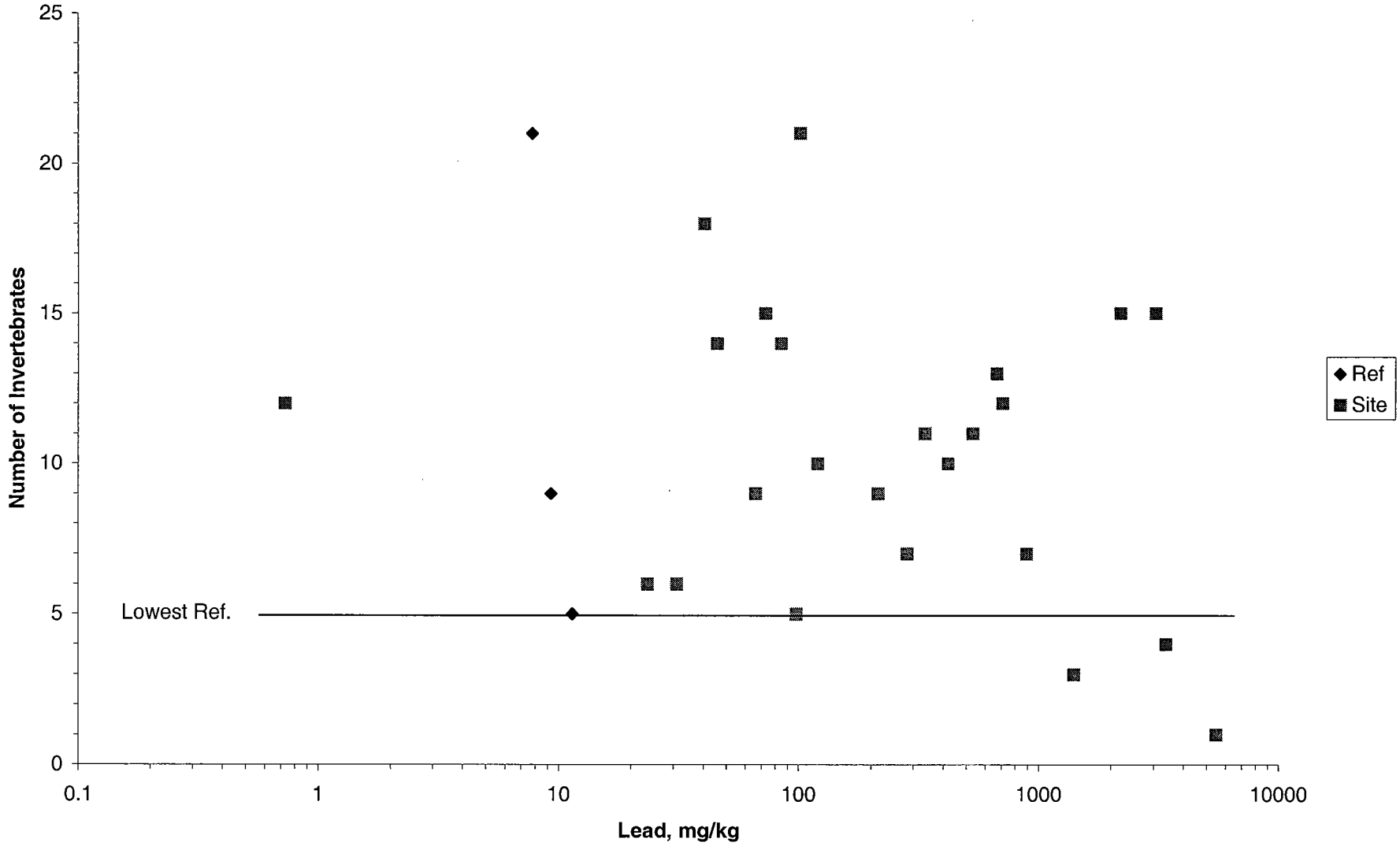
Invertebrate Lead Concentration as a Function of Soil Lead Concentration (Y-intercept not set to Zero)

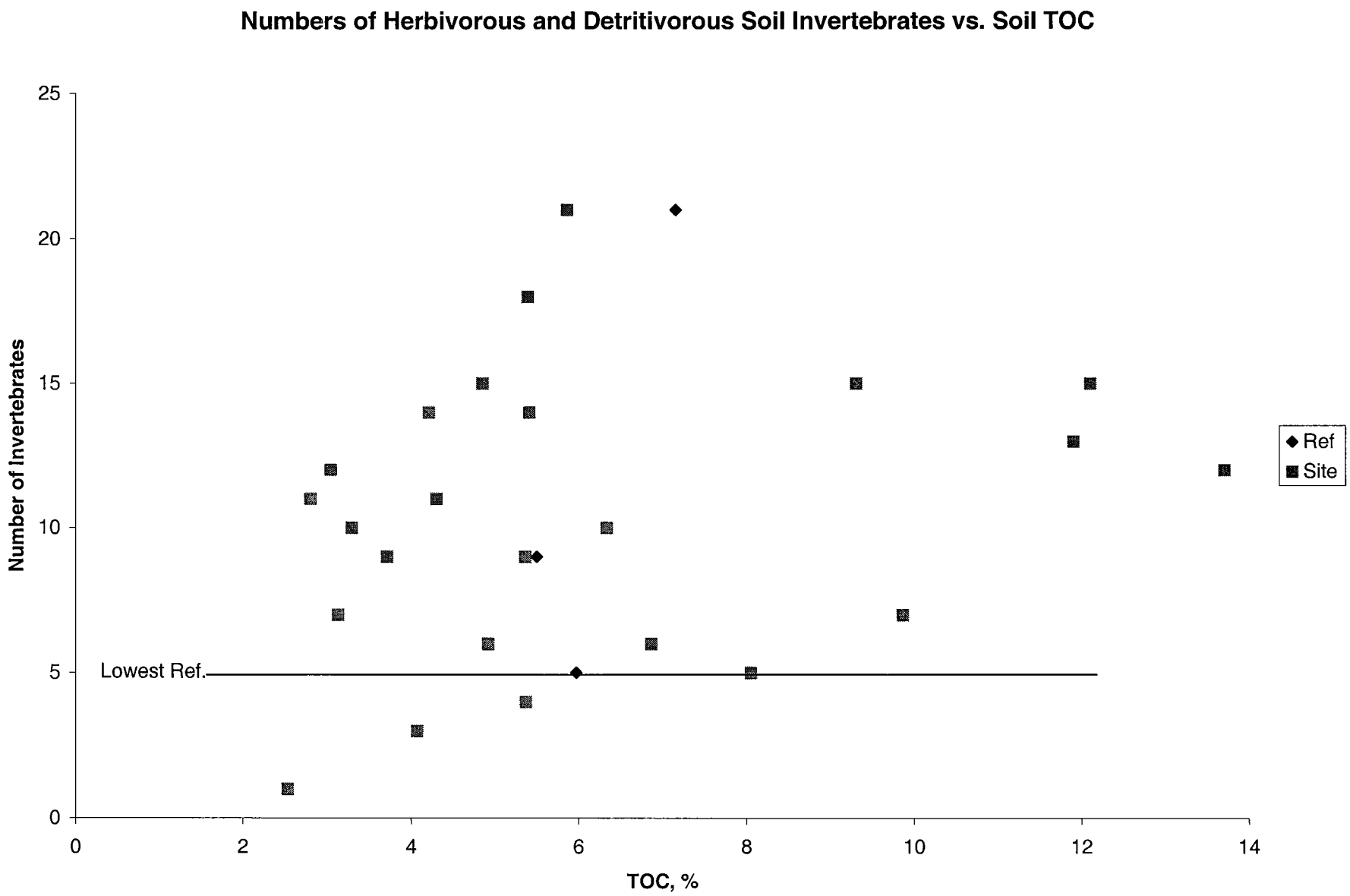


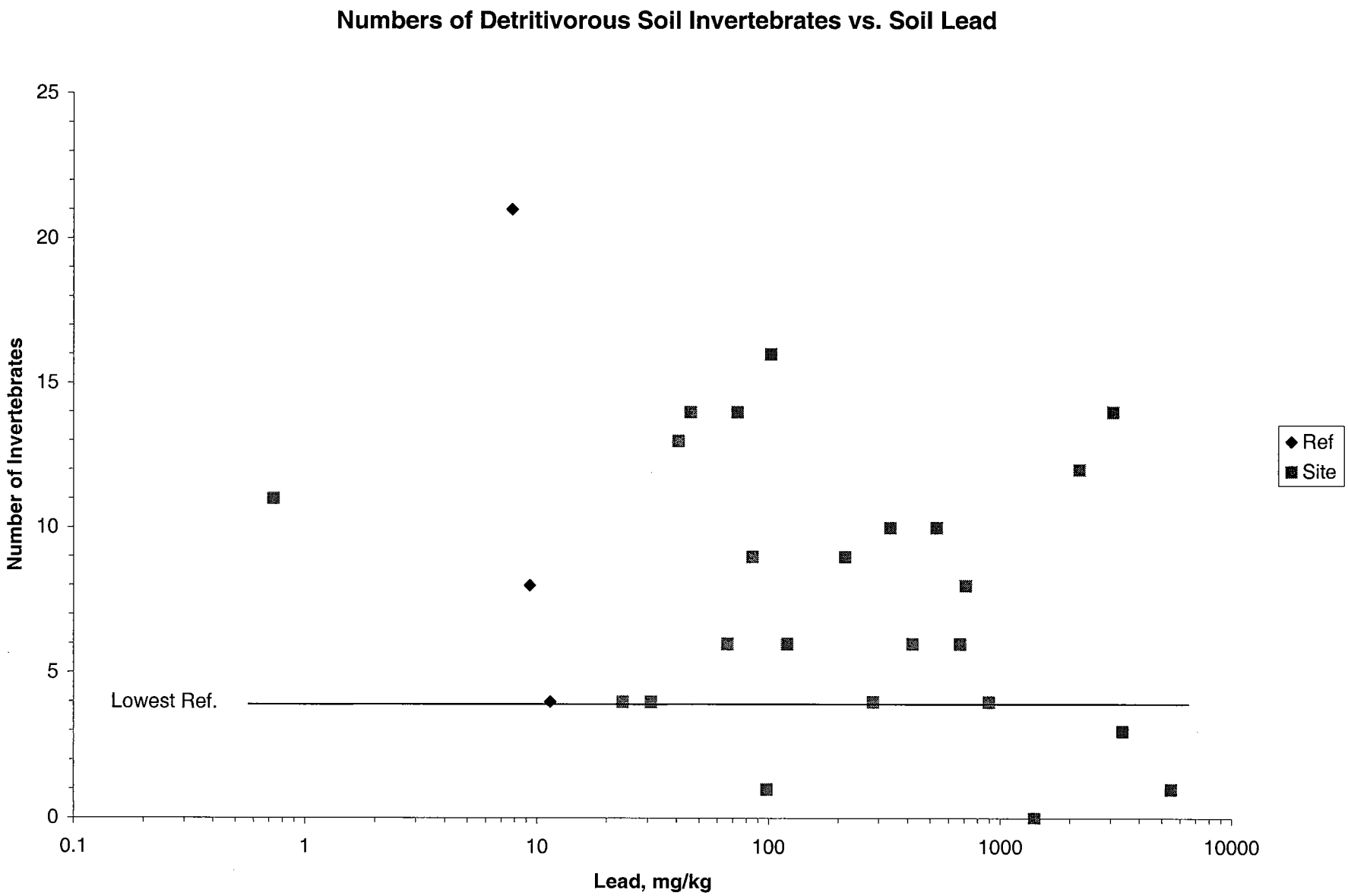

Biomass of Soil Invertebrates vs. Soil Lead
Biomass of Invertebrates, g
0
1
2
3
4
5
6
7
Lowest Ref.
LCL for Ref.
1
10
100
1000
10000
Lead, mg/kg
Ref
Site

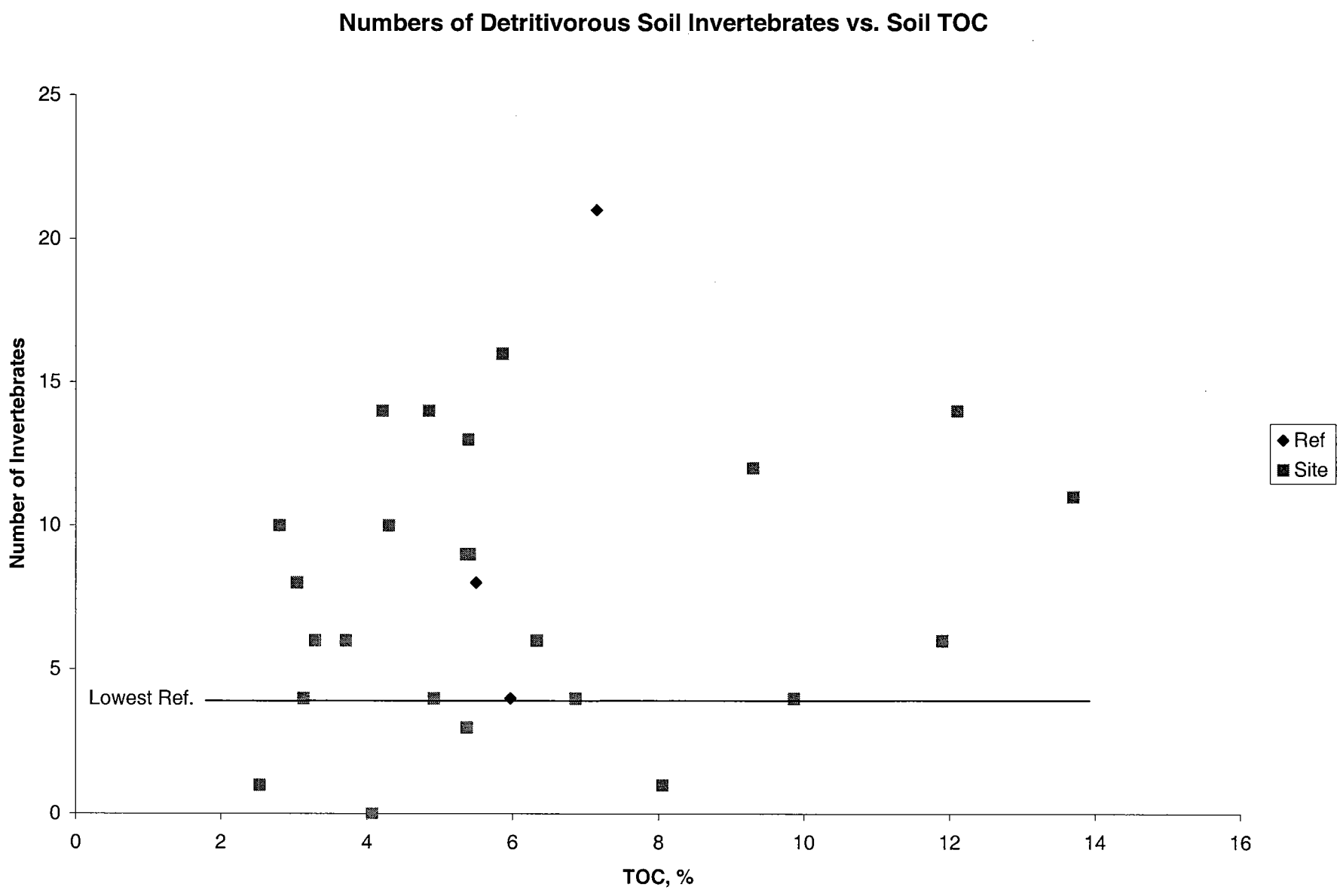

Biomass of Soil Invertebrates vs. Soil TOC
Biomass of Invertebrates, g
TOC, %
0
1
2
3
4
5
6
7
0
2
4
6
8
10
12
14
y = 1.05 + 0.280 x
r2 = 0.36
p = 0.019
Lowest Ref.
Ref
Site

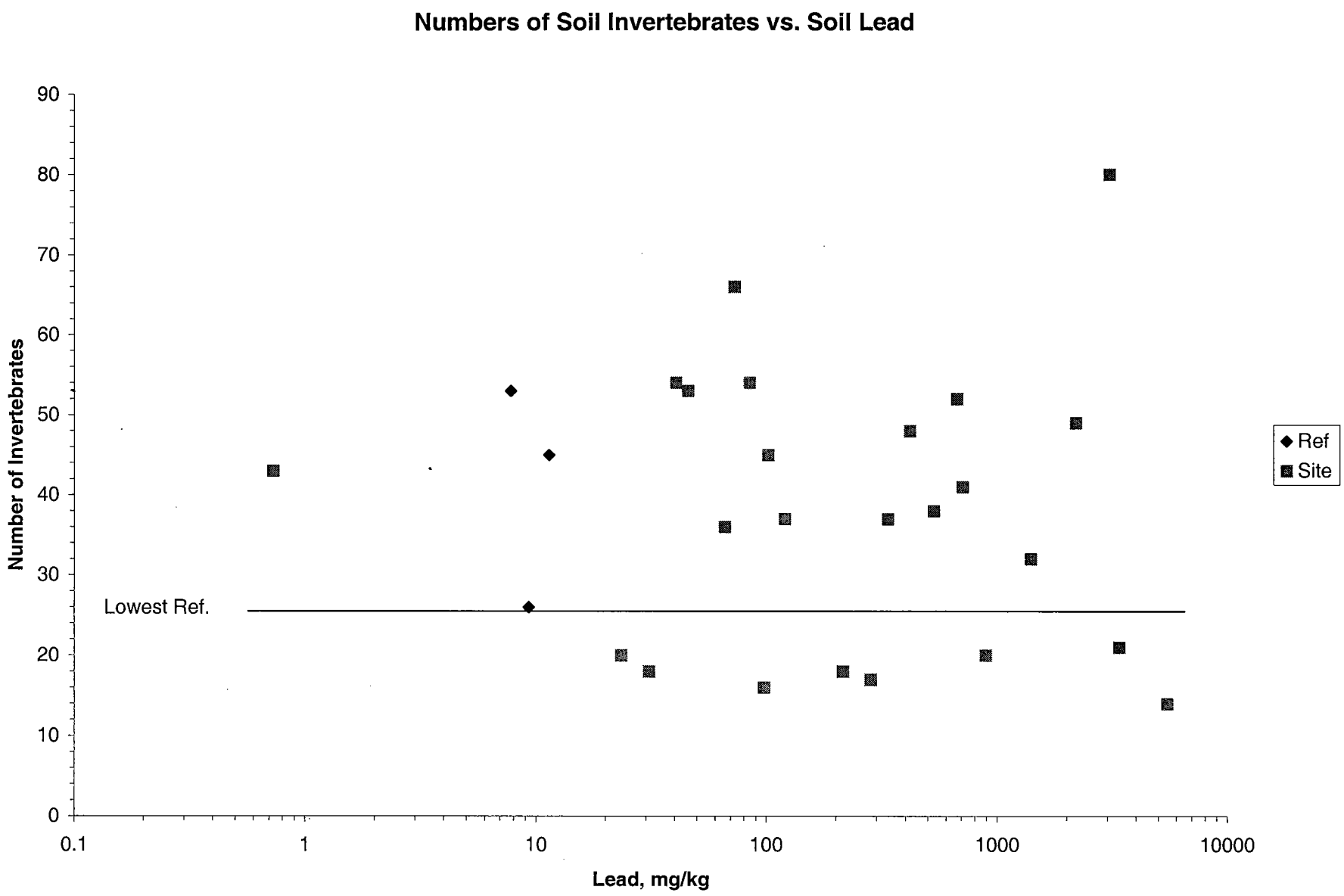
Numbers of Herbivorous and Detritivorous Soil Invertebrates vs. Soil Lead

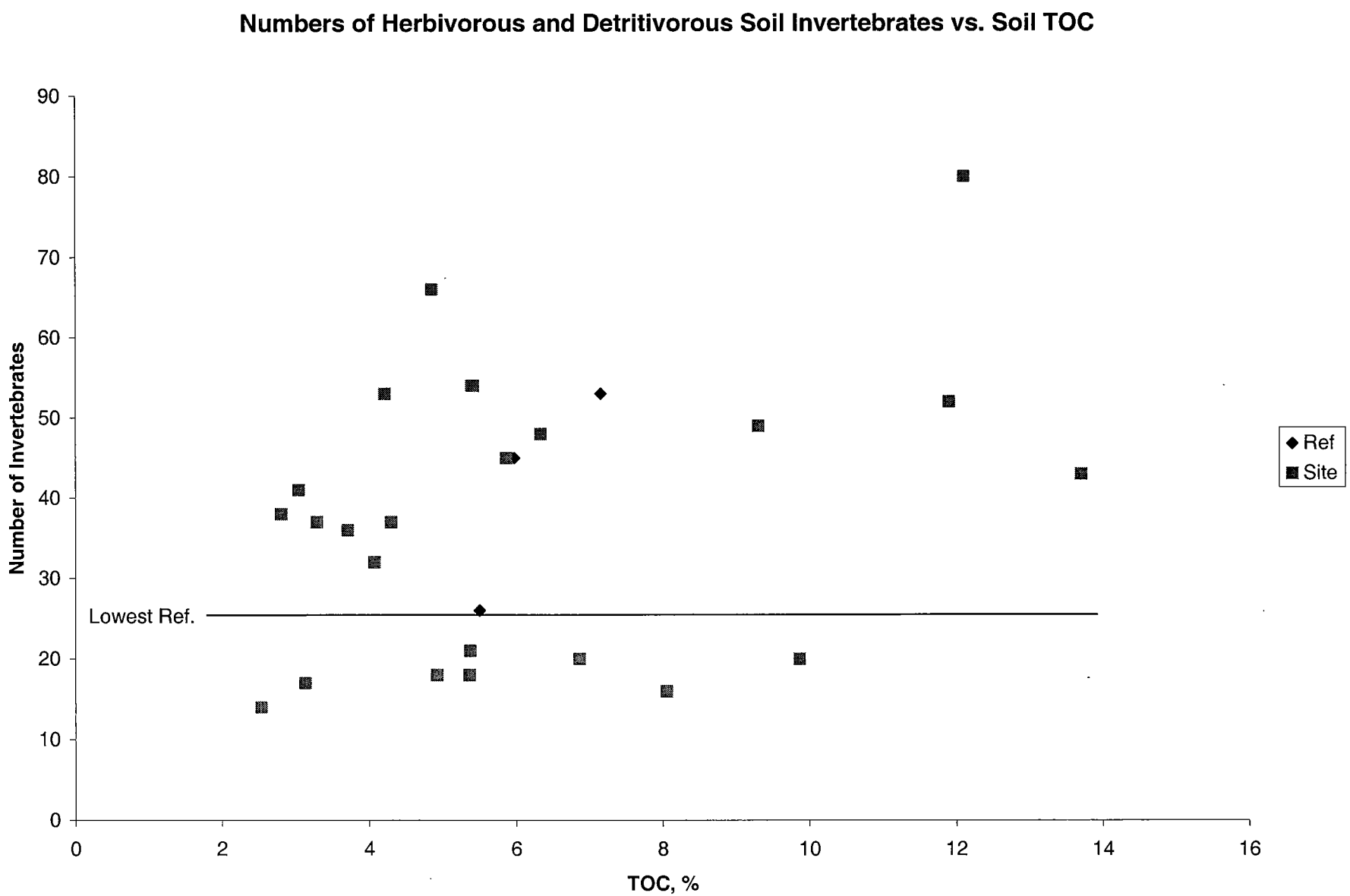


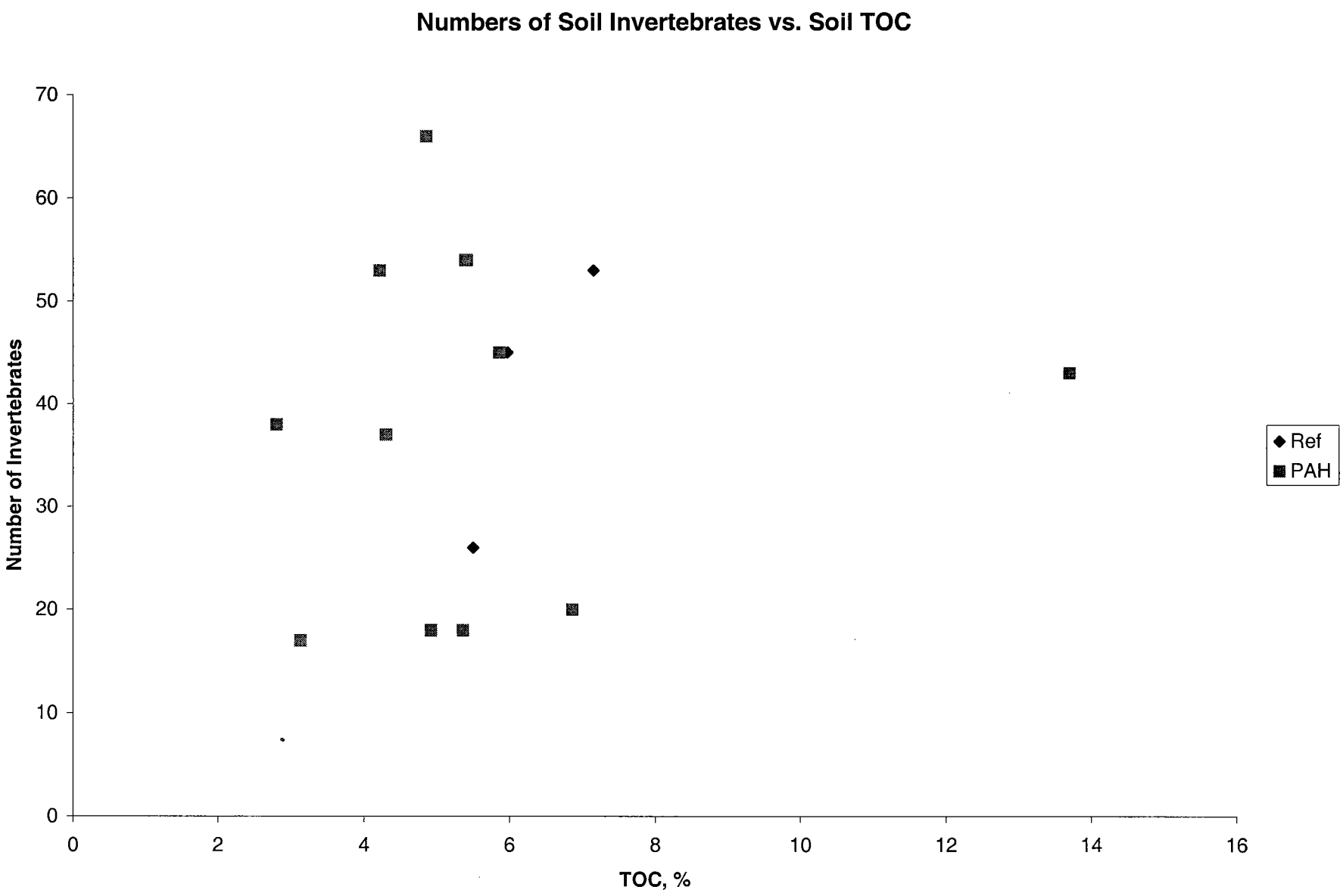

Numbers of Herbivorous and Detritivorous Soil Invertebrates vs. Soil TOC
Number of Invertebrates
25
20
15
10
5
0
Lowest Ref.
0
2
4
6
8
10
12
14
TOC, %
Ref
Site


Numbers of Detritivorous Soil Invertebrates vs. Soil Lead
Number of Invertebrates
25
20
15
10
5
0
Lowest Ref.
0.1
1
10
100
1000
10000
Lead, mg/kg
Ref
Site


Numbers of Detritivorous Soil Invertebrates vs. Soil TOC
Number of Invertebrates
25
20
15
10
5
0
Lowest Ref.
0
2
4
6
8
10
12
14
16
TOC, %
Ref
Site


Numbers of Soil Invertebrates vs. Soil Lead
Number of Invertebrates
90
80
70
60
50
40
30
20
10
0
Lowest Ref.
0.1
1
10
100
1000
10000
Lead, mg/kg
Ref
Site


Numbers of Herbivorous and Detritivorous Soil Invertebrates vs. Soil TOC
Number of Invertebrates
TOC, %
Lowest Ref.
Ref
Site
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12
14
16


Numbers of Soil Invertebrates vs. Soil TOC
Number of Invertebrates
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12
14
16
TOC, %
Ref
PAH

APPENDIX G

PRG CALCULATION SPREADSHEETS

Bird (represented by mockingbird) spreadsheet used to calculate soil remediation goals

THI	LOAEL	WR (kg)	CF	AUF	SAs (%)	AF	F	FAs (%)	BAF	Cs(mg/kg)
	(mg/kg/day)						(mg/day)			
1	11.3	0.0490	1.00E+06	1	0.05	1.0	5,040	0.95	0.05	1127

Mammal (represented by shrew) spreadsheet used to calculate soil remediation goals using each of two BAFs

THI	LOAEL	WR (kg)	CF	AUF	SAs (%)	AF	F	FAs (%)	BAF	Cs(mg/kg)
	(mg/kg/day)						(mg/day)			
1	80	0.0055	1.00E+06	1	0.05	1.0	957	0.95	0.14	2512
1	80	0.0055	1.00E+06	1	0.05	1.0	957	0.95	0.05	4716

$$C_S = \frac{TRV \times WR \times CF}{(AUF \times AF \times F) \times (SA_S + BAF \times FA)}$$

THI = target hazard index (set equal to 1.0)
LOAEL = lowest observed adverse effect level (from literature)
WR = weight of receptor
CF = conversion factor (kg to mg)
AUF = area use factor (assumed to be 100%, = 1.0)
SA_s = portion of diet composed of incidentally ingested soil
AF = absorption fraction (assumed to be 100%, = 1.0)
F = total amout of material consumed per day
FA = invertebrates as a portion of diet (1.0 minus portion of soil ingested)
BAF = bioaccumulation factor
Cs = lead concentration in soil

Bird (represented by mockingbird) spreadsheet used to calculate soil remediation goals

THI	LOAEL	WR (kg)	CF	AUF	SAs (%)	AF	F	FAs (%)	BAF	Cs(mg/kg)
	(mg/kg/day)						(mg/day)			
1	11.3	0.0490	1.00E+06	1	0.05	1.0	5,040	0.95	0.05	1127

Mammal (represented by shrew) spreadsheet used to calculate soil remediation goals using each of two BAFs

THI	LOAEL	WR (kg)	CF	AUF	SAs (%)	AF	F	FAs (%)	BAF	Cs(mg/kg)
	(mg/kg/day)						(mg/day)			
1	80	0.0055	1.00E+06	1	0.05	1.0	957	0.95	0.14	2512
1	80	0.0055	1.00E+06	1	0.05	1.0	957	0.95	0.05	4716

$$C_S = \frac{TRV \times WR \times CF}{(AUF \times AF \times F) \times (SA_S + BAF \times FA)}$$

THI = target hazard index (set equal to 1.0)
LOAEL = lowest observed adverse effect level (from literature)
WR = weight of receptor
CF = conversion factor (kg to mg)
AUF = area use factor (assumed to be 100%, = 1.0)
SA_s = portion of diet composed of incidentally ingested soil
AF = absorption fraction (assumed to be 100%, = 1.0)
F = total amout of material consumed per day
FA = invertebrates as a portion of diet (1.0 minus portion of soil ingested)
BAF = bioaccumulation factor
Cs = lead concentration in soil

Bird (represented by mockingbird) spreadsheet showing soil remediation goals (Cs) for three BAF values, two absorption fraction values, two invertebrate food consumption values, and two soil ingestion rate values.

THI	LOAEL (mg/kg/day)	WR (kg)	CF	AUF	SAs (%)	AF (%)	F (mg/day)	FAs (%)	BAF	Cs(mg/kg)
1	11.3	0.0490	1.00E+06	1	0.093	1.0	37,600	0.907	0.071	94
1	11.3	0.0490	1.00E+06	1	0.093	1.0	37,600	0.907	0.04	114
1	11.3	0.0490	1.00E+06	1	0.093	1.0	37,600	0.907	0.014	139
1	11.3	0.0490	1.00E+06	1	0.02	1.0	37,600	0.98	0.071	164
1	11.3	0.0490	1.00E+06	1	0.02	1.0	37,600	0.98	0.04	249
1	11.3	0.0490	1.00E+06	1	0.02	1.0	37,600	0.98	0.014	437
1	11.3	0.0490	1.00E+06	1	0.093	0.72	37,600	0.907	0.071	130
1	11.3	0.0490	1.00E+06	1	0.093	0.72	37,600	0.907	0.04	158
1	11.3	0.0490	1.00E+06	1	0.093	0.72	37,600	0.907	0.014	194
1	11.3	0.0490	1.00E+06	1	0.02	0.72	37,600	0.98	0.071	228
1	11.3	0.0490	1.00E+06	1	0.02	0.72	37,600	0.98	0.04	345
1	11.3	0.0490	1.00E+06	1	0.02	0.72	37,600	0.98	0.014	607
1	11.3	0.0490	1.00E+06	1	0.093	1.0	18,800	0.907	0.071	187
1	11.3	0.0490	1.00E+06	1	0.093	1.0	18,800	0.907	0.04	228
1	11.3	0.0490	1.00E+06	1	0.093	1.0	18,800	0.907	0.014	279
1	11.3	0.0490	1.00E+06	1	0.02	1.0	18,800	0.98	0.071	329
1	11.3	0.0490	1.00E+06	1	0.02	1.0	18,800	0.98	0.04	498
1	11.3	0.0490	1.00E+06	1	0.02	1.0	18,800	0.98	0.014	873
1	11.3	0.0490	1.00E+06	1	0.093	0.72	18,800	0.907	0.071	260
1	11.3	0.0490	1.00E+06	1	0.093	0.72	18,800	0.907	0.04	316
1	11.3	0.0490	1.00E+06	1	0.093	0.72	18,800	0.907	0.014	387
1	11.3	0.0490	1.00E+06	1	0.02	0.72	18,800	0.98	0.071	457
1	11.3	0.0490	1.00E+06	1	0.02	0.72	18,800	0.98	0.04	691
1	11.3	0.0490	1.00E+06	1	0.02	0.72	18,800	0.98	0.014	1213

$$C_S = \frac{TRV \times WR \times CF}{(AUF \times AF \times F) \times (SA_S + BAF \times FA)}$$

THI = target hazard index (set equal to 1.0)
LOAEL = lowest observed adverse effect level (from literature)
WR = weight of receptor
CF = conversion factor (kg to mg)
AUF = area use factor (assumed to be 100%, = 1.0)
SA_s = portion of diet composed of incidemntally ingested soil
AF = absorption fraction
F = total amout of material consumed per day
FA = invertebrates as a portion of diet (1.0 minus portion of soil ingested)
BAF = bioaccumulation factor
Cs = lead concentration in soil

Mammal (represented by shrew) spreadsheet showing soil remediation goals (Cs) for three BAF values and two absorption fraction values.

THI	LOAEL	WR (kg)	CF	AUF	SAs (%)	AF (%)	F (mg/d)	FA (%)	BAF	Cs(mg/kg)
	(mg/kg/day)									
1	80	0.0055	1.00E+06	1	0.015	1	3300	0.985	0.014	4631
1	80	0.0055	1.00E+06	1	0.015	0.72	3300	0.985	0.014	6432
1	80	0.0055	1.00E+06	1	0.015	1	3300	0.985	0.04	2451
1	80	0.0055	1.00E+06	1	0.015	0.72	3300	0.985	0.04	3404
1	80	0.0055	1.00E+06	1	0.015	1	3300	0.985	0.071	1570
1	80	0.0055	1.00E+06	1	0.015	0.72	3300	0.985	0.071	2180

$$C_S = \frac{TRV \times WR \times CF}{(AUF \times AF \times F) \times (SA_S + BAF \times FA)}$$

THI = target hazard index (set equal to 1.0)
LOAEL = lowest observed adverse effect level (from literature)
WR = weight of receptor
CF = conversion factor (kg to mg)
AUF = area use factor (assumed to be 100%, = 1.0)
SA_s = portion of diet composed of incidemntally ingested soil
AF = absorption fraction
F = total amout of material consumed per day
FA = invertebrates as a portion of diet (1.0 minus portion of soil ingested)
BAF = bioaccumulation factor
Cs = lead concentration in soil

APPENDIX C

WETLANDS DELINEATION REPORT

Wetland Delineation Report
for
Operable Unit 5, Site 15

Naval Air Station Cecil Field
Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888

Contract Task Order 0039

December 2003

120301/P

WETLAND DELINEATION REPORT
FOR
OPERABLE UNIT 5, SITE 15

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

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

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0039

DECEMBER 2003

PREPARED UNDER THE SUPERVISION OF:

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TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMITTAL BY:

DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CFR	Code of Federal Register
COE	United States Army Corps of Engineers
CTO	Contract Task Order
DBH	Diameter at breast height
F.A.C.	Florida Administrative Code
FAC	Facultative plant
FACU	Facultative upland plant
FACW	Facultative wet plant
FDEP	Florida Department of Environmental Protection
FLUCFCS	Florida Land Use, Cover, and Form Classification System
FWS	United States Fish and wildlife Service
HASP	Health and Safety Plan
IR	Installation Restoration
NAS	Naval Air Station
NAVFACENGCOM	Naval Facilities Engineering Command
NRCS	Natural Resources Conservation Service
NPL	National Priorities List
OBL	Obligate plant
OU	Operable Unit
PFO	Palustrine Forested
SAF	Society of American Foresters
SCS	Soil Conservation Service
TtNUS	Tetra Tech NUS, Inc.
UPL	Upland plant
USC	United States Code
USCS	United Soil Classification System
U.S. EPA	United States Environmental Protection Agency
UST	Underground storage tank
UXO	Unexploded ordnance
WRPA	Wetlands Rapid Assessment Procedure

1.0 INTRODUCTION

A wetland delineation was conducted in October 2003 for that part of the Naval Air Station (NAS) Cecil Field in Jacksonville, Florida designated as Installation Restoration (IR) Program Site 15. Chemical contamination on Site 15 will be remediated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [42 United States Code (USC) 9601 *et seq.*]. The delineation was performed by J. Peyton Doub, CEP, PWS of the Germantown, Maryland office of Tetra Tech NUS and Michael Whitten of the Aiken, South Carolina office of Tetra Tech NUS. The delineation identified areas meeting the definition of wetlands used by the U.S. Environmental Protection Agency (U.S. EPA) and U.S. Army Corps of Engineers (COE) under Section 404 of the Clean Water Act (33 USC 1344). The delineation also identified areas meeting the definition of wetlands used by the Florida Department of Environmental Protection (FDEP) and St. Johns River Water Management District under Chapter 62-340 of the Florida Administrative Code (F.A.C.).

Federal Wetland Definition: The definition of wetlands recognized by COE and U.S. EPA is:

> "those areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" [40 Code of Federal Register (CFR) 230.3 and 33 CFR 328.3].

Under this definition, wetlands may be either under the influence of tides (tidal) or unaffected by tides (nontidal). All wetlands in western Duval County, Florida (which includes NAS Cecil Field) are nontidal wetlands.

State of Florida Wetland Definition: Wetlands are defined in Subsection 373.019(17) of the Florida Statutes as:

> "those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands,

sloughs, wet prairies, riverine swamps and marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto."

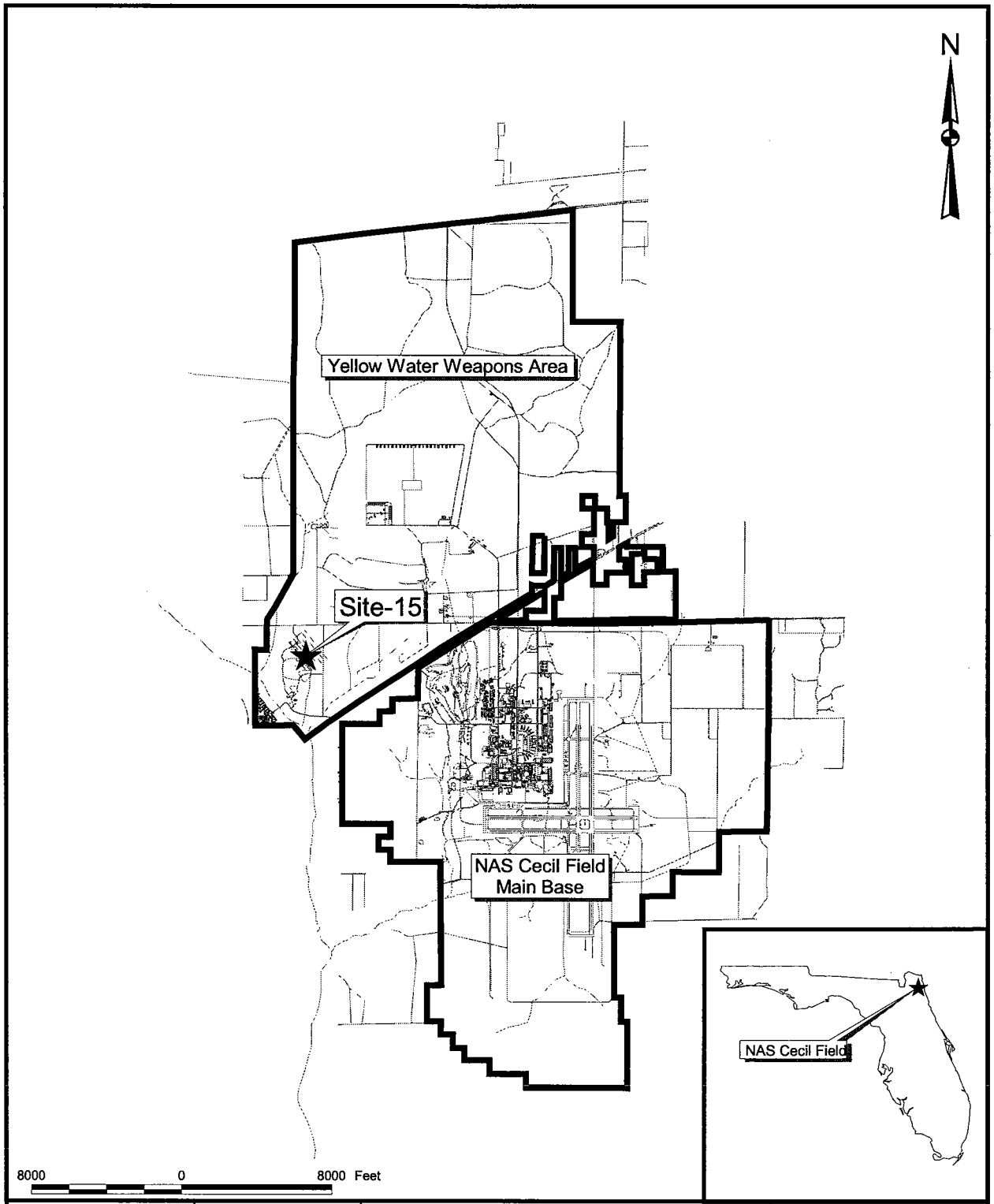
The federal and the Florida wetland definitions are generally similar. However, the Florida definition specifically clarifies that certain pine flatwood settings dominated by longleaf pine (*Pinus palustris*) or slash pine (*Pinus elliottii*) with an understory of saw palmetto (*Serenoa repens*) are not wetlands, even if they contain poorly drained soils that experience surface saturation for brief periods following heavy rainfall.

Overview of NAS Cecil Field: NAS Cecil Field is located in western Duval County, Florida, within the limits of the City of Jacksonville (Figure 1-1). In 1989, NAS Cecil Field was placed on U.S. EPA's CERCLA National Priorities List (NPL) as a result of pollution resulting from past waste disposal practices that predate CERCLA. In 1990, the Navy entered into a Federal Facilities Agreement with U.S. EPA to define the overall extent of contamination. NAS Cecil Field was closed in 1999 under the Base Closure and Realignment Act (BRAC). NAS Cecil Field includes approximately 35 individual sites where hazardous wastes may have been handled, spilled, or buried. As a result, work at the various sites has been grouped into eight operable units (OUs), as well as more than 100 other areas undergoing evaluation in the BRAC Underground Storage Tank (UST) program (TtNUS, 2003).

Overview of Site 15: Site 15, the Blue 10 Ordnance Disposal Area (and former trap and skeet range), is located in the southwestern part of the Yellow Water Weapons Area, a remote part of NAS Cecil Field (Figure 1-2). No actively used structures exist at the site, although several building foundations, burn pads, and a burn chamber remain. The site, which encompasses approximately 110 acres, is situated approximately 1,400 feet east of Caldwell Branch, which drains into Yellow Water Creek (ABB-ES, 1997).

From the early 1940s to the mid 1950s, the site was used as a skeet range. Ordnance was disposed of at Site 15 from the mid 1960s through 1977. Disposal consisted of burning ordnance materials in a large metal chamber and static firing of rockets. The ordnance disposal structures were located west of the skeet range. The majority of ordnance disposed of 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. An unexploded ordnance (UXO) survey completed at the site in 1995 found no UXO; however, several pieces of metal, shell casing, and similar items were located and removed (TtNUS, 2003).

Vegetative communities identified on Site 15 and adjoining areas in a 1995 site reconnaissance include mesic and wet slash pine flatwoods, disturbed uplands, mesic and wet mixed pine/hardwoods, pine flatwoods with attributes of a dry prairie, floodplain swamps with cypress dome swamp characteristics, man-made drainage ditches, and tannin-stained tributaries (ABB-ES, 1997). Investigations since 1995 have condensed the site to a smaller area consisting of mesic and wet pine flatwoods, disturbed uplands, mesic and wet mixed pine/hardwoods, and man-made drainage ditches. Of these habitats, wet pine flatwoods [generally corresponding to Florida Land Use, Cover, and Forms Classification System (FLUCFCS) Code 620], wet mixed pine/hardwoods (generally corresponding to FLUCFCS Code 630), and the man-made drainage ditches are wetland habitats. Mesic pine flatwoods (generally corresponding to FLUCFCS Code 411), mesic mixed pine/hardwoods (generally corresponding to FLUCFCS Code 434) and disturbed uplands are upland habitats. Almost all of the mesic pine flatwoods and mesic pine/hardwoods have been strongly influenced by past logging and planting of slash pine and might thus be better characterized as pine plantation land (FLUCFCS Code 441). A large area of mesic pine flatwoods in the central part of the site was recently clearcut and presently supports herbaceous and woody shrub and seedling vegetation, with scattered volunteer slash pine seedlings.



DRAWN BY MJJ	DATE 04Dec03	GENERAL LOCATION MAP OU 5, SITE 15 WETLAND DELINEATION REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV 0

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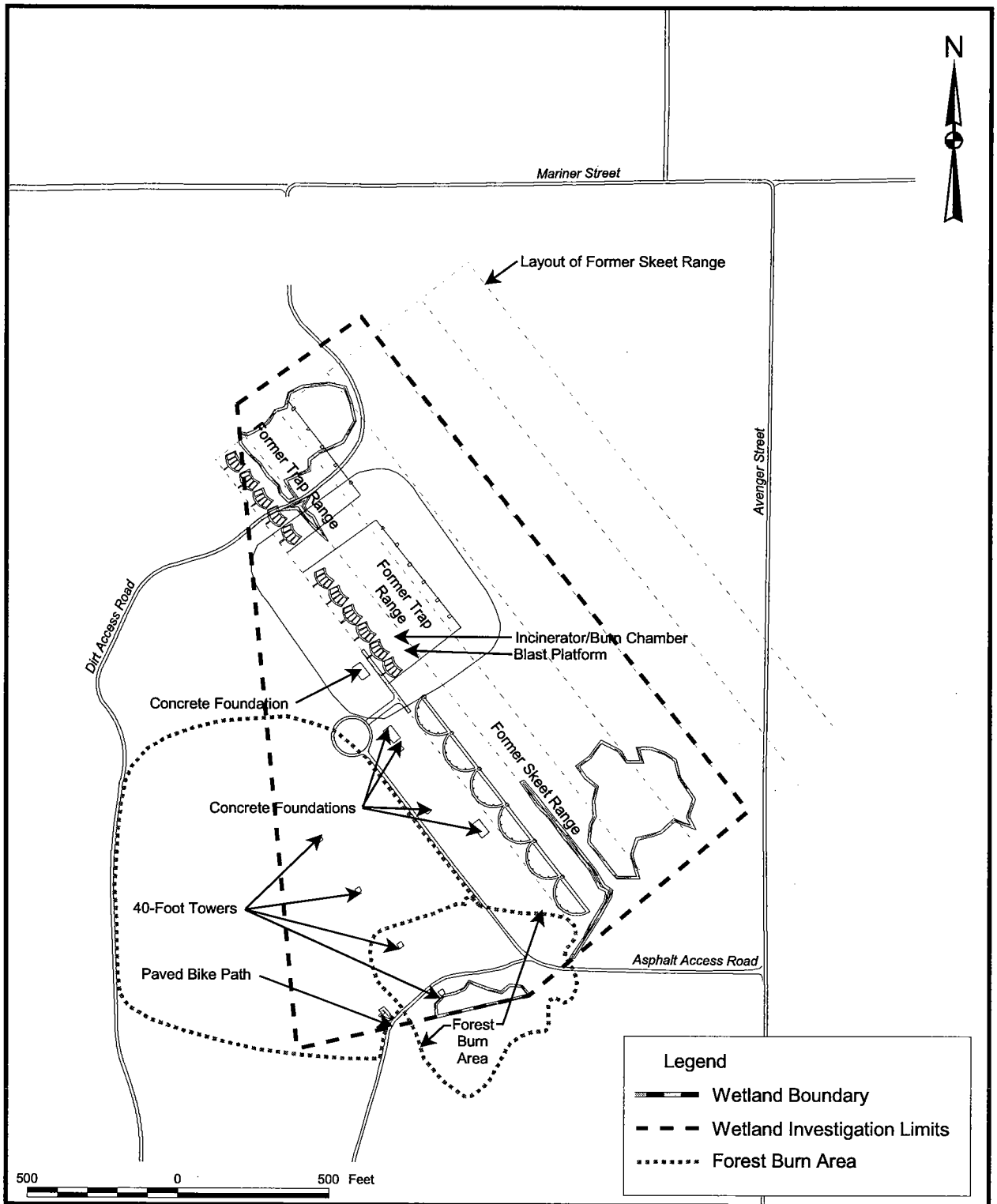

DRAWN BY	DATE			CONTRACT NUMBER
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COST/SCHEDULE-AREA				APPROVED BY / DATE
SCALE				DRAWING NO. / REV
AS NOTED				FIGURE 1-2 / 0

SITE MAP
OU 5, SITE 15
WETLAND DELINEATION REPORT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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2.0 METHODOLOGY

Fieldwork for the wetland delineation was conducted between October 1 and 3, 2003. The wetland delineation followed two methodologies:

1) the routine onsite methodology outlined in the COE Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory, 1987) and the COE memorandum on clarification and interpretation of that manual (COE, 1992); and
2) methodology outlined in the Florida Wetlands Delineation Manual (FDEP, 1994)

Federal Methodology: With a few exceptions referred to as problem areas, any area identified as a wetland according to the federal methodology (1987 Manual) must display positive evidence of each of the following three parameters indicative of wetland conditions:

- Hydrophytic Vegetation – Defined as the sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Environmental Laboratory, 1987).

- Hydric Soil – Defined as a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (Environmental Laboratory, 1987). The 1987 Manual includes a list of field indicators of hydric soils for sandy and non-sandy soils which is designed for national application. The COE also allows the use of an expanded list of hydric soil field indicators that was developed by the National Technical Committee for Hydric Soils (NRCS, 1998).

- Wetland Hydrology – Defined as the sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation (Environmental Laboratory, 1987). The 1987 Manual includes a list of six "primary" field indicators of wetland hydrology, designed for national application; and the COE has developed additional "secondary" field indicators that provide corroborating evidence of wetland hydrology (COE, 1992).

State of Florida Methodology: The Florida methodology requires that an area meet one of four tests to be identified as wetlands. Applying the tests requires that the vegetation, soils, and hydrology be characterized. To characterize the vegetation, the percent aerial cover for each plant species at representative locations must be estimated. The Florida methodology assigns one of the wetland indicator statuses listed in Table 2-1 to each plant species. The methodology requires identification of

one or more field indicators to determine whether hydric soils and wetland hydrology are present. The tests include:

- "A" Test [62-340.300(2)(a), F.A.C.]: The percent aerial cover by obligate (OBL) plant species must exceed the percent aerial cover by upland (UPL) plant species; and the presence of one or more field indicators of hydric soils <u>or</u> wetland hydrology.

- "B" Test [62-340.300(2)(b), F.A.C.]: The percent aerial cover by OBL and facultative wetland (FACW) plant species must total at least 80 percent of the total percent aerial cover by OBL, FACW, and UPL plant species; and the presence of one or more field indicators of hydric soils <u>or</u> wetland hydrology.

- "C" Test [62-340.300(2)(c), F.A.C.]: The presence of hydric soils in areas that have not been subject to artificial drainage, and are not pine flatwoods or improved pastures. Because Site 15 includes areas of pine flatwoods, the "C" Test can not be used.

- "D" Test [62-340.300(2)(d), F.A.C.]: The presence of field indicators for both hydric soils <u>and</u> wetland hydrology.

The FDEP has developed a list of field indicators applicable to those physiographic areas occurring in Florida (FDEP, 2003). Section 62-340.500 of the F.A.C. lists 13 field indicators of wetland hydrology. The Florida lists of hydric soil and wetland hydrology field indicators differ somewhat from the national lists recognized by the COE and U.S. EPA. Determining the presence of hydric soils and wetland hydrology for use in the Florida methodology requires the use of the field indicators approved by FDEP.

Description of Fieldwork: The fieldwork commenced with walking the site to identify areas potentially meeting the federal and/or Florida definitions of wetlands. Representative data collection points were selected at each potential wetland to record data used as the basis for determining the boundary. The data points were oriented on representative transects perpendicular to the hydrological gradient. For each transect, one data point was positioned approximately 10 feet down-gradient of the boundary (i.e., inside of the wetland) and one data point was positioned approximately 10 feet up-gradient of the boundary (i.e., outside of the wetland). For boundaries where the transition from wetlands to uplands is gradual, an additional data point was positioned on the boundary.

The percent aerial cover for each plant species in each vegetative stratum (tree canopy, subcanopy, and ground cover, as defined in Section 62-340.200 F.A.C.) was estimated for circular plots surrounding each data point (Table 2-2). Wetland indicator statuses developed by the U.S. Fish & Wildlife Service (FWS) (Reed, 1988; Table 2-3) and by the FDEP (in the "Vegetative Index" in Section 62-340.450 of the F.A.C.;

Table 2-1) were assigned to each plant species. A soil pit was hand augured at each data point location to a minimum depth of 18 inches and the color, texture, and other descriptive data were recorded for each encountered soil horizon. These observations were used to determine whether field indicators of hydric soils, as listed in the 1987 Manual and by the FDEP (FDEP, 2003), were present. Surface and subsurface observations were made at each data point to determine which field indicators of wetland hydrology, as listed in the 1987 Manual and Section 62-340.500 F.A.C., were present.

Wetland delineation data sheets presenting vegetation, soil, and hydrology data for each data point were completed and are provided in Appendix A. The data sheets are patterned after the format that is recommended by the COE (1992) but have been modified to present data required for the Florida methodology as well. Six wetland areas were identified on the site (designated as Wetlands A through F, see Section 3.0). Each wetland boundary was marked in the field using wooden stakes and orange ribbon. Each stake was labeled "WET 15-X-N", with "X" as a letter from A to F corresponding to the wetland area and "N" as the numeric order of the stake. The "15" refers to Site 15. A land survey depicting the location of each stake was subsequently completed in October 2003 and is the basis for the wetland delineation map provided in Section 3.0. Stakes were also placed at each data point location on each transect.

Consideration of Functions and Values: Wetland functions are physical, chemical, and biological processes or attributes of wetlands that are vital to the integrity of a wetland system, regardless of how those benefits are perceived by society. Wetland values are attributes that are not necessarily important to the integrity of a wetland system but which are perceived as valuable to society (Adamus et al., 1991). Table 2-4 lists several commonly recognized functions and values provided by wetlands. The discussion of the functions and values presented in this report for the wetlands delineated on Site 15 is subjective, and is intended only to contribute to a general description of the delineated wetlands. More rigorous quantitative and semi-quantitative models are available for assessing the functions and values of wetlands but are rarely necessary to support most permitting and planning decisions affecting wetlands.

The functions and values discussion for each wetland also includes an evaluation using the Wetland Rapid Assessment Procedure (WRAP) (Miller and Gunsalus, 1999). WRAP is a standardized rating index that can be used in combination with professional judgment to assess the relative quality and importance of a wetland. Variables considered in WRAP include:

1. Wildlife utilization;
2. Wetland overstory/shrub canopy;
3. Wetland vegetative ground cover;
4. Adjacent upland support/wetland buffer;

5. Field indicators of wetland hydrology; and
6. Water quality input and treatment systems.

Variables 1 and 4 correspond directly to the wildlife diversity/abundance and aquatic diversity/abundance functions. Variables 2, 3, and 4 pertain indirectly to habitat functions in that diverse and intact vegetation in the wetland and adjoining buffer generally indicate good habitat quality. Variable 6 corresponds directly to the sediment/toxicant retention and nutrient removal/transformation functions. Variables 2 and 3 consider the vegetative integrity of the wetland and thus indirectly pertain to its ability to perform functions dependent (at least in part) on vegetation such as groundwater recharge, floodflow alteration, sediment/shoreline stabilization, production export, and habitat quality. Variable 5 considers the hydrological integrity of the wetland and thus indirectly pertains to its ability to perform functions dependent (at least in part) on wetland hydrology such as groundwater recharge, groundwater discharge, and floodflow alteration. The four values listed in Table 2-4 are not directly addressed in WRAP, but the parameters addressed by Variables 2, 3, 4, and 5 are indirectly relevant to the aesthetic, cultural, and/or educational value of a wetland.

TABLE 2-1

STATE OF FLORIDA WETLAND PLANT INDICATOR STATUSES
SITE 15 WETLAND DELINEATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Indicator Status	Abbreviation	Definition[1,2]
Obligate Plant	OBL	Plant species which under natural conditions are only found or achieve their greatest abundance in an area which is subject to surface water inundation and/or soil saturation. Some obligate plant species can be observed in an upland, especially under a controlled environment. Included in this category are the littoral plants and emergent aquatics, such as *Nymphaea* spp. (water lilies), *Nelumbo* spp. (lotus), and *Nuphar luteum* (spatterdock).
Facultative Wet Plant	FACW	Plants which under natural conditions typically exhibit their maximum cover in areas subject to surface water inundation and/or soil saturation, but can also be found in an upland.
Facultative Plant	FAC	Plants which are so problematic in their distribution as to render them inappropriate for indicating inundation or soil saturation. Specifically included are exotic plants with a weedy distribution. Facultative plants are not used when evaluating the dominance of plants species or when determining the appropriate strata.
Upland Plant	UPL	Plants not specifically identified as OBL, FACW, or FAC in the "Vegetative Index" in Section 62-340.450 of the F.A.C.

1 - Source: FDEP, 1994 and "Vegetative Index" in Section 62-340.450 of the F.A.C.
2 - The State of Florida does not recognize definitions for facultative upland or obligate upland plants.

TABLE 2-2

DEFINITIONS OF VEGETATION STRATA USED IN WETLAND DELINEATION
SITE 15 WETLAND DELINEATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Stratum	Symbol	Definition[1]	Plot Diameter[2] (feet)
Canopy	C	Often referred to as the top layer of the forest. The definition in the rule further qualifies the characteristics as woody plants or palms with a main trunk at least 4 inches in diameter (four inches wide) at a point 4.5 feet above the base of the tree (Diameter at Breast Height - DBH). If the tree is on a slope, the diameter is measured from the midpoint of the base of the tree on the slope. Vines are not considered for this or any other vegetative evaluation.	30
Subcanopy	S	Generally thought of as the smaller trees and tall shrubs in the forest. It is typically the middle of the three vegetative layers considered in the vegetation analysis. A plant must have a main stem more than 4.5 feet tall and greater than 1" in diameter to be in the subcanopy. Most species of palms will not be in the subcanopy category if their diameter is greater than 4.5" when the trunk is at least 4.5 feet tall.	15
Ground Cover (Herbaceous)	H	Includes all plants which are less than 4.5' tall or have a DBH of less than 1". Vines are not considered. Groundcover is the lower most of the three layers of vegetation which are evaluated for the vegetation analysis.	5

1 - Source: FDEP, 1994.
2 - Plot size used for visually estimating percent aerial cover for plant species (circular plots).

TABLE 2-3

FEDERAL PLANT WETLAND INDICATOR STATUSES
SITE 15 WETLAND DELINEATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Indicator Status	Abbreviation	Definition[1]
Obligate Wetland	OBL	Species recognized as occurring in wetlands greater than 99 percent of the time.
Facultative Wetland	FACW	Species recognized as occurring in wetlands 67 to 99 percent of the time.
Facultative	FAC	Species equally likely to occur in wetlands or uplands (nonwetlands).
Facultative Upland	FACU	Species recognized as occurring in wetlands 1 to 33 percent of the time.
Obligate Upland	UPL	Species recognized as occurring in wetlands less than 1 percent of the time.

1 - Source: Reed, 1988.

TABLE 2-4

COMMON FUNCTIONS AND VALUES OF WETLANDS[1]
SITE 15 WETLAND DELINEATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Function	Description
Groundwater Recharge	Some wetlands function to catch and detain surface runoff, allowing at least some of the detained water to leach down into underlying aquifers. Wetlands capable of best performing this function tend to receive runoff from a large watershed, support dense vegetation, and have a narrow (constricted) outlet (or no outlet).
Groundwater Discharge	Some wetlands function as areas where groundwater is discharged to the surface. Such wetlands are commonly referred to as seeps or springs and represent a means by which wildlife inhabiting the surface can access water reserves held in the ground.
Floodflow Alteration	Some wetlands function to slow the overland runoff of floodwaters, thereby reducing peak flow levels following heavy precipitation events. Wetlands capable of best performing this function tend to be located in the upper parts of the watershed to stream systems.
Sediment/ Shoreline Stabilization	Vegetation in wetlands bordering streams and other water bodies can stabilize banks and shorelines against erosion caused by currents and waves.
Sediment/ Toxicant Retention	Some wetlands serve to detain surface flow (surface runoff or channel flow) allowing some suspended sediments, toxicants, and/or pathogens to settle out into the wetland soil, thereby preventing their migration into downstream waters. Wetlands capable of best performing this function tend to support dense vegetation, have constricted (or no) outlets, and be located near disturbed soils or toxicant sources.
Nutrient Removal/ Transformation	Some wetlands serve to detain surface flow (surface runoff or channel flow) allowing nutrients such as nitrogen and phosphorus to settle out into the wetland soil, thereby preventing their migration into downstream waters. High nutrient levels in water bodies cause eutrophication, a condition where undesirable algal growths deplete dissolved oxygen and interfere with other aquatic biota. Wetlands capable of best performing this function tend to support dense vegetation, have constricted (or no) outlets, and be located near areas of heavy fertilizer use.
Production Export	Some wetlands serve as sources of biomass, nutrients, and food sources supporting aquatic ecosystems in downgradient water bodies. Wetlands capable of best performing this function tend to have dense, diverse vegetation and be connected to areas of open water.
Aquatic Diversity/ Abundance	Wetlands adjoining or forming a part of streams, lakes, and other areas of open water tend to provide specialized habitat for many species of fish and other aquatic biota, thereby enhancing the diversity of aquatic ecosystems.
Wildlife Diversity/ Abundance	Wetlands provide favored habitat for many amphibian, reptile, bird, and mammal species. The exact species of wildlife attracted by a wetland depends largely on the wetland's vegetation composition.

TABLE 2-4

COMMON FUNCTIONS AND VALUES OF WETLANDS[1]
SITE 15 WETLAND DELINEATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Function	Description
Recreation	Many wetlands provide opportunities for recreational activities such as hiking, canoeing, boating, fishing, and hunting. The recreational value of a wetland depends not only on its physical characteristics but also on its public accessibility and proximity to population centers.
Uniqueness/ Heritage	Many wetlands are inherently "special" places that reflect or contribute to the history and/or culture of the surrounding region.
Educational/ Scientific Value	Many wetlands, especially wetlands that have experienced little human alteration or disturbance, are of value for scientific research and/or for public outdoor education. The location of a wetland on public land and/or in close proximity to schools enhances this value.
Visual Quality/ Aesthetics	Especially in urban/suburban settings, many wetlands are visually pleasing natural areas that can buffer, screen, or offset the visual impacts of developed areas.

1 - Source: Adamus et al., 1991 and De Santo and Flieger, 1995.

3.0 RESULTS AND DISCUSSION

Six wetland areas (Wetlands A, B, C, D, E, and F) were identified within the area addressed by the wetland delineation (Figures 3-1, 3-2, and 3-3).

1. Wetland A is a forested wetland situated in the northwest part of Site 15 (Figure 3-1). It lies within a shallow topographic depression of roughly 1.7 acres that is connected by a narrow drainage ditch to a broader zone of forested wetlands adjoining Caldwell Branch, a non-tidal tributary to Yellow Water Creek.

2. Wetland B is a forested wetland situated in a narrow swale immediately east of Wetland A (Figure 3-1). It encompasses less than 0.1 acre. The wetland status of the swale appears to be the result of past construction of an elevated road bed without a culvert or other feature to allow surface water to drain out and into Wetland A. Wetland B is separated from Wetland A only by the road bed.

3. Wetland C is a forested wetland situated in the south-central part of Site 15 (Figure 3-3). Wetland C comprises the northern edge of a broad wetland area associated with the headwaters of an unnamed tributary to Yellow Water Creek.

4. Wetland D is a forested wetland situated in the southeast part of Site 15 (Figure 3-2). It is a roughly ovular depression suggestive of a small cypress dome, although the characteristic cypress-dominated vegetation has been altered by past logging and pine planting activity.

5. Wetland E is a drainage ditch roughly 10 to 20 feet in width beginning just northwest of Wetland D and proceeding directly south (Figure 3-2). The ditch is a headwater of the unnamed tributary to Yellow Water Creek associated with Wetland C.

6. Wetland F is a small man-made pit measuring less than 0.1 acre situated in the southwestern part of Site 15 (Figure 3-3). The pit is surrounded by uplands that have been recently clearcut.

Appendix A includes completed data sheets for each data point shown in Figures 3-1, 3-2, and 3-3. The data sheets summarize field observations of vegetation, soils, and hydrology for each data point on representative transects perpendicular to the delineated wetland boundaries. The sections below summarize the vegetation, soils, hydrology, classification, and functions and values for each delineated wetland. The sections focus on each wetland as a whole rather than on specific data point locations.

3.1 WETLAND A

Wetland A is a forested wetland situated in the northwest part of Site 15 (Figure 3-1; Photo 1). It lies within a shallow topographic depression of roughly 1.7 acres that is connected by a narrow drainage ditch to a broader zone of forested wetlands adjoining Caldwell Branch, a tributary to Yellow Water Creek. The wetland delineation addressed the entire depression but did not extend to the broader band of wetlands adjoining Caldwell Branch, which lies outside of Site 15.

Vegetation: Vegetation throughout Wetland A is dominated by slash pine, a needle-leaved evergreen tree. Many of the slash pines are 12 to 18 inches in diameter at breast height (DBH). Pond cypress (*Taxodium ascendens*), a needle-leaved deciduous tree, occurs throughout the wetland, especially in the center. Most of the pond cypress trees are less than 6 inches DBH. The subcanopy consists of widely scattered red maple (*Acer rubrum*), sweetbay (*Magnolia virginiana*), wax myrtle (*Myrica cerifera*), and gallberry (*Ilex glabra*). The groundcover consists of scattered patches of cinnamon fern (*Osmunda cinnamomea*), pitcher plants (*Sarracenia* sp.), royal fern (*Osmunda regalis*), and Virginia chain fern (*Woodwardia virginica*) (Photos 2 and 3). Occasional seedlings of gallberry and wax myrtle also occur in the groundcover.

Vegetation in the uplands adjoining Wetland A consists of rows of planted slash pine with a dense understory of saw palmetto (Photo 4). In contrast to the wetlands, most of the slash pine in the uplands is less than 8 inches DBH. The saw palmetto understory terminates abruptly close to the delineated wetland boundary, and its presence is the most visible contrast between the upland and wetland vegetation. Pond cypress occurs only inside the wetland boundary. The dense patches of fern groundcover occur primarily within the wetland boundary although a few small patches, especially of cinnamon fern, occur in isolated locations in the uplands.

The vegetation in Wetland A appears to correspond to the Society of American Foresters (SAF) Forest Cover Type 84, Slash Pine Forest (Eyre, 1980). The native range of Slash Pine Forest reportedly extends from the southern tip of South Carolina south to central Florida and west along the Coastal Plain to southeast Louisiana. Typical undergrowth in Slash Pine Forest on moist to wet sites (such as Wetland A) is described as including wax myrtle, gallberry, buckwheat tree (*Cliftonia monophylla*), dahoon (*Ilex cassine*), yaupon (*Ilex vomitoria*), and pitcher plant. Typical undergrowth in Slash Pine Forest on better drained soils includes pineland three-awn (*Aristida stricta*), saw-palmetto, gallberry, Curtis dropseed (*Sporobolus curtissii*), dwarf huckleberry (*Gaylussacia dumosa*), ground blueberry (*Vaccinium* sp.), yaupon, and dahoon (Eyre, 1980).

All of the dominant plant species in Wetland A are assigned indicator statuses of OBL, FACW, or FAC for the southeastern United States by the FWS (Appendix A, Data Point 15A-1-1), and hence the vegetation

is hydrophytic according to the Federal criteria. The frequent occurrence of pond cypress knees, a morphological plant adaptation to wet conditions, supports the hydrophytic status of the vegetation. Two out of the three dominant species in the adjoining upland vegetation also have a FWS indicator status of FACW (Appendix A, Data Point 15A-1-3), and thus that vegetation also technically meets the minimum Federal criteria for hydrophytic vegetation. However, the dense undergrowth by saw palmetto, which is a plant that favors well-drained soils and which is assigned an indicator status of UPL by the FWS, and the absence of morphological plant adaptations suggests that the upland vegetation does not meet the intent of the federal definition of hydrophytic vegetation.

The State of Florida considers slash pine, which is dominant in the canopy, to be an UPL species. However, the canopy and subcanopy vegetation has been substantially altered by past forest management activities. Reasonable scientific judgment suggests that the vegetation is indicative of wetlands, considering the frequency of state-designated FACW and OBL fern species in the groundcover, the presence of morphological plant adaptations, and the ability of slash pine and gallberry to grow in wetland as well as upland conditions.

Soils: Soils in the vicinity of Wetland A (including the surrounding uplands) are mapped as Olustee fine sand, which is described as a nearly level, poorly drained soil in broad flatwood areas. The typical soil profile is described as including a 6-inch surface layer (topsoil) of black fine sand. The upper part of the subsoil is described as consisting of a 5-inch layer of very dark gray fine sand overlying a 10-inch layer of black fine sand. Below the upper subsoil is a 15-inch layer of gray fine sand. The lower part of the subsoil (between 36 and 54 inches below the surface) is described as gray sandy clay loam. Under natural conditions, the water table is described as occurring at a depth of less than 10 inches below the surface for 2 to 4 months and at a depth of 10 to 30 inches below the surface for 2 to 8 months in a normal year (SCS, 1978).

Soils observed in the wetland during the wetland delineation (Appendix A, Data Point 15A-1-1) displayed a roughly 3-inch surface layer of black (2.5Y 2.5/1) fine sand overlying more than 15 inches of gray and dark gray (polychromatic mixture of 2.5Y 5/1 and 2.5Y 4/1) fine sand. This is generally consistent with the upper part of the typical soil profile description for an Olustee fine sand. The upper part of the soil profile in the adjoining uplands did not differ distinctively from that in the wetlands. The placement of the delineated wetland boundary reflected changes in vegetation and observed hydrological field indicators rather than changes in soil characteristics.

The dark surface layer reflects a high organic content, which (for a sandy soil) is one of the Federal hydric soil field indicators presented in the 1987 Manual. The dark surface layer is also one of the field indicators of hydric soil recognized by the FDEP (Field Indicator S7). The adjoining upland soils (Appendix A, Data Point 15A-1-3) displayed a less pronounced dark surface layer, but the transition from a hydric to clearly non-hydric

soil morphology is very gradual. This observation is consistent with the fact that the entire landscape surrounding Wetland A is mapped in the poorly drained Olustee and Ridgeland soil series, including areas that clearly display upland vegetation and/or hydrology.

Hydrology: Soils were saturated to the surface throughout Wetland A at the time of the wetland delineation. The observed depth to the water table at the outer edge of the wetland (Appendix A, Data Point 15A-1-1) was 6 inches below the surface. The capillary fringe was keeping the surface saturated. Isolated pools of shallow (1-2 inches) standing water were observed in the central part of the wetland (Photo 5).

June through September are typically the rainiest months in Jacksonville, with October beginning a relatively dry fall and winter period. For a period between 1961 and 1990, Jacksonville has averaged about 7.1 inches of rain in September, compared to only about 2.9 inches for October (World Weather Information Service, 2003). Precipitation over a broad period preceding the wetland delineation has generally been normal, with Jacksonville receiving 39.55 inches of rain in 2003 as of October 1, 2003 versus an average of 43.79 inches for the same period (Weather Underground, 2003). The most recent substantial rainfall preceding the delineation was approximately 1.5 inches on September 26, 2003 (Weather Underground, 2003). Jacksonville's growing season is long. The average data of the first freeze is December 16, and the average date of the last freeze is February 6 (SCS, 1978). The wetland delineation, which was conducted in October, therefore clearly fell during the growing season. Based on the data summarized above, the visual observation of saturated surface soils at the time of the delineation therefore supports the presence of wetland hydrology. Likewise, one would expect the visual absence of saturated soil conditions at that time to indicate the absence of wetland hydrology.

It is furthermore noted that the pond cypress knees observed throughout much of Wetland A (Photo 1) constitute a morphological plant adaptation to saturated soil conditions. Such morphological plant adaptations constitute one of the field indicators of wetland hydrology listed in Section 62-340.500 of the F.A.C. Additionally, the soil surface throughout much of Wetland A displayed distinct hummocks, another wetland hydrology field indicator in Section 62-340.500 of the F.A.C.

Soils just outside of the delineated wetland boundary (Appendix A, Data Point 15A-1-3) were not saturated to the surface at the time of the wetland delineation and did not display morphological plant adaptations or hummocking.

Classification: Wetland A meets both the federal and Florida criteria for a wetland. Wetland A would be classified as Palustrine Forested (PFO). The Palustrine system is described by the FWS as consisting of nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (as well as tidal wetlands whose salinity is less than 0.5 parts per thousand) (Cowardin et al., 1979).

Functions and Values: Groundwater recharge and discharge are not key issues in northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast. Wetland A lacks and is not contiguous to open water, thus it does not play a role in sediment and shoreline stabilization.

The dense understory in Wetland A helps enable it to effectively retain sediments and toxicants. The vegetation may have helped toxicants related to Site 15's history from migrating offsite and into Caldwell Creek. However, the watershed contributing runoff to Wetland A is completely forested; thus, the ability of the wetland to trap sediment and nutrients is likely of little importance. The dense and diverse vegetation in Wetland A and its surface connection to Caldwell Creek suggest a possible role with respect to production export.

The diverse vegetation in, and minimal human disturbance of, Wetland A and the surrounding uplands suggest that the wetland may provide good wildlife habitat (wildlife diversity/abundance function). Because Wetland A lacks open water, it does not directly provide aquatic habitat (aquatic diversity/abundance function), but its production export function could contribute to the quality of aquatic habitat in Caldwell Creek.

Wetland A appears to be of substantial importance with respect to each of the four wetland values noted in Table 2-4. Once Site 15 is successfully cleaned up, it and the surrounding area will likely be open to the public and provide valuable opportunities for hiking, bird watching, and perhaps hunting to residents of nearby urban areas. As urban areas in the City of Jacksonville expand westward, the complex of natural wetlands and uplands on and around Site 15 (including Wetland A) could be of increasing importance with respect to uniqueness/heritage, educational/ scientific value, and visual quality/aesthetics. The aesthetics and educational importance of Wetland A are strengthened by the fact that the adjoining uplands and up-gradient watershed are almost completely forested rather than used for urban uses or agriculture.

Wetland A scored 0.81 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of relatively high ecological and human value that deserves protection to the extent possible. The high score primarily reflects the wetland's natural vegetation, relatively intact hydrology, and relatively undeveloped forest setting.

3.2 WETLAND B

Wetland B is a forested wetland situated in a narrow swale immediately east of Wetland A (Figure 3-1; Photo 6). It encompasses less than 0.1 acre. Wetland conditions appear to be the result of past construction of an elevated dirt road bed across the swale without including a culvert or other feature that

allows surface water to drain from the swale to Wetland A. Wetland B is separated from Wetland A only by the dirt road bed. Wetland B lies entirely within Site 15 and was therefore delineated in its entirety.

Vegetation: Wetland B supports planted slash pine trees in rows that are part of the same grid of planted pine rows in the adjoining uplands. Most of the pines are under 6 inches DBH. Pines closest to the western (down-gradient) part of the swale appear to have been stressed by excessive soil saturation, and a gap in the pine canopy in that part of the wetland supports a dense and diverse patch of herbaceous vegetation (Appendix A, Data Point 15B-1-1) (Photo 7). The herbaceous vegetation includes plants of the genera *Rhynchospora*, *Iris*, and others.

Soils: Soils in the vicinity of Wetland B (including the surrounding uplands) are mapped as Ridgeland fine sand and as Olustee fine sand. The Ridgeland fine sand is described as a nearly level, poorly drained soil in broad flatwood areas. The typical soil profile is described as including a 6-inch surface layer (topsoil) of very dark gray fine sand. The upper part of the subsoil is described as a dark brown fine sand extending from 6 to 16 inches below the surface. Below the upper subsoil is a 15-inch thick layer described as very pale brown fine sand. The lower part of the subsoil, extending to a depth of 80 inches beneath the surface, is described as dark reddish brown and black fine sand (SCS, 1978).

The Olustee fine sand is described as a nearly level, poorly drained soil in broad flatwood areas. The typical soil profile is described as including a 6-inch surface layer (topsoil) of black fine sand. The upper part of the subsoil is described as consisting of a 5-inch layer of very dark gray fine sand overlying a 10-inch layer of black fine sand. Below the upper subsoil is a 15-inch layer of gray fine sand. The lower part of the subsoil (between 36 and 54 inches below the surface) is described as gray sandy clay loam. Under natural conditions, the water table is described as occurring at a depth of less than 10 inches below the surface for 2 to 4 months and at a depth of 10 to 30 inches below the surface for 2 to 8 months in a normal year (SCS, 1978).

Soils observed in Wetland B during the wetland delineation displayed a roughly 3-inch surface layer of very dark gray (2.5Y 3/1) fine sand overlying more than 15 inches of dark grayish brown (2.5Y 4/2) fine sand (Appendix A, Data Point 15B-1-1). This is generally consistent with the upper part of the typical soil profile described for the Ridgeland fine sand soils (SCS, 1978). However, the shallow thickness of the dark surface layer and the absence of distinctly black or gray coloration in the upper subsoil suggest a history of better drainage than is expected for Ridgeland soils. The soil profile in Wetland B is not as visibly suggestive of hydric soils as are the soil profiles observed in the larger wetlands on Site 15 (i.e., Wetlands A, C, and D). Wetland B may not have historically been a wetland. Its wetland characteristics appear to instead be the result of runoff ponded by the adjoining roadbed. However, any soils that are ponded for a long or very long duration during the growing season still meet the technical definition of hydric soils used by Florida and

federal agencies. Thus, the soils in Wetland B still appear to be hydric, despite the weak evidence provided by the soil profile. The soil profile in the adjoining upland soils (Appendix A, Data Point 15B-1-2) generally appeared similar to that in the wetland, but is even less suggestive of hydric soil.

Hydrology: The soil surface was saturated in the downgradient (northern) part of Wetland B at the time of the wetland delineation (Appendix A, Data Point 15B-1-1). Watermarks on the trunks of pine trees in the remainder of Wetland B (faintly visible in Photo 6) suggest that ponded water is periodically present throughout the wetland. Wetland B appears to be the result of localized ponding of surface runoff caused by the adjoining roadbed rather than the result of a seasonal high water table. The soil surface outside of the delineated wetland boundary was not saturated at the time of the wetland delineation, and the trunks of pine trees outside of the delineated wetland boundary did not display evidence of water marks.

Classification: Wetland B meets both the federal and Florida criteria for a wetland. Wetland B would be classified as Palustrine Forested (PFO). The Palustrine system is described by the FWS as consisting of nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (as well as tidal wetlands whose salinity is less than 0.5 parts per thousand) (Cowardin et al., 1979).

Functions and Values: Groundwater recharge and discharge are not key issues in northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast. Wetland B lacks and is not contiguous to open water, thus it does not play a role in sediment and shoreline stabilization.

The dense understory in much of Wetland B may enable it to retain sediments and toxicants. The vegetation may have helped reduce the entry of some toxicants originating in areas to the south (upgradient) from migrating in runoff to Wetland A. However, the watershed contributing runoff to Wetland A is completely forested; thus, the ability of the wetland to trap sediment and nutrients is likely of little importance. Wetland B is too small and lacks a direct surface outlet to other wetlands and water; therefore it does not likely play a significant role with respect to production export.

Although the diverse vegetation in Wetland B could provide quality habitat for some wildlife, the wetland's small size and proximity of several larger wetlands (including Wetland A) could render it of little importance as wildlife habitat (wildlife diversity/abundance function). Because Wetland B lacks permanent open water, it does not directly provide substantial aquatic habitat (aquatic diversity/abundance function).

Although most wetlands on Site 15 could be of substantial importance with respect to each of the wetland values noted in Table 2-4, its small size and artificial origin likely render its contribution insignificant.

Wetland B scored 0.61 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of mediocre ecological and human value, but still a habitat deserving of protection to the extent possible. The lower score relative to that for Wetland A primarily reflects its artificial hydrology (runoff impounded by man-made road bed) and dominance by planted pine.

3.3 WETLAND C

Wetland C is a forested wetland situated in the south-central part of Site 15 (Figure 3-3; Photo 8). Wetland C comprises the northern edge of a broad wetland area associated with the headwaters of an unnamed tributary to Yellow Water Creek. Because Wetland C is located on the southern edge of Site 15, only the northern boundary of the wetland was delineated. The wetland extends southward for an undetermined distance and is contiguous to large areas of undelineated wetlands adjoining the unnamed tributary.

Vegetation: Vegetation in the northern part of Wetland C (that part addressed in the wetland delineation for Site 15) is dominated by slash pine, a needle-leaved evergreen tree. Many of the slash pines are 12 to 18 inches DBH. In contrast to pine-dominated vegetation in Wetlands A and B, pond cypress does not occur in the northern part of Wetland C, but black gum (*Nyssa sylvatica*) occurs frequently in the canopy and subcanopy. The subcanopy generally resembles that described for Wetland A. The groundcover is characterized by scattered patches of cinnamon fern and Virginia chain fern. The vegetation in Wetland C appears to correspond to SAF Forest Cover Type 84, Slash Pine Forest (Eyre, 1980), which is described above in Section 3.1 for Wetland A.

The northern boundary of Wetland C (upper part of Photo 8) generally corresponds to the southern edge of a large upland clearcut occupying much of the central part of Site 15. The clearcut (overview in Photo 9) consists of a dense cover of slash pine and hardwood seedlings, gallberries and myrtles (shrubs), patches of blackberry (*Rubus* sp.), and herbaceous old field vegetation.

All of the dominant plant species in Wetland C are assigned indicator statuses of OBL, FACW, or FAC for the southeastern United States by the FWS, and hence the vegetation is hydrophytic according to the Federal criteria. The State of Florida considers slash pine, which is dominant in the canopy, to be an UPL species. However, the canopy and subcanopy vegetation has been substantially altered by past forest management activities. Reasonable scientific judgment suggests that the vegetation is indicative of wetlands, considering the frequency of FACW and OBL fern species in the groundcover and the ability of slash pine and gallberry to grow in wetland as well as upland conditions.

Soils: Soils in the vicinity of Wetland C (including the surrounding uplands) are mapped as Olustee fine sand, which is described as a nearly level, poorly drained soil in broad flatwood areas. The typical soil profile is described as including a 6-inch surface layer (topsoil) of black fine sand. The upper part of the subsoil is described as consisting of a 5-inch layer of very dark gray fine sand overlying a 10-inch layer of black fine sand. Below the upper subsoil is a 15-inch layer of gray fine sand. The lower part of the subsoil (between 36 and 54 inches below the surface) is described as gray sandy clay loam. Under natural conditions, the water table is described as occurring at a depth of less than 10 inches below the surface for 2 to 4 months and at a depth of 10 to 30 inches below the surface for 2 to 8 months in a normal year (SCS, 1978).

Soils observed in the wetland during the wetland delineation (Appendix A, Data Point 15C-1-1) displayed a roughly 3-inch surface layer of black (2.5Y 2.5/1) fine sand overlying more than 15 inches of gray and black (polychromatic mixture of 2.5Y 5/1 and 2.5Y 2.5/1) fine sand. This is generally consistent with the upper part of the typical soil profile description for an Olustee fine sand. The dark surface layer reflects a high organic content, which (for a sandy soil) is one of the Federal hydric soil field indicators presented in the 1987 Manual. The dark surface layer is also one of the field indicators of hydric soil recognized by the FDEP (Field Indicator S7).

The upper part of the soil profile in the adjoining uplands (Appendix A, Data Point 15C-1-2) was generally similar but included a narrow band of very dark grayish brown soils (2.5Y 3/2) at an approximate depth of 3 to 8 inches. The transition from a hydric to clearly non-hydric soil morphology is very gradual. This observation is consistent with the fact that the entire landscape surrounding Wetland C is mapped in the poorly drained Olustee and Ridgeland soil series, including areas that clearly display upland vegetation and/or hydrology.

Hydrology: Soils were saturated to the surface throughout Wetland C at the time of the wetland delineation. The observed depth to the water table at the northern edge of the wetland (Appendix A, Data Point 15C-1-1) was 3 inches below the surface. The capillary fringe was keeping the surface saturated. As explained in Section 3.1 in the hydrology discussion for Wetland A, the wetland delineation, which was conducted in October, clearly fell during the growing season. The visual observation of saturated surface soils at the time of the delineation supports the presence of wetland hydrology. Saturated surface soils did not extend outside of the delineated wetland boundary for Wetland C (Appendix A, Data Point 15C-1-2).

Classification: Wetland C meets both the federal and Florida criteria for a wetland. Wetland C would be classified as Palustrine Forested (PFO). The Palustrine system is described by the FWS as consisting of nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (as well as tidal wetlands whose salinity is less than 0.5 parts per thousand) (Cowardin et al., 1979).

Functions and Values: Groundwater recharge and discharge are not key issues in inland areas of northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast. Wetland A lacks and is not contiguous to open water, thus it does not play a role in sediment and shoreline stabilization.

The dense understory in Wetland C helps enable it to effectively retain sediments and toxicants. The vegetation may have helped toxicants related to Site 15's history from migrating offsite and into the tributary to Caldwell Creek. However, the watershed contributing runoff to Wetland C is completely forested; thus, the ability of the wetland to trap sediment and nutrients is likely of little importance. The dense and diverse vegetation in Wetland C and its surface connection to a tributary of Caldwell Creek suggest a possible role with respect to production export.

The diverse vegetation in, and minimal human disturbance of, Wetland C and the surrounding uplands suggest that the wetland may provide good wildlife habitat (wildlife diversity/abundance function). Because Wetland C lacks open water, it does not directly provide aquatic habitat (aquatic diversity/abundance function), but its production export function likely contributes to the quality of aquatic habitat in the tributary of Caldwell Creek.

Wetland C appears to be of substantial importance with respect to each of the four wetland values noted in Table 2-4. Once Site 15 is successfully cleaned up, it and the surrounding area could be opened to the public and provide valuable opportunities for hiking, bird watching, and perhaps hunting to residents of nearby urban areas. As urban areas in the City of Jacksonville expand westward, the complex of natural wetlands and uplands on and around Site 15 (including Wetland C) could be of increasing importance with respect to uniqueness/heritage, educational/ scientific value, and visual quality/aesthetics. The aesthetics and educational importance of Wetland A are strengthened by the fact that the adjoining uplands and up-gradient watershed are almost completely forested rather than used for urban uses or agriculture.

Wetland C scored 0.81 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of relatively high ecological and human value that deserves protection to the extent possible. The high score primarily reflects the wetland's natural vegetation, relatively intact hydrology, and relatively undeveloped forest setting.

3.4 WETLAND D

Wetland D is a forested wetland situated in the southeast part of Site 15 (Figure 3-2; Photo 10). It is a roughly ovular depression suggestive of a small cypress dome, although the characteristic cypress-

dominated vegetation has been altered by past logging and pine planting activity. Wetland D lies entirely within Site 15 and therefore its entire boundary was delineated.

Vegetation: Vegetation throughout most of Wetland D consists of a sparse stand of widely scattered pond cypress with occasional slash pine saplings (Photo 10; Appendix A, Data Point 15D-1-1). All trees are under 6 inches DBH. Understory and groundcover vegetation is sparse to absent throughout most of the wetland. Vegetation in the southwestern quadrant of Wetland D; southwest of an imaginary line connecting wetland boundary flags 15-D-21 and 15-D-29 in Figure 3-2); generally resembles that described for Wetland A (Photo 11; Appendix A, Data Point 15D-2-1). It is dominated by mature slash pine trees, generally between 6 and 18 inches DBH, with scattered pond cypress saplings and dense understory and groundcover vegetation.

Vegetation in Wetland D is suggestive of a cypress dome that has been disturbed by logging and planting of slash pine. The few slash pines in the main part of Wetland D occur in rows suggestive of planting (Photo 12). Unlike in the adjoining uplands, the planted slash pines appear to be struggling, apparently stressed by inundated soil conditions suggested by watermarks on the bases of the tree trunks (see hydrology discussion below). It is not apparent why the pines in the southwestern quadrant of the wetland appear to be older, spared from recent logging activity. It is not clear whether the vegetation throughout Wetland D historically resembled that in the southwestern quadrant prior to logging or whether Wetland D once supported a stand of mature pond cypress.

Vegetation in the uplands adjoining Wetland D consists of rows of planted slash pine with a dense understory of saw palmetto. In contrast to the wetlands, most of the slash pine in the uplands is less than 8 inches DBH. As is true for Wetland A, the saw palmetto understory terminates abruptly close to the delineated wetland boundary, and its presence is the most visible contrast between the upland and wetland vegetation. Pond cypress occurs only inside the wetland boundary. The dense patches of fern groundcover occur primarily within the wetland boundary although a few small patches, especially of cinnamon fern, occur in isolated locations in the uplands.

The vegetation in the southwest quadrant of Wetland D appears to correspond to SAF Forest Cover Type 84, Slash Pine Forest (Eyre, 1980), which is described above in Section 3.1 for Wetland A. The vegetation in main part of Wetland D has been substantially disturbed and does not clearly resemble a particular forest cover type. It could be characterized as a disturbed example of either SAF Forest Cover Type 84 (Slash Pine Forest) or SAF Forest Cover Type 100 (Pondcypress Forest), which is described as forest vegetation dominated by pondcypress (Eyre, 1980).

All of the dominant plant species in Wetland A are assigned indicator statuses of OBL, FACW, or FAC for the southeastern United States by the FWS (Appendix A, Data Points 15D-1-1 and 15D-2-1), and hence the vegetation is hydrophytic according to the Federal criteria. The frequent occurrence of pond cypress knees, a morphological plant adaptation to wet conditions, supports the hydrophytic status of the vegetation. Most of the dominant species in the adjoining upland vegetation are FACW (Appendix A, Data Points 15D-1-3, 15D-1-4, and 15D-2-3), and thus that vegetation also technically meets the minimum Federal criteria for hydrophytic vegetation. However, the dense undergrowth by saw palmetto, an UPL plant that favors well-drained soils, and the absence of morphological plant adaptations suggests that the upland vegetation does not meet the intent of the federal definition of hydrophytic vegetation.

The State of Florida considers slash pine, which is dominant in the canopy, to be an UPL species. However, the canopy and subcanopy vegetation has been substantially altered by past forest management activities. Reasonable scientific judgment suggests that the vegetation is indicative of wetlands, considering the frequency of FACW and OBL fern species in the groundcover, the presence of morphological plant adaptations, and the ability of slash pine and gallberry to grow in wetland as well as upland conditions.

Soils: Soils in the vicinity of Wetland D (including the surrounding uplands) are mapped as Ridgeland fine sand, which is described as a nearly level, poorly drained soil in broad flatwood areas. The typical soil profile is described as including a 6-inch surface layer (topsoil) of very dark gray fine sand. The upper part of the subsoil is described as a dark brown fine sand extending from 6 to 16 inches below the surface. Below the upper subsoil is a 15-inch thick layer described as very pale brown fine sand. The lower part of the subsoil, extending to a depth of 80 inches beneath the surface, is described as dark reddish brown and black fine sand (SCS, 1978).

Soils observed in the wetland during the wetland delineation (Appendix A, Data Point 15D-1-1) displayed a roughly 2-inch surface layer of black (2.5Y 2.5/1) fine sand overlying more than 16 inches of dark gray (2.5Y 4/1) fine sand with streaks of very dark gray (2.5Y 3/1) fine sand. This is perhaps more consistent with the upper part of the typical soil profile description for an Olustee fine sand (see soils discussion for Wetland B), but is still clearly suggestive of a poorly drained soil. Soils in the southwestern quadrant of Wetland D displayed a generally similar soil profile (Appendix A, Data Point 15D-2-1). The dark surface layer reflects a high organic content, which (for a sandy soil) is one of the Federal hydric soil field indicators presented in the 1987 Manual. The dark surface layer is also one of the field indicators of hydric soil recognized by the FDEP (Field Indicator S7).

The upper part of the soil profile in the adjoining uplands did not greatly differ from that in the wetlands. The placement of the delineated wetland boundary generally reflects changes in vegetation and observed hydrological field indicators rather than changes in soil characteristics.

The adjoining upland soils (Appendix A, Data Points 15D-1-3 and 15D-2-3) displayed a generally similar soil profile to the soils in the wetland, and therefore also displayed similar Federal and Florida field indicators for hydric soils. The transition from hydric to clearly non-hydric soil morphology is obviously very gradual. This observation is consistent with the fact that the entire landscape surrounding Wetland D is mapped in the poorly drained Olustee and Ridgeland soil series, including areas that clearly display upland vegetation and/or hydrology.

Hydrology: Soils were saturated to the surface throughout Wetland D at the time of the wetland delineation. The observed depth to the water table at the outer edge of the wetland (Appendix A, Data Points 15D-1-1 and 15D-2-1) was 5-7 inches below the surface. The capillary fringe was keeping the surface saturated.

Classification: Wetland D meets both the federal and Florida criteria for a wetland. Wetland D would be classified as Palustrine Forested (PFO). The Palustrine system is described by the FWS as consisting of nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (as well as tidal wetlands whose salinity is less than 0.5 parts per thousand) (Cowardin et al., 1979).

Functions and Values: Groundwater recharge and discharge are not key issues in inland areas of northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast. Wetland A lacks and is not contiguous to open water, thus it does not play a role in sediment and shoreline stabilization.

Unlike Wetlands A and C, most of Wetland D lacks a dense understory, and thus it could lack the capability to effectively retain sediments and toxicants, and it could possess a reduced capability to contribute to production export. It is unclear why a dense understory (at least one comprised of plant seedlings) is not present or whether a dense understory will result from natural succession. However, as for Wetlands A and C, the watershed contributing runoff to Wetland D is completely forested; thus, the ability of the wetland to trap sediment and nutrients could be of little importance.

The diverse vegetation in the surrounding uplands suggest that Wetland D could provide good wildlife habitat (wildlife diversity/abundance function), but the sparse understory suggests that the value of the wetland to wildlife could be less than that of Wetlands A and C. Because Wetland D lacks permanent open water, it does not directly provide substantial aquatic habitat (aquatic diversity/abundance function).

Wetland D appears to be of substantial importance with respect to each of the four wetland values noted in Table 2-4. Once Site 15 is successfully cleaned up, it and the surrounding area could be opened to the public and provide valuable opportunities for hiking, bird watching, and perhaps hunting to residents of nearby urban areas. As urban areas in the City of Jacksonville expand westward, the complex of natural wetlands and uplands on and around Site 15 (including Wetland D) could be of increasing importance with respect to uniqueness/heritage, educational/ scientific value, and visual quality/aesthetics. The aesthetics and educational importance of Wetland D are strengthened by the fact that the adjoining uplands and up-gradient watershed are almost completely forested rather than used for urban uses or agriculture.

Wetland D scored 0.67 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of mediocre ecological and human value, but still a habitat deserving of protection to the extent possible. The lower score relative to that for Wetlands A and C primarily reflect the substantially sparser vegetation.

3.5 WETLAND E

Wetland E is a drainage ditch roughly 10 to 20 feet in width beginning just northwest of Wetland D and proceeding directly south (Figure 3-2; Photo 13). The ditch is a headwater of the unnamed tributary of Yellow Water Creek associated with Wetland C. The ditch is straight and of generally uniform width, suggesting that it is of man-made origin. It is between 5 and 15 feet wide on Site 15 and its banks are between 6 inches and 2 feet in height. It may have been dug to help drain Wetland D to facilitate the growth of planted pine. A segment of the ditch extending north from the asphalt access road to the ditch terminus north of Wetland D were delineated. That part of the ditch south of the asphalt access road is located outside of Site 15 and hence was not delineated.

Vegetation: Vegetative cover in the ditch is influenced by the shade of slash pines growing on the banks and adjoining uplands and therefore is generally sparse. Most of the plants that do grow in the ditch are FACW or OBL according to Federal and Florida criteria (Appendix A, Data Point 15E-1-1). It is therefore reasonable scientific judgment to conclude that the vegetation within the ditch is hydrophytic.

Soils: Soils were not a consideration in the delineation of Wetland E, which is a sharply defined drainage ditch. Because saturated and inundated conditions were observed in the ditch during the growing season, it is reasonable scientific judgment to assume that the soils in the ditch meet one of the following two technical criteria for hydric soil established by the Natural Resources Conservation Service (NRCS):

- Soils that are frequently ponded for long duration or very long duration during the growing season,

or

- Soils that are frequently flooded for long duration or very long duration during the growing season.

The NRCS further defines "frequently" with respect to ponding or flooding as an event likely to occur often under usual weather conditions (more than 50 percent chance in any year, or more than 50 times in 100 years).

Hydrology: Portions of the ditch were saturated at the time of the wetland delineation, and portions contained as much as an inch of standing water. Considering the typical regional precipitation patterns (discussed for hydrology for Wetland A in Section 3.1), it is reasonable scientific judgment to assume that the ditch possesses wetland hydrology.

Classification: Wetland E meets the criteria for federal regulation as a water of the United States (as defined in 33 CFR 328) and the criteria for Florida regulation as a surface water (as defined in Section 62-340.600 F.A.C.). Waters of the United States and Florida surface waters are regulated in a manner generally similar to wetlands even though they lack the persistent vegetation typical of wetlands. Wetland E would be classified as Riverine Intermittent (R4). The Riverine system is described by the FWS as consisting of wetlands and deepwater habitats contained within a channel, except for wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens and for habitats with water containing ocean-derived salts in excess of 0.5 parts per thousand (Cowardin et al., 1979). Although the most applicable of the FWS classifications, Wetland E is a man-made drainage ditch that lacks many of the characteristics of natural intermittent streams.

Functions and Values: Because Wetland E is a man-made drainage ditch rather than a natural wetland, it does not display most of the functions and values typical of natural wetlands. As is true for the other Site 15 wetlands, groundwater recharge and discharge are not key issues in northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast.

The upland vegetation on the embankments to Wetland E could play a role in stabilizing the embankments and reducing sedimentation entering the ditch and hence the natural streams ultimately receiving flow from the ditch. The same is true for areas within the ditch that contain vegetation. However, the presence of the ditch as opposed to natural uplands can not be credited with playing a significant regional role with respect to sediment and shoreline stabilization.

Wetland E lacks dense vegetation, and thus it could lack the capability to effectively retain sediments and toxicants or to provide substantial production export. Other surface water features are abundant in the area, hence Wetland E does not likely serve as an important drinking water source for terrestrial wildlife.

Wetland E could provide habitat for some aquatic organisms (primarily benthos or small fish), but its narrow width and artificial character likely render it insignificant as aquatic habitat. Although most wetlands on Site 15 could be of substantial importance with respect to each of the wetland values noted in Table 2-4, Wetland E's status as a man-made drainage ditch could render its contribution insignificant.

Wetland E scored 0.64 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of mediocre ecological and human value. The lower score relative to that for Wetlands A, C, and D primarily reflect the status of the wetland as an artificial drainage ditch.

3.6 WETLAND F

Wetland F consists of land at the bottom of a small man-made excavation pit measuring less than 0.1 acre situated in the southwestern part of Site 15 (Figure 3-3, Photo 14). The pit is surrounded by uplands that have been recently clearcut. The pit lacks a surface connection with other wetlands or bodies of water. The wetlands contained within the pit are therefore isolated wetlands and hence are not subject to Federal jurisdiction under Section 404 of the Clean Water Act. The pit lies entirely within Site 15 and thus its entire boundary was delineated.

Vegetation: Vegetation within lands at the bottom of the pit is variable but consists of species typical of wetlands such as willow (*Salix* sp.) and beakrushes (*Rhynchospora* sp.) (Appendix A, Data Point 15F-1-1). All willow species are designated by Florida as OBL, and most beakrush species are designated by Florida as OBL or FACW.

Soils: Soils were not a consideration in the delineation of Wetland F, which consists of the bottom of a small, sharply defined man-made excavation pit. Because saturated and inundated conditions were observed in the bottom of the pit during the growing season, it is reasonable scientific judgment to assume that the soils in the bottom of the pit meet one of the following two technical criteria for hydric soil established by the NRCS:

- Soils that are frequently ponded for long duration or very long duration during the growing season,

or

- Soils that are frequently flooded for long duration or very long duration during the growing season.

The NRCS further defines "frequently" with respect to ponding or flooding as an event likely to occur often under usual weather conditions (more than 50 percent chance in any year, or more than 50 times in 100 years).

Hydrology: Portions of the bottom of the pit were saturated at the time of the wetland delineation, and portions contained as much as an inch of standing water. Considering the typical regional precipitation

patterns (discussed for hydrology for Wetland A in Section 3.1), it is reasonable scientific judgment to assume that the bottom of the pit possesses wetland hydrology.

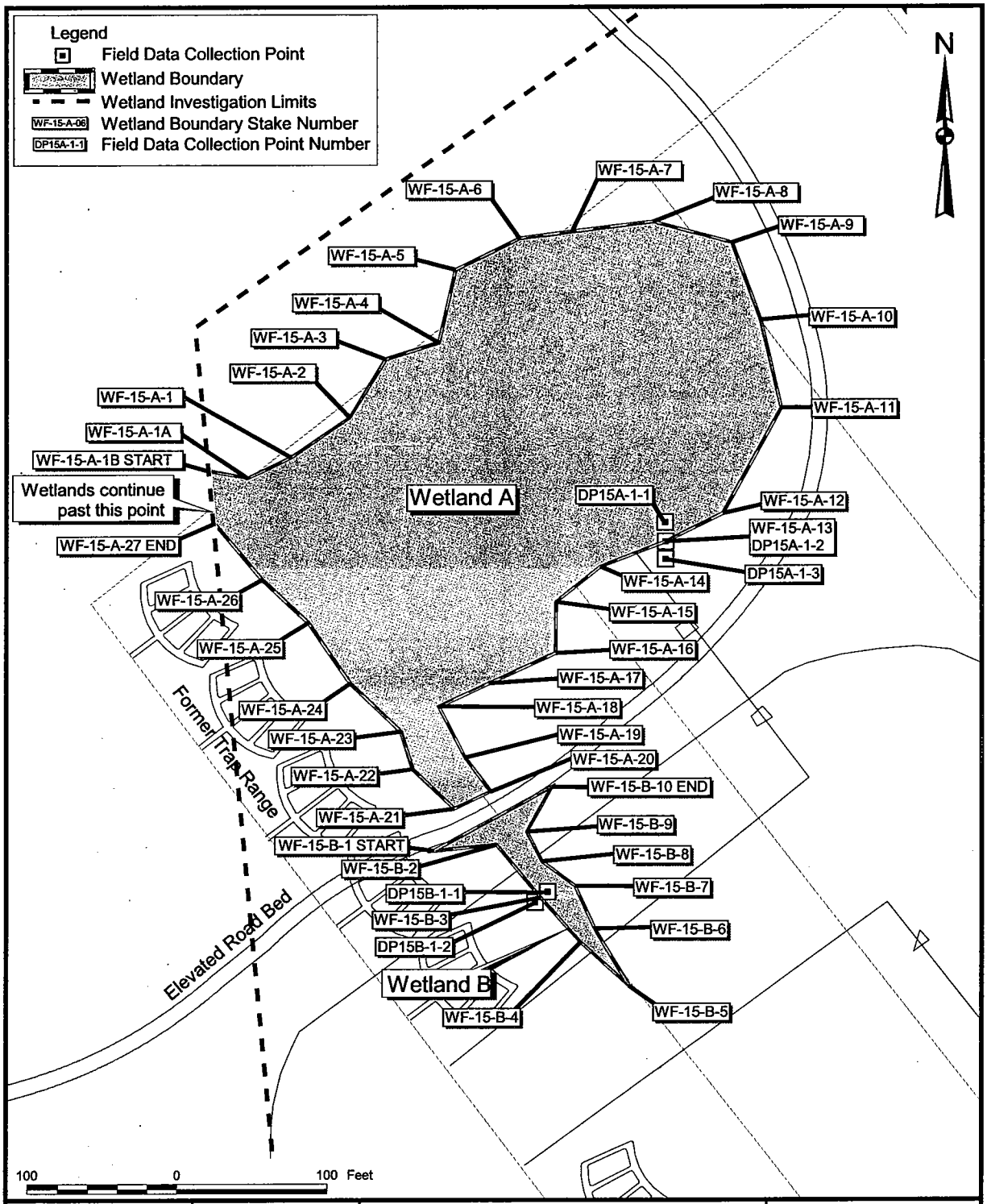
Classification: Wetland F meets both the federal and Florida criteria for a wetland. However, unlike the other wetlands on Site 15, Wetland F lacks a surface connection to tributaries to navigable waters of the United States. It therefore is not subject to federal regulation under Section 404 of the Clean Water Act even though it meets the definition of a wetland. Wetland F is still regulated by Florida, whose regulations do not exclude regulation of isolated wetlands.

Wetland F would be classified as Palustrine Emergent (PFO). The Palustrine system is described by the FWS as consisting of nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens (as well as tidal wetlands whose salinity is less than 0.5 parts per thousand) (Cowardin et al., 1979).

Functions and Values: Because Wetland F is a small man-made excavation pit rather than a natural wetland, it does not display most of the functions and values typical of natural wetlands. As is true for the other Site 15 wetlands, groundwater recharge and discharge are not key issues in northern Florida, which has abundant precipitation and extensive areas of surface water. Flooding, which can be reduced by the presence of wetlands, is likewise not a key issue in inland areas of northern Florida, considering the nearly level topography and substantial distance from the coast. The pit does not contain or adjoin open water, thus it does not play a in sediment and shoreline stabilization. Because of the small size of the pit, it does not likely contribute substantially to detaining surface runoff and hence does not likely play a significant role with respect to sediment/toxicant retention or nutrient removal/transformation. Because the pit is hydrologically isolated from other wetlands and surface water features, it may not substantially contribute to production export.

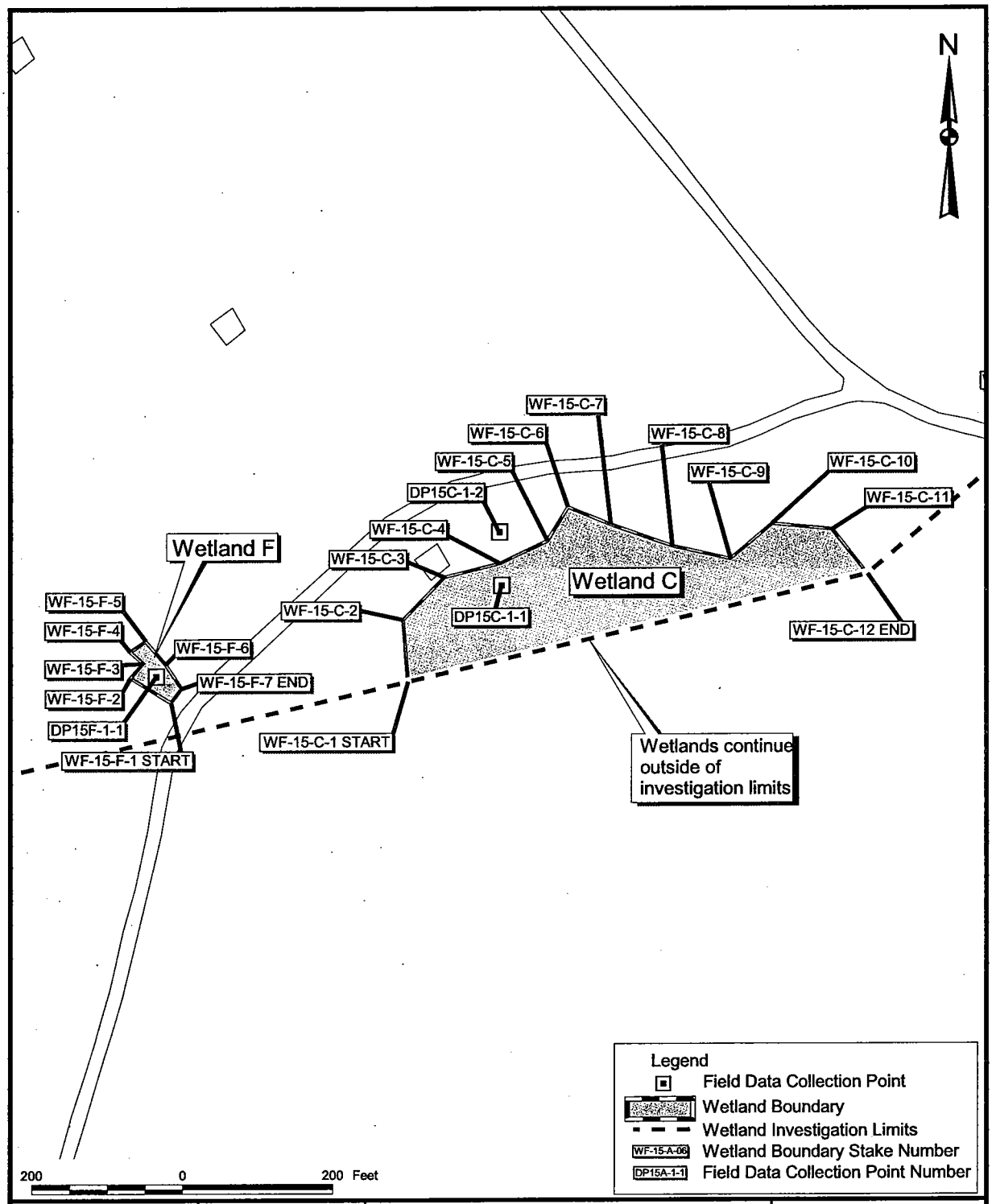
Other surface water features are abundant in the area, hence Wetland F does not likely serve as an important drinking water source for terrestrial wildlife. Wetland F does not contain permanent standing water and therefore does not provide aquatic habitat. Although most wetlands on Site 15 could be of substantial importance with respect to each of the wetland values considered, Wetland F's status as a man-made excavation pit could render its contribution insignificant.

Wetland F scored 0.58 (out of a possible 1.00) using WRAP (Appendix B). This score suggests a wetland of mediocre ecological and human value. The lower score relative to that for Wetlands A, C, and D primarily reflect the status of the wetland as a small man-made excavation pit.



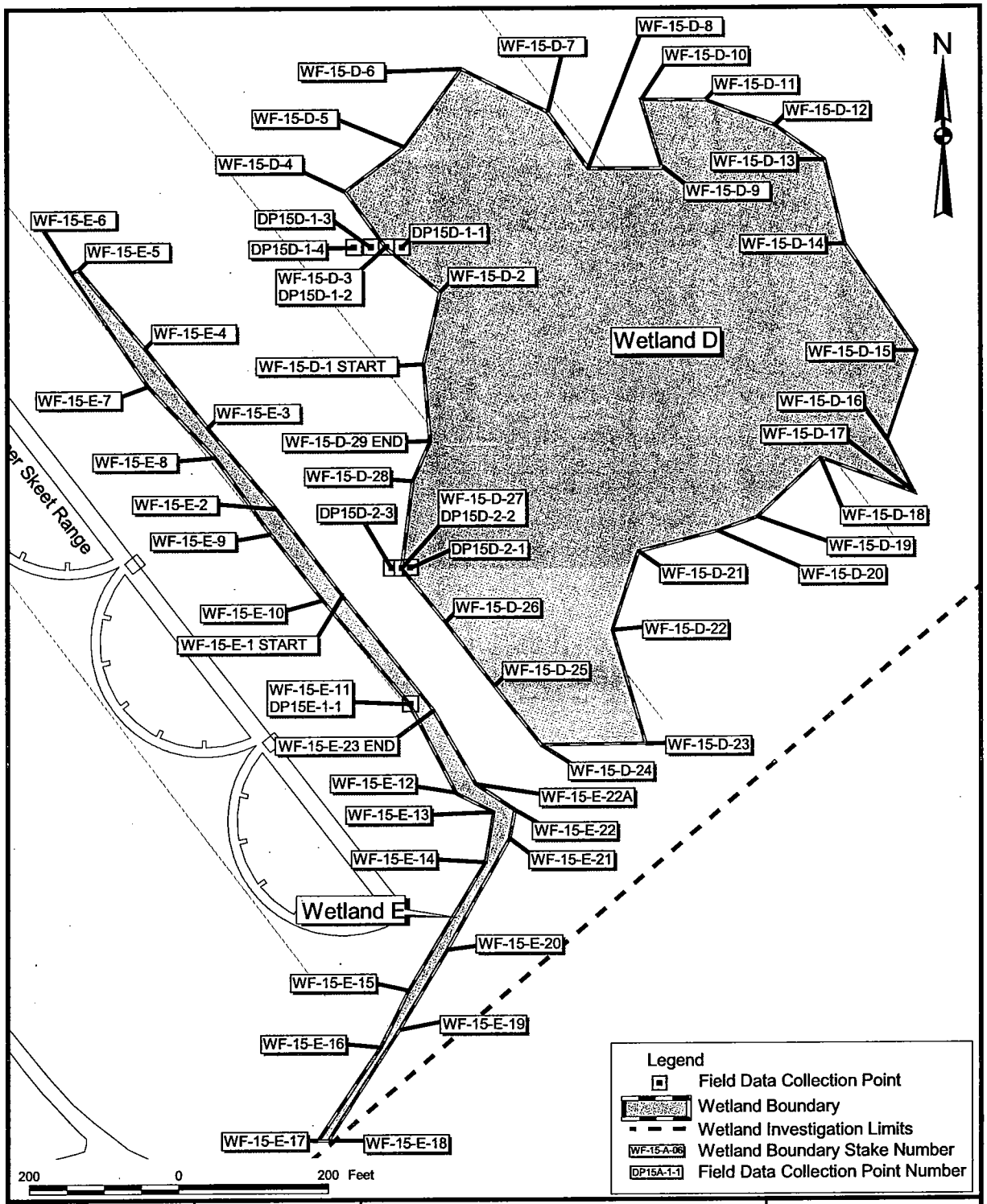
DRAWN BY MJJ	DATE 04Dec03	WETLAND DELINEATION MAP NORTHERN PART OF SITE 15 OU 5, SITE 15 WETLAND DELINEATION REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-1 REV 0

P:\GIS\Cecil\Site-15_Wwetlands.apr 16Dec03 MJJ 02-Layout



DRAWN BY MJJ	DATE 04Dec03	WETLAND DELINEATION MAP SOUTHERN PART OF SITE 15 OU 5, SITE 15 WETLAND DELINEATION REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-2 REV 0

P:\GIS\Cecil\Site-15_Wwetlands.apr 16Dec03 MJJ 04-Layout



DRAWN BY MJJ	DATE 04Dec03	WETLAND DELINEATION MAP SOUTHEASTERN PART OF SITE 15 OU 5, SITE 15 WETLAND DELINEATION REPORT NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-3 / REV 0

P:\GIS\Cecil\Site-15_Wwetlands.apr 16Dec03 MJJ 03-Layout

4.0 SUMMARY

Six areas on NAS Cecil Field IR Program Site 15 meet the Federal technical criteria recognized by the U.S. EPA and COE for delineation as wetlands. These areas are designated as Wetlands A, B, C, D, E, and F and are depicted in Figures 3-1, 3-2, and 3-3. All are non-tidal, freshwater wetlands. Wetlands A, C, D, and E possess surface connections to tributaries that ultimately discharge into navigable waters of the United States and thus are "adjacent" wetlands subject to regulation under Section 404 of the Clean Water Act. Wetland B is separated from Wetland A and its connection to navigable waters by a narrow road bed and thus would likely to be regarded by U.S. EPA and COE as an "adjacent" wetland subject to Section 404 jurisdiction. Wetland F is contained within a small excavated pit situated more than 50 feet from the nearest wetland or other surface water. The U.S. EPA and COE would therefore regard Wetland F as an "isolated" wetland not under Section 404 jurisdiction.

All of the wetlands delineated on Site 15 meet the delineation 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.). Although the wetland delineation methodology recognized by FDEP and St. Johns River Water Management District differs from that recognized by the U.S. EPA and COE, the different methodologies result in a substantially similar sequence of wetland boundaries on Site 15. In contrast to Section 404, the Florida statutes for wetland protection do not distinguish between "adjacent" and "isolated" wetlands. Therefore, impacts to Wetland F as well as impacts to Wetlands A, B, C, D, and E are subject to Florida jurisdiction.

The three largest wetlands delineated on Site 15 (Wetlands A, C, and D) appear to be wetlands of natural origin. All appear to provide good habitat for terrestrial wildlife and could play substantial roles in exporting nutrients and prey sources (production export) to down-gradient aquatic habitats in tributaries to Yellow Water Creek. All could be of substantial value as natural features of aesthetic and scientific value should Site 15 and surrounding lands ever be opened to the public. Efforts to minimize disturbance of these three wetland features during the remediation of Site 15 are recommended, as are efforts to restore in place (*in situ*) any areas that must be disturbed to satisfactorily accomplish the remedial action objectives.

The three smaller wetlands (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 than are Wetlands A, C, and D. Wetland B appears to be the result of ponded water resulting from a man-made road bed. Wetland E appears to be a man-made drainage ditch, and Wetland F is a man-made excavation pit. Although these smaller, man-made wetlands are still subject to federal and/or state regulation, extraordinary efforts to minimize their disturbance or to restore the wetlands *in situ* are not recommended.

REFERENCES

ABB-ES (ABB-Environmental Services), 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

Adamus, P. R., L. T. Stockwell, E. J. Clairain, Jr., M. E. Morrow, L. P. Rozas, and R. D. Smith, 1991. *Wetland Evaluation Technique (WET); Volume I: Literature Review and Evaluation Rationale.* Technical Report WRP-DE-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

COE (U.S. Army Corps of Engineers), 1992. Memorandum dated March 6, 1992 from A. E. Williams, Major General, USA, Directorate of Civil Works, concerning clarification and interpretation of the 1987 Manual.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe, 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* FWS/OBS-79/31, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, DC.

DeSanto, R. S. and T. A. Flieger, 1995. *Wetland Functions and Values: Descriptive Approach to Visualizing and Assessing Wetland Systems.* Transportation Research Record 1475, Transportation Research Board, National Research Council, Washington, DC.

Environmental Laboratory, 1987. *Corps of Engineers Wetlands Delineation Manual.* Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Eyre, F. H., 1980. *Forest Cover Types of the United States and Canada.* Society of American Foresters, Washington, DC.

FDEP (Florida Department of Environmental Protection), 1994. The Florida Wetland Delineation Manual. Prepared in cooperation with the South Florida Water Management District, St. Johns River Water Management District, Suwannee River Water Management District, Southwest Florida Water Management District, and Northwest Florida Water Management District.

FDEP, 2003. Delineation Program – Hydric Soils of Florida. http://www.dep.state.fl.us/water/wetlands/delineation/soilwatr.htm, updated 06/30/03.

FICWD (Federal Interagency Committee for Wetland Delineation), 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, and USDA Soil Conservation Service. Cooperative technical publication.

Miller, R. E. and B. E. Gunsalus, 1999. Wetland Rapid Assessment Procedure (WRAP). Technical Publication REG-001, Natural Resource Management Division, Regulation Department, South Florida Water Management District. Updated August.

NRCS (Natural Resources Conservation Service), 1998. *Field Indicators of Hydric Soils in the United States*, Version 4.0. March.

Reed, P. B., Jr., 1988. *National List of Plant Species that Occur in Wetlands: National Summary.* U.S. Fish and Wildlife Service Biol. Rep. 88(24), U.S. Department of the Interior, Fish & Wildlife Service, Washington, DC.

SCS (U.S. Soil Conservation Service), 1978. *Soil Survey of City of Jacksonville, Duval County, Florida.* U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Florida, Institute of Food and Agricultural Sciences and Agricultural Experiment Stations, Soil Science Department.

TtNUS (Tetra Tech NUS, Inc.), 2003. Health and Safety Plan for Groundwater Monitoring and Wetland Delineation, Operable Unit 5, Site 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina. September.

Weather Underground, 2003. History for Jacksonville, Florida. http://www.wunderground.com/history/airport/KJAX/2003/10/1/DailyHistory.html.

World Weather Information Service, 2003. Weather Information for Jacksonville, Florida. http://www.worldweather.org/093/c00774f.htm.

APPENDIX A

WETLAND DELINEATION DATA SHEETS

DATA POINT 15A-1-1
10 FEET WETLAND (NORTH) OF STAKE "WET 15-A-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/02/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	WET PINE FLATWOODS (FLUCFCS CODE 620)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	A-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	1

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (40)	UPL/FACW	MYRICA CERIFERA	S (1)	FAC/FAC
ACER RUBRUM	S (7)	FACW/FAC	MYRICA CERIFERA	H (1)	FAC/FAC
PINUS ELLIOTTII	S (5)	UPL/FACW			
MAGNOLIA VIRGINIANA	S (5)	OBL/FACW			
SERENOA REPENS	S (5)	UPL/UPL			
ILEX GLABRA	H (20)	UPL/FACW			
OSMUNDA CINNAMOMEA	H (20)	FACW/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100 (BASED ON CANOPY) FWS: 100 (ALL STRATA)

Remarks: HYDROPHYTIC VEGETATION. HERBACEOUS GROUNDCOVER USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE AND SUBCANOPY IS STRONGLY INFLUENCED BY PLANTED PINE. ALSO MEETS EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

____ Recorded Data (Described in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
____ Other	X Saturated in Upper 12 inches
X No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: NONE (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 6 (in.)	Secondary Indicators (2 or more required):
Depth to Saturated Soil: SURFACE (in.)	____ Oxidized Root Channels in Upper 12 inches
	X Water-Stained Leaves
	X Local Soil Survey Data
	X FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. IN ADDITION TO THE INDICATORS CHECKED ABOVE, SOIL SURFACE DISPLAYED DISTINCT VEGETATIVE HUMMOCKS. THE FOLLOWING HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE SATURATION DURING GROWING SEASON) AND (12) VEGETATED TUSSOCKS OR HUMMOCKS.

DATA POINT 15A-1-1
10 FEET WETLAND (NORTH) OF STAKE "WET 15-A-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	OLUSTEE FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes **No**

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
3-18+	A2 OR B2h	2.5Y 5/1	2.5Y 4/1	50:50	MUCKY FINE SAND
				POLYCHROMATIC	
				MATRIX	

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. FDEP HYDRIC SOIL FIELD INDICATOR S7 "DARK SURFACE".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	Yes	**No**	Is this Sampling Point Within a Wetland?	**Yes**	No
Wetland Hydrology Present?	**Yes**	No			
Hydric Soils Present?	**Yes**	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF A HYDRIC SOIL AND A HYDROLOGIC INDICATOR.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 624)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4).

DATA POINT 15A-1-2
AT STAKE "WET 15-A-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/02/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	[redacted] No	Community ID:	ECOTONE (FLUCFCS CODES 624-441)
Is the site significantly disturbed (Atypical Situation)?:	Yes [redacted]	Transect ID:	A-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes [redacted]	Plot ID:	2

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (60)	UPL/FACW	ACER RUBRUM	C (5)	FACW/FAC
ACER RUBRUM	S (10)	FACW/FAC	NYSSA SYLVATICA	C (5)	UPL/FAC
SERENOA REPENS	S (15)	UPL/UPL	QUERCUS NIGRA	S (<1)	FACW/FAC
ILEX GLABRA	H (30)	UPL/FACW	OSMUNDA CINNAMOMEA	H (5)	FACW/FACW

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 40 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: ON TRANSITION FROM AN AREA THAT MEETS FLORIDA DEFINITION OF HYDROPHYIC VEGETATION AND AN AREA THAT DOES NOT. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE. VEGETATON ON BOTH SIDES OF THIS POINT MEETS THE FEDERAL CRITERIA FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

____ Recorded Data (Described in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
____ Other	____ Saturated in Upper 12 inches
X No Recorded Data Available	____ Water Marks
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: NONE (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: 15 (in.)	Secondary Indicators (2 or more required):
Depth to Saturated Soil: 10 (in.)	____ Oxidized Root Channels in Upper 12 inches
	____ Water-Stained Leaves
	X Local Soil Survey Data
	X FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: POINT LIES ON A TRANSITION FROM WETLAND HYDROLOGY TO NON-WETLAND (UPLAND) HYDROLOGY. VEGETATED HUMMOCKS OBSERVED ONLY DOWNGRADIENT (WET SIDE) OF THIS POINT.

DATA POINT 15A-1-2
AT STAKE "WET 15-D-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	OLUSTEE FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
3-18+	A2 OR B2h	2.5Y 5/1	2.5Y 3/1 STREAKS	50:50 POLYCHROMATIC MATRIX	MUCKY FINE SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- X Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS TRANSITIONAL FROM A FLORIDA WETLAND TO A NON-WETLAND.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987). HOWEVER, IT IS IN TRANSITION TO A NON WETLAND.

FLORIDA CLASSIFICATION: ECOTONE BETWEEN FLUCFCS CODES 624 AND 441
USFWS CLASSIFICATION: ECOTONE BETWEEN PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4) WETLAND AND UPLAND (U).

DATA POINT 15A-1-3
10 FEET UPLAND (SOUTH) OF STAKE "WET 15-A-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	PINE PLANTATION (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	A-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	3

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (60)	UPL/FACW	NYSSA SYLVATICA	C (5)	FAC/FAC
SERENOA REPENS	S (50)	UPL/UPL	ACER RUBRUM	C (5)	FACW/FAC
ILEX GLABRA	H (25)	UPL/FACW	NYSSA SYLVATICA	S (5)	FAC/FAC
			MYRICA CERIFERA	H (5)	FAC/FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 0 (BASED ON SUBCANOPY) FWS: 67 (ALL STRATA)

Remarks: DOES NOT MEET FLORIDA DEFINITION OF HYDROPHYTIC VEGETATION. DOES MEET EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	15	(in.)
Depth to Saturated Soil:	10	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15A-1-3
10 FEET UPLAND (SOUTH) OF STAKE "WET 15-A-13"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	OLUSTEE FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
3-18+	A2 OR B2h	2.5Y 2.5/1	2.5Y 5/1 STREAKS	50:50 POLYCHROMATIC MATRIX	FINE SAND

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soil
- ___ Organic Streaking in Sandy Soils
- X Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS. DARK SURFACE HORIZON LESS PRONOUNCED THAN IN THE WETLANDS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	Yes	No	Is this Sampling Point Within a Wetland?	Yes	No
Wetland Hydrology Present?	Yes	No			
Hydric Soils Present?	Yes	No			

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. ALTHOUGH THE AREA DISPLAYS MARGINAL EVIDENCE OF EACH OF THE THREE FEDERAL WETLAND PARAMETERS (ENVIRONMENTAL LABORATORY, 1987), REASONABLE SCIENTIFIC JUDGEMENT SUGGESTS THAT THE AREA FUNCTIONS MORE LIKE AN UPLAND THAN A WETLAND.

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15B-1-1
10 FEET WETLAND (NORTH) OF STAKE "WET 15-B-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/02/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:		No	Community ID:	WET SWALE IN PINE PLANT. (FLUCFCS 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes		Transect ID:	B-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes		Plot ID:	1

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (5)	UPL/FACW	RHYNCHOSPORA ODORATA (?)	H (5)	FACW/OBL
ACER RUBRUM	S (10)	FACW/FAC	ACER RUBRUM	H (5)	FACW/FAC
IRIS SP.	H (25)	OBL/FACW	GALEUM TINCTORIUM (?)	H (5)	FACW/FACW
RHYNCHOSPORA TRACYI (?)	H (10)	OBL/OBL	HYPOXIS SP.	H (5)	FACW/FAC
			LYCOPUS SP.	H (5)	OBL/OBL
			DICHONDRA CAROLINENSIS	H (5)	FAC/FACW
			LINUM SP.	H (5)	FAC/FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: HYDROPHYTIC VEGETATION. SUBCANOPY IS USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE. ALSO MEETS EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

____ Recorded Data (Described in Remarks):	Wetland Hydrology Indicators:
____ Stream, Lake, or Tide Gauge	Primary Indicators:
____ Aerial Photographs	____ Inundated
____ Other	X Saturated in Upper 12 inches
X No Recorded Data Available	X Water Marks (1-2" ABOVE GROUND SURFACE)
	____ Drift Lines
Field Observations:	____ Sediment Deposits
Depth of Surface Water: NONE (in.)	____ Drainage Patterns in Wetlands
Depth to Free Water in Pit: NONE TO 20"+ (in.)	Secondary Indicators (2 or more required):
Depth to Saturated Soil: SURFACE (in.)	____ Oxidized Root Channels in Upper 12 inches
	X Water-Stained Leaves
	X Local Soil Survey Data
	X FAC-Neutral Test
	____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. SURFACE WATER APPEARS TO BE PERCHED, PERHAPS RUNOFF THAT COLLECTS IN SWALE BUT CAN NOT PASS UNDER ROADWAY (NO CULVERT OBSERVED). THE FOLLOWING HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE SATURATION DURING GROWING SEASON) AND (13) WATER MARKS.

DATA POINT 15B-1-1
10 FEET WETLAND (NORTH) OF STAKE "WET 15-B-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 3/1	NONE	N/A	MUCKY FINE SAND
3-18+	A2 OR B2h	2.5Y 4/2	NONE	N/A	FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
X	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: APPEARS TO BE A HYDRIC SOIL ONLY BECAUSE OF THE EVIDENT PONDING OF SURFACE WATER. PONDING LIKELY CAUSED BY FACT THAT ADJOINING ROADWAY WAS CONSTRUCTED ACROSS THIS SWALE WITHOUT A CULVERT OR OTHER FEATURE ALLOWING THE DOWN-GRADIENT FLOW OF SURFACE WATER.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "B" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF 80% OF PLANT COVER IN APPROPRIATE STRATUM (IN THIS CASE, THE SUBCANOPY) CONSISTING OF OBL AND FACW SPECIES VS. LESS THAN 20% OF THE PLANT COVER CONSISTING OF UPL SPECIES.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 441)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4).

DATA POINT 15B-1-2
10 FEET UPLAND (SOUTH) OF STAKE "WET 15-B-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	Yes [redacted] No	Community ID:	PINE PLANTATION (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes [redacted]	Transect ID:	B-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes [redacted]	Plot ID:	2

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (60)	UPL/FACW			
MYRICA CERIFERA	S (10)	FAC/FAC			
ACER RUBRUM	S (5)	FACW/FAC			
PTERIDIUM AQUILINUM	H (5)	UPL/UPL			
QUERCUS NIGRA	H (5)	FACW/FAC			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100 (BASED ON SUBCANOPY) FWS: 80 (ALL STRATA)

Remarks: ALTHOUGH TECHNICALLY MEETING BOTH THE FLORIDA AND FEDERAL CRITERIA FOR HYDROPHYTIC VEGETATION, THIS AREA OF PLANTED PINES WITH SPARSE UNDERSTORY APPEARS TO FUNCTION MORE AS UPLAND.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	24	(in.)
Depth to Saturated Soil:	18	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15B-1-3
10 FEET UPLAND (SOUTH) OF STAKE "WET 15-B-2"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes **No**

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-10	A	2.5Y 5/1	NONE	N/A	FINE SAND
10-15	B	10YR 4/3	NONE	N/A	FINE SANDY LOAM
15-20	B	10YR 4/4	NONE	N/A	FINE SANDY LOAM
20-30	B	10YR 4/3	10YR 4/1	50:50 POLYCHROMATIC MATRIX	FINE SANDY LOAM

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: NON-HYDRIC SOILS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	**Yes**	No	Is this Sampling Point Within a Wetland?	Yes	**No**
Wetland Hydrology Present?	Yes	**No**			
Hydric Soils Present?	Yes	**No**			

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. AND DOES NOT MEET THE FEDERAL SOILS OR HYDROLOGY CRITERIA (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15C-1-1
10 FEET WETLAND (SOUTH) OF STAKE "WET 15-C-4"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/02/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	WET PINE FLATWOODS (FLUCFCS CODE 620)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	C-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	1

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (20)	UPL/FACW	ILEX GLABRA	S (<1)	UPL/FACW
NYSSA SYLVATICA	C (20)	OBL/OBL	MYRICA CERIFERA	S (<1)	FAC/FAC
PINUS ELLIOTTII	S (5)	UPL/FACW	OSMUNDA CINNAMOMEA	H (20)	FACW/FACW
QUERCUS NIGRA	S (5)	FACW/FAC			
NYSSA SYLVATICA	S (5)	OBL/OBL			
WOODWARDIA AREOLATA	H (30)	OBL/OBL			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

FLORIDA: 100 (BASED ON GROUNDCOVER) FWS: 100 (ALL STRATA)

Remarks: HYDROPHYTIC VEGETATION. HERBACEOUS GROUNDCOVER USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE AND SUBCANOPY IS SPARSE AND STRONGLY INFLUENCED BY PLANTED PINE. ALSO MEETS EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	3	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. IN ADDITION TO THE INDICATORS CHECKED ABOVE, SOIL SURFACE DISPLAYED SLIGHT VEGETATIVE HUMMOCKS. THE FOLLOWING HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE SATURATION DURING GROWING SEASON) AND (12) VEGETATED TUSSOCKS OR HUMMOCKS.

DATA POINT 15C-1-1
10 FEET WETLAND (SOUTH) OF STAKE "WET 15-C-4"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	OLUSTEE FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
3-18+	A2 OR B2h	2.5Y 2.5/1	2.5Y 5/1	70:30	MUCKY FINE SAND
				POLYCHROMATIC	
				MATRIX	

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	X	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
X	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. FDEP HYDRIC SOIL FIELD INDICATOR S7 "DARK SURFACE" AND S6 "STRIPPED MATRIX".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "A" TEST, 62-340.300(2)(a), WHICH IS BASED ON THE PREVALENCE OF OBLIGATE VEGETATION OVER UPLAND VEGETATION AND ALSO THE PRESENCE OF FIELD INDICATORS HYDRIC SOILS AND/OR WETLAND HYDROLOGY; AS WELL AS MEETING THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF FIELD INDICATORS OF HYDRIC SOIL AND WETLAND HYDROLOGY.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 620)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4).

DATA POINT 15C-1-2
10 FEET UPLAND (NORTH) OF STAKE "WET 15-C-4"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	CLEARCUT PINE PLANT. (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	C-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	2

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
ACER RUBRUM	S (5)	FACW/FAC	PINUS ELLIOTTII	H (<1)	UPL/FACW
MYRICA CERIFERA	S (5)	FAC/FAC	MYRICA CERIFERA	H (5)	FAC/FAC
QUERCUS NIGRA	S (5)	FACW/FAC			
RUBUS SP.	H (25)	FAC/VAR			
ILEX GLABRA	H (25)	UPL/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100 (BASED ON SUBCANOPY) FWS: 80 (ALL STRATA)

Remarks: MEETS FLORIDA AND EPA/COE DEFINITIONS OF HYDROPHYTIC VEGETATION. IT IS NOTED, HOWEVER, THAT NO OBL SPECIES ARE PRESENT AND ALL OF THE DOMINANT SPECIES COMMONLY OCCUR IN MESIC UPLANDS AS WELL AS WETLANDS.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	20	(in.)
Depth to Saturated Soil:	15	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15C-1-2
10 FEET UPLAND (NORTH) OF STAKE "WET 15-C-4"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	OLUSTEE FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – ULTIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes **No**

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-3	A1	2.5Y 4/1	NONE	N/A	FINE SAND
3-8	A2 OR B2h	2.5Y 3/2	NONE	N/A	FINE SAND
8-18+	A2 OR B2h	2.5Y 3/1	NONE	N/A	FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: NO FLORIDA OR FEDERAL FIELD INDICATORS OF HYDRIC SOIL.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	**Yes**	No	Is this Sampling Point Within a Wetland?	Yes	**No**
Wetland Hydrology Present?	Yes	**No**			
Hydric Soils Present?	Yes	**No**			

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. AND ONLY MEETS ONE OF THE THREE FEDERAL CRITERIA.

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15D-1-1
10 FEET WETLAND (EAST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	[redacted] No	Community ID:	CYPRESS (FLUCFCS CODE 621)
Is the site significantly disturbed (Atypical Situation)?:	Yes [redacted]	Transect ID:	D-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes [redacted]	Plot ID:	1

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (10)	UPL/FACW			
PINUS ELLIOTTII	S (5)	UPL/FACW			
ILEX GLABRA	H (5)	UPL/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 0 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: HYDROPHYTIC VEGETATION. ALTHOUGH PINUS ELLIOTTII AND ILEX GLABRA ARE NOT FACW OR OBL PER FLORIDA REGULATION, REASONABLE SCIENTIFIC JUDGEMENT SUGGESTS THAT THE SPARSENESS OF THE VEGETATION AT THIS POINT IS DUE TO PERIOD SURFACE INUNDATION. THE VEGETATION CLEARLY MEETS THE EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. THE PREDOMINANT CANOPY AND SUBCANOPY PINE OVER MOST OF THIS COMMUNITY IS POND CYPRESS (TAXODIUM ASCENDENS).

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	7	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- X Water Marks (1-2" ABOVE SURFACE)
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- X Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. IN ADDITION TO THE ITEMS CHECKED ABOVE, SLIGHT EVIDENCE OF A DRIED ALGAL MAT WAS OBSERVED. THE FOLLOWING HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED: (1) ALGAL MATS, (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE SATURATION DURING GROWING SEASON), AND (13) WATER MARKS.

DATA POINT 15D-1-1
10 FEET WETLAND (EAST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 3/1	2.5Y 3/1 STREAKS	INDISTINCT	MUCKY FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. FDEP HYDRIC SOIL FIELD INDICATOR S7 "DARK SURFACE".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF A HYDRIC SOIL AND A HYDROLOGIC INDICATOR.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 621)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4).

DATA POINT 15D-1-2
AT STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	ECOTONE (FLUCFCS CODES 621-441)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	D-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	2

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (20)	UPL/FACW	VIBURNUM OBOVATUM (?)	H (<1)	FACW/FACW
PINUS ELLIOTTII	S (5)	UPL/FACW	LICHENS	B (3)	NI
FORESTIERA ACUMINATA (?)	S (5)	FACW/OBL			
ILEX GLABRA	H (5)	UPL/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 50 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: ON TRANSITION FROM AN AREA THAT MEETS FLORIDA DEFINITION OF HYDROPHYIC VEGETATION AND AN AREA THAT DOES NOT. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE. VEGETATON ON BOTH SIDES OF THIS POINT MEETS THE FEDERAL CRITERIA FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	10	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- X Water Marks (1-2" ABOVE SURFACE)
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- X Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: POINT LIES ON A TRANSITION FROM WETLAND HYDROLOGY TO NON-WETLAND (UPLAND) HYDROLOGY. ALGAL MATS, WATERMARKS, AND WATER-STAINED LEAVES PERSIST ONLY DOWNGRADIENT OF THIS POINT.

DATA POINT 15D-1-2
AT STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 7/1	2.5Y 4/1 STREAKS	50:50 POLYCHROMATIC MATRIX	MUCKY FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS TRANSITIONAL FROM A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d) TO A NON-WETLAND.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987). HOWEVER, IT IS IN TRANSITION TO A NON WETLAND.

FLORIDA CLASSIFICATION: ECOTONE BETWEEN FLUCFCS CODES 621 AND 441
USFWS CLASSIFICATION: ECOTONE BETWEEN PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4) WETLAND AND UPLAND (U).

DATA POINT 15D-1-3
10 FEET UPLAND (WEST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	Yes	No	Community ID:	PINE PLANTATION (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes	No	Transect ID:	D-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	No	Plot ID:	3

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (25)	UPL/FACW			
MYRICA CERIFERA	S (5)	FAC/FAC			
ILEX VOMITORIA	S (5)	FAC/FAC			
ILEX GLABRA	H (20)	UPL/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 0 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: DOES NOT MEET FLORIDA DEFINITION OF HYDROPHYTIC VEGETATION. DOES MEET EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	14	(in.)
Depth to Saturated Soil:	11	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- X Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340-500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15D-1-3
10 FEET UPLAND (WEST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 6/1	2.5Y 4/1	50:50	MUCKY FINE SAND
				POLYCHROMATIC	
				MATRIX	

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS. DARK SURFACE HORIZON LESS PRONOUNCED THAN IN THE WETLANDS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes	[redacted]		
Hydric Soils Present?	Yes	[redacted]		

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. ALTHOUGH THE AREA DISPLAYS MARGINAL EVIDENCE OF EACH OF THE THREE FEDERAL WETLAND PARAMETERS (ENVIRONMENTAL LABORATORY, 1987), REASONABLE SCIENTIFIC JUDGEMENT SUGGESTS THAT THE AREA FUNCTIONS MORE LIKE AN UPLAND THAN A WETLAND.

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15D-1-4
20 FEET UPLAND (WEST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	[redacted] No	Community ID:	PINE PLANTATION (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes [redacted]	Transect ID:	D-1
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes [redacted]	Plot ID:	4

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (40)	UPL/FACW			
MYRICA CERIFERA	S (10)	FAC/FAC			
SERENOA REPENS	S (5)	UPL/UPL			
ILEX VOMITORIA	S (5)	FAC/FAC			
ILEX GLABRA	H (20)	UPL/FACW			
SERENOA REPENS	H (5)	UPL/UPL			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 0 (BASED ON SUBCANOPY) FWS: 67 (ALL STRATA)

Remarks: DOES NOT MEET FLORIDA DEFINITION OF HYDROPHYTIC VEGETATION. DOES MEET EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	18	(in.)
Depth to Saturated Soil:	12	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks (1-2" ABOVE SURFACE)
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340-500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15D-1-4
20 FEET UPLAND (WEST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 3/1	2.5Y 5/2	50:50	MUCKY FINE SAND
				POLYCHROMATIC	
				MATRIX	

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS. DARK SURFACE HORIZON LESS PRONOUNCED THAN IN THE WETLANDS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)
Hydrophytic Vegetation Present?	Yes	[redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes	[redacted]		
Hydric Soils Present?	Yes	[redacted]		

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. ALTHOUGH THE AREA DISPLAYS MARGINAL EVIDENCE OF EACH OF THE THREE FEDERAL WETLAND PARAMETERS (ENVIRONMENTAL LABORATORY, 1987), REASONABLE SCIENTIFIC JUDGEMENT SUGGESTS THAT THE AREA FUNCTIONS MORE LIKE AN UPLAND THAN A WETLAND.

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15D-2-1
10 FEET WETLAND (SOUTH) OF STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	[redacted] No	Community ID:	WET PINE FLATWOODS (FLUCFCS CODE 620)
Is the site significantly disturbed (Atypical Situation)?:	Yes [redacted]	Transect ID:	D-2
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes [redacted]	Plot ID:	1

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (30)	UPL/FACW	ACER RUBRUM	C (2)	FACW/FAC
TAXODIUM ASCENDENS	C (15)	OBL/OBL	TAXODIUM ASCENDENS	S (3)	OBL/OBL
DIOSPYROS VIRGINIANA	S (5)	FAC/FAC	QUERCUS NIGRA	S (2)	FACW/FAC
			PINUS ELLIOTTII	S (<1)	UPL/FACW
			MYRICA CERIFERA	S (<1)	FAC/FAC
			FORESTIERA ACUMINATA (?)	H (1)	FACW/OBL
			MYRICA CERIFERA	H (<1)	FAC/FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100 (BASED ON CANOPY) FWS: 100 (ALL STRATA)

Remarks: ALTHOUGH CANOPY DOMINATED BY PLANTED PINE, THE PARTIAL DOMINANCE BY UNPLANTED POND CYPRESS (TAXODIUM ASCENDENS, OBL) IS USED TO SUPPORT PRESENCE OF HYDROPHYTIC VEGETATION ACCORDING TO THE FLORIDA DEFINITION. ALSO MEETS EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	5	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- X Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. IN ADDITION TO THE INDICATORS CHECKED ABOVE, POND CYPRESS TRUNKS DISPLAYED NOTICEABLE BUTTRESSING (A MORPHOLOGICAL PLANT ADAPTATION TO SATURATED CONDITIONS) AND SOIL SURFACE DISPLAYED DISTINCT VEGETATIVE HUMMOCKS. THE FOLLOWING HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE SATURATION DURING GROWING SEASON), (9) MORPHOLOGICAL PLANT ADAPTATIONS, AND (12) VEGETATED TUSSOCKS OR HUMMOCKS.

DATA POINT 15D-2-1
10 FEET WETLAND (SOUTH) OF STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	1G 2.5/N	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 3/1	2.5Y 6/1 STREAKS	INDISTINCT MOTTLES	MUCKY FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. FDEP HYDRIC SOIL FIELD INDICATOR S7 "DARK SURFACE".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF A HYDRIC SOIL AND A HYDROLOGIC INDICATOR. ALSO QUALIFIES ON BASIS OF "A" TEST, 63-340.300(2)(a), WHICH IS BASED ON >50% DOMINANCE BY OBL SPECIES IN APPROPRIATE STRATUM, IF PLANTED PINE IS DISCOUNTED AND CANOPY CONSIDERED TO INCLUDE ONLY THE POND CYPRESS,

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 624)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4).

DATA POINT 15D-2-2
AT STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	ECOTONE (FLUCFCS CODES 620-441)
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	D-2
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes	[redacted]	Plot ID:	2

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (30)	UPL/FACW	TAXODIUM ASCENDENS	C (5)	OBL/OBL
DIOSPYROS VIRGINIANA	S (10)	FAC/FAC	ACER RUBRUM	C (5)	FACW/FAC
ILEX GLABRA	H (5)	UPL/FACW	MYRICA CERIFERA	S (2)	FAC/FAC
PINUS ELLIOTTII	H (5)	UPL/FACW	ILEX VOMITORIA	S (2)	FAC/FAC
ILEX VOMITORIA	H (5)	FAC/FAC	SERENOA REPENS	S (2)	UPL/UPL
			ACER RUBRUM	S (2)	FACW/FAC
			MYRICA CERIFERA	H (1)	FAC/FAC

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 50 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: ON TRANSITION FROM AN AREA THAT MEETS FLORIDA DEFINITION OF HYDROPHYIC VEGETATION AND AN AREA THAT DOES NOT. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE. VEGETATON ON BOTH SIDES OF THIS POINT MEETS THE FEDERAL CRITERIA FOR HYDROPHYTIC VEGETATION.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	12	(in.)
Depth to Saturated Soil:	6	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: THIS POINT LIES ON A TRANSITION FROM WETLAND HYDROLOGY TO NON-WETLAND (UPLAND) HYDROLOGY. WATER-STAINED LEAVES, VEGETATED HUMMOCKS, AND MORPHOLOGICAL PLANT ADAPTATIONS OCCUR ONLY DOWN-GRADIENT OF THIS POINT.

DATA POINT 15D-2-2
AT STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 2.5/1	2.5Y 6/1 STREAKS	5%, INDISTINCT	MUCKY FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS TRANSITIONAL FROM A FLORIDA WETLAND TO A NON-WETLAND.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987). HOWEVER, IT IS IN TRANSITION TO A NON WETLAND.

FLORIDA CLASSIFICATION: ECOTONE BETWEEN FLUCFCS CODES 624 AND 441
USFWS CLASSIFICATION: ECOTONE BETWEEN PALUSTRINE FORESTED WETLAND, NEEDLE-LEAVED EVERGREEN (PFO4) WETLAND AND UPLAND (U).

DATA POINT 15D-2-3
10 FEET UPLAND (NORTH) OF STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA
Do Normal Circumstances exist on the site?:	Yes / No	Community ID:	PINE PLANTATION (FLUCFCS CODE 441)
Is the site significantly disturbed (Atypical Situation)?:	Yes / No	Transect ID:	D-2
Is the area a potential Problem Area?: (If needed, explain on reverse)	Yes / No	Plot ID:	3

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (40)	UPL/FACW	TAXODIUM ASCENDENS	C (<1)	OBL/OBL
ACER RUBRUM	S (5)	FACW/FAC			
SERENOA REPENS	S (5)	UPL/UPL			
TAXODIUM ASCENDENS	S (5)	OBL/OBL			
PINUS ELLIOTTII	S (5)	UPL/FACW			
MYRICA CERIFERA	H (5)	FAC/FAC			
ILEX GLABRA	H (5)	UPL/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 75 (BASED ON SUBCANOPY) FWS: 100 (ALL STRATA)

Remarks: DOES NOT MEET FLORIDA DEFINITION OF HYDROPHYTIC VEGETATION. DOES MEET EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. SUBCANOPY USED AS "APPROPRIATE VEGETATIVE STRATUM" BECAUSE CANOPY IS PLANTED PINE. IN SUBCANOPY, THERE IS ONLY 25% COVER BY OBL VS. 50% COVER BY UPL, HENCE FAILS "A" TEST. THERE IS ONLY 75% COVER BY OBL+FACW VS. 25% COVER BY UPL, HENCE FAILS "B" TEST.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	16	(in.)
Depth to Saturated Soil:	9	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ____ Inundated
- ____ Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- ____ Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: NOT WETLAND HYDROLOGY. NONE OF THE HYDROLOGICAL INDICATORS FROM 62-340.500 F.A.C. WERE OBSERVED. EVIDENCE OF WETLAND HYDROLOGY PER FEDERAL CRITERIA IS VERY WEAK.

DATA POINT 15D-2-3
10 FEET UPLAND (WEST) OF STAKE "WET 15-D-3"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-2	A1	2.5Y 2.5/1	NONE	N/A	MUCKY FINE SAND
2-18+	A2 OR B2h	2.5Y 2.5/1	2.5Y 5/1 STREAKS	20:80	MUCKY FINE SAND
				POLYCHROMATIC	
				MATRIX	

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: POINT ON TRANSITION FROM HYDRIC TO NON-HYDRIC SOILS. DARK SURFACE HORIZON LESS PRONOUNCED THAN IN THE WETLANDS.

WETLAND DETERMINATION (FLORIDA)

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	Yes [redacted]	Is this Sampling Point Within a Wetland?	Yes [redacted]
Wetland Hydrology Present?	Yes [redacted]		
Hydric Soils Present?	Yes [redacted]		

Remarks: THIS AREA DOES NOT MEET ANY OF THE CRITERIA FOR A FLORIDA WETLAND IN 62-340.300(2) F.A.C. ALTHOUGH THE AREA DISPLAYS MARGINAL EVIDENCE OF EACH OF THE THREE FEDERAL WETLAND PARAMETERS (ENVIRONMENTAL LABORATORY, 1987), REASONABLE SCIENTIFIC JUDGEMENT SUGGESTS THAT THE AREA FUNCTIONS MORE LIKE AN UPLAND THAN A WETLAND.

FLORIDA CLASSIFICATION: FLUCFCS CODE 441 (PINE PLANTATION)
USFWS CLASSIFICATION: UPLAND (U).

DATA POINT 15E-1-1
CENTER OF DITCH AT STAKE "WET 15-E-11"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:		No	Community ID:	DRAINAGE DITCH
Is the site significantly disturbed (Atypical Situation)?:	Yes		Transect ID:	E-1
Is the area a potential Problem Area?:	Yes		Plot ID:	1
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
PINUS ELLIOTTII	C (15)	UPL/FACW	MAGNOLIA VIRGINIANA	S (1)	OBL/FACW
ACER RUBRUM	C (10)	FACW/FAC	MYRICA CERIFERA	S (<1)	FAC/FAC
ILEX GLABRA	S (5)	UPL/FACW	OSMUNDA REGALIS	H (<1)	OBL/OBL
			OSMUNDA CINNAMOMEA	H (<1)	FACW/FACW

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 50 (BASED ON CANOPY) FWS: 100 (ALL STRATA)

Remarks: ALTHOUGH CANOPY DOMINATED BY PLANTED PINE, THE PARTIAL DOMINANCE BY UNPLANTED RED MAPLE (ACER RUBRUM, FAC) AND THE PREVALENT UNDERSTORY AND HERBACEOUS VEGETATION IS USED TO SUPPORT PRESENCE OF HYDROPHYTIC VEGETATION ACCORDING TO THE FLORIDA DEFINITION. ALSO MEETS EPA/COE DEFINITION FOR HYDROPHYTIC VEGETATION. NOTE: THIS VEGETATION REPRESENTS A SHORT SEGMENT OF THE DITCH THAT SUPPORTS A VERY NARROW STRIP OF VEGETATION. MUCH OF THE DITCH IS UNVEGETATED.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	0-4	(in.)
Depth to Free Water in Pit:	SURFACE	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- X Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- X Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. THE FOLLOWING HYDROLOGICAL INDICATOR FROM 62-340.500 F.A.C. WAS OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE INUNDATION DURING GROWING SEASON.

DATA POINT 15D-2-1
10 FEET WETLAND (SOUTH) OF STAKE "WET 15-D-27"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes **No**

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
0-18+	A1	1G 2.5/N	NONE	N/A	MUCKY FINE SAND

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
___	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. FDEP HYDRIC SOIL FIELD INDICATOR S7 "DARK SURFACE".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF A HYDRIC SOIL AND A HYDROLOGIC INDICATOR. ALSO QUALIFIES ON BASIS OF "A" TEST, 63-340.300(2)(a), WHICH IS BASED ON >50% DOMINANCE BY OBL SPECIES IN APPROPRIATE STRATUM, IF PLANTED PINE IS DISCOUNTED AND CANOPY CONSIDERED TO INCLUDE ONLY THE RED MAPLE AND THE UNDERSTORY AND GROUNDCOVER VEGETATION.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (FLUCFCS CODE 630)
USFWS CLASSIFICATION: PALUSTRINE FORESTED WETLAND, BROAD-LEAVED DECIDUOUS (PFO1).

DATA POINT 15F-1-1
CENTER OF PIT, APPROX. 5 FEET FROM STAKE "WET 15-F-6"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 1

Project/Site:	NAS CECIL FIELD – IR SITE 15	Date:	10/01/03
Applicant:	SOUTHERN DIVISION NAVFAC	County:	DUVAL
Investigator:	J. PEYTON DOUB, PWS	State:	FLORIDA

Do Normal Circumstances exist on the site?:	[redacted]	No	Community ID:	EXCAVATED PIT
Is the site significantly disturbed (Atypical Situation)?:	Yes	[redacted]	Transect ID:	F-1
Is the area a potential Problem Area?:	Yes	[redacted]	Plot ID:	1
(If needed, explain on reverse)				

VEGETATION

Dominant Plant Species	Stratum (%)	Indicator (FL/FWS)	Other Plant Species	Stratum (%)	Indicator
SALIX NIGRA	H (20)	OBL/OBL			
RHYNCHOSPORA SP.	H (5)	FACW/FACW			

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). FLORIDA: 100; FWS: 100

Remarks: MOST OF THIS SMALL MAN-MADE EXCAVATED PIT BOTTOM IS SPARSELY AND IRREGULARLY VEGETATED. SIDE SLOPES OF EXCAVATED PIT SUPPORT OLD FIELD VEGETATION RESEMBLING THAT IN THE SURROUNDING UPLANDS.

HYDROLOGY

Recorded Data (Described in Remarks):
- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- X No Recorded Data Available

Field Observations:

Depth of Surface Water:	0-4	(in.)
Depth to Free Water in Pit:	SURFACE	(in.)
Depth to Saturated Soil:	SURFACE	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- X Inundated
- X Saturated in Upper 12 inches
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ____ Oxidized Root Channels in Upper 12 inches
- X Water-Stained Leaves
- X Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks: WETLAND HYDROLOGY. THE FOLLOWING HYDROLOGICAL INDICATOR FROM 62-340.500 F.A.C. WAS OBSERVED: (8) HYDROLOGICAL DATA (DIRECT OBSERVATION OF SURFACE INUNDATION DURING GROWING SEASON.

DATA POINT 15F-1-1
CENTER OF PIT, APPROX. 5 FEET FROM STAKE "WET 15-F-6"
FORMER NAS CECIL FIELD, JACKSONVILLE, FLORIDA – IR SITE 15
WETLAND DELINEATION DATA FORM, PAGE 2

SOIL

Map Unit Name (Series and Phase):	RIDGELAND FINE SAND	Drainage Class:	POORLY DRAINED
Taxonomy (subgroup):	ULTISOLS – TYPIC HAPLAQUODS	Field Observations Confirmed Mapped Type?	Yes [redacted]

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture Concretions, Structure, etc,
N/A	N/A	N/A	N/A	N/A	N/A

Hydric Soil Indicators:

___	Histosol	___	Concretions
___	Histic Epipedon	___	High Organic Content in Surface Layer in Sandy Soil
___	Sulfidic Odor	___	Organic Streaking in Sandy Soils
X	Aquic Moisture Regime	X	Listed on Local Hydric Soils List
___	Reducing Conditions	X	Listed on National Hydric Soils List
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)

Remarks: HYDRIC SOIL. SOILS THAT ARE FREQUENTLY PONDED FOR A LONG OR VERY LONG DURATION DURING THE GROWING SEASON MEET THE DEFINITION OF HYDRIC SOIL REGARDLESS OF THE PRESENCE OR ABSENCE OF SPECIFIC "FIELD INDICATORS".

WETLAND DETERMINATION (FLORIDA)

	(Circle)			(Circle)	
Hydrophytic Vegetation Present?	[redacted]	No	Is this Sampling Point Within a Wetland?	[redacted]	No
Wetland Hydrology Present?	[redacted]	No			
Hydric Soils Present?	[redacted]	No			

Remarks: THIS AREA IS A FLORIDA WETLAND BASED ON THE "D" TEST, 62-340.300(2)(d), WHICH IS BASED ON THE PRESENCE OF A HYDRIC SOIL AND A HYDROLOGIC INDICATOR.

THIS AREA IS A FEDERAL WETLAND BASED ON THE PRESENCE OF HYDROPHYTIC VEGETATION, HYDRIC SOIL, AND WETLAND HYDROLOGY, BASED ON DEFINITIONS IN THE "CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (ENVIRONMENTAL LABORATORY, 1987).

FLORIDA CLASSIFICATION: WETLAND (NO CORRESPONDING FLUCFCS CODE)
USFWS CLASSIFICATION: PALUSTRINE EMERGENT WETLAND (PEM).

APPENDIX B

WETLAND RAPID ASSESSMENT PROCEDURE (WRAP) SHEETS

WETLAND A

Wetland Rapid Assessment Procedure

(WRAP)

☑ Existing Conditions ☐ Proposed Conditions (Check one)

Application Number	Project Name	Date	Evaluator	Wetland Type
CECILFIELD	SITE 15, WETLAND A	10/1/03	PEYTON DOUB	PFO4

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	620 Description: WETLAND CONIF. FOREST	

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	2.5	2.5

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD): 2

WQ Input & Treatment (WQ)*: 3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score: 0.91

Field Notes:

Wildlife Utilization (WU)

Minimal human disturbance, contiguous to diversity of undeveloped upland habitats,

Wetland Canopy (O/S)

Well stratified, diverse, native vegetation; no undesirable exotic or invasive species

Wetland Ground Cover (GC)

Diverse groundcover with no exotic or invasive species

Habitat Support / Buffer

>300 Feet of undeveloped forested buffer, but planted pine

Field Hydrology (HYD)

Observed saturated conditions appear normal for the wetland, but wetland is contiguous to man-made ditch

WQ Input & Treatment (WQ)

Wetland in 100% natural setting, other than forest management

WETLAND B

Wetland Rapid Assessment Procedure

☑ Check one
☒ Existing Conditions ☐ Proposed Conditions (WRAP)

Application Number	Project Name	Date	Evaluator	Wetland Type
CECIL FIELD	SITE 15, WETLAND B	10/1/03	PEYTON DOUB	PFO4

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	441 Description: PINE PLANTATION	<0.1 ACRE

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	1.5	1.5

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD): 0.5

WQ Input & Treatment (WQ)*: 3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score: 0.61

Field Notes:

Wildlife Utilization (WU)
Undeveloped setting

Wetland Canopy (O/S)
Canopy is planted pine; many pines are dead or dying, apparently due to ponded water

Wetland Ground Cover (GC)
Ground cover of desirable regionally indigenous wetland plants but is influenced by planted pine and ponded water caused by an adjoining dirt roadbed.

Habitat Support / Buffer
>300 feet of undeveloped forest buffer, but is planted pine

Field Hydrology (HYD)
Hydrology appears to be completely attributed to ponded runoff caused by adjoining dirt roadbed

WQ Input & Treatment (WQ)
Wetland in 100% natural setting, other than forest management.

WETLAND C

Wetland Rapid Assessment Procedure

(WRAP)

☑ Check one: ☒ Existing Conditions ☐ Proposed Conditions

Application Number	Project Name	Date	Evaluator	Wetland Type
CECIL FIELD	SITE 15, WETLAND C	10/1/03	PEYTON DOUB	PFO4

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	620 Description: WETLAND CONIF. FOREST	> 10 ACRES

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	2.5	2.5

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD): 2

WQ Input & Treatment (WQ)*: 3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score: 0.81

Field Notes:

Wildlife Utilization (WU)

Minimal human disturbance, contiguous to diversity of undeveloped upland habitats.

Wetland Canopy (O/S)

Well stratified, diverse, native vegetation; no undesirable exotic or invasive species

Wetland Ground Cover (GC)

Diverse groundcover without exotic or invasive species

Habitat Support / Buffer

>300 feet of undeveloped forest buffer, but planted pine and ~50% of buffer is clearcut

Field Hydrology (HYD)

Observed saturated conditions appear normal for the wetland, but wetland is contiguous to a man-made drainage ditch.

WQ Input & Treatment (WQ)

Wetland in 100% natural setting, other than for forest management

WETLAND D

Wetland Rapid Assessment Procedure

☑ Existing Conditions ☐ Proposed Conditions (Check one) (WRAP)

Application Number	Project Name	Date	Evaluator	Wetland Type
CECIL FIELD	SITE 15, WETLAND D	10/1/03	PEYTON DOUB	PFO2

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	621 Description: CYPRESS	

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	1.5	1

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD): 2

WQ Input & Treatment (WQ)*: 3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score: 0.67

Field Notes:

Wildlife Utilization (WU)

Minimal human disturbance, contiguous to diversity of undeveloped upland habitats

Wetland Canopy (O/S)

Canopy substantially sparser compared to other Site 15 wetlands, planted pines are dead or dying (apparently due to inundation), little natural woody vegetation in much of the wetland.

Wetland Ground Cover (GC)

little or no groundcover over much of wetland, even in areas with little or no shade. Could be due to inundation regime or unknown soil factors.

Habitat Support / Buffer

>300 feet of undeveloped forest buffer, but planted pine.

Field Hydrology (HYD)

Observed hydrology appears to be natural for the wetland, but wetland may be influenced by nearby drainage ditch (Wetland E)

WQ Input & Treatment (WQ)

Wetland in 100% natural setting, other than for forest management

WETLAND E

Wetland Rapid Assessment Procedure

☑ Check one
☒ Existing Conditions ☐ Proposed Conditions (WRAP)

Application Number	Project Name	Date	Evaluator	Wetland Type
CECIL FIELD	SITE 15, WETLAND E	10/1/03	PEYTON DOUB	R4

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	N/A Description: DRAINAGE DITCH	<0.1 ACRE

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	1	2

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD): 1

WQ Input & Treatment (WQ)*: 3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score: 0.64

Field Notes:

Wildlife Utilization (WU)
Water feature available to wildlife in generally natural setting

Wetland Canopy (O/S)
Few canopy trees in ditch itself, most parts of ditch shaded by pines on adjoining uplands.

Wetland Ground Cover (GC)
Natural ground cover present except where ditch is inundated.

Habitat Support / Buffer
>300 feet of undeveloped forest buffer, but planted pine.

Field Hydrology (HYD)
Ditch is man-made but could possess hydrological characteristics of some natural intermittent streams

WQ Input & Treatment (WQ)
Wetland in natural setting, other than for forest management

WETLAND F

Wetland Rapid Assessment Procedure

☑ Check one
☒ Existing Conditions ☐ Proposed Conditions (WRAP)

Application Number	Project Name	Date	Evaluator	Wetland Type
CECIL FIELD	SITE 15, WETLAND F	10/1/03	PEYTON DEUB	PEMx

Land Use	FLUCCS Code	Wetland Acreage
CERCLA	641 Description: FRESHWATER MARSH	<0.1 ACRE

Wildlife Utilization (WU)	Wetland Canopy (O/S)	Wetland Ground Cover (GC)
2	1	1

Habitat Support / Buffer

Buffer type	(Score)	X (% of area)	=Sub Totals
FOREST	2.5	100	2.5
		TOTAL	2.5

Field Hydrology (HYD)	WQ Input & Treatment (WQ)*
1	3

* The value of WQ is obtained by adding the TOTAL scores of Land use Category and Pretreatment category then dividing by 2

Land use Category (LU)

Land use Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(LU) TOTAL	3

Pretreatment Category (PT)

Pretreatment Category	(Score)	X (% of area)	=Sub Totals
Natural	3	100	3
		(PT) TOTAL	3

WRAP Score
0.58

Field Notes:

Wildlife Utilization (WU)
Water feature available to wildlife in generally natural setting.

Wetland Canopy (O/S)
Few willow seedlings but no canopy

Wetland Ground Cover (GC)
Sparse groundcover, may be hindered by poor soil fertility of severely disturbed surface soils

Habitat Support / Buffer
>300 feet of undeveloped buffer consisting of mostly clearcut forest with natural regeneration

Field Hydrology (HYD)
Feature is man-made pit

WQ Input & Treatment (WQ)
Feature is in natural setting

APPENDIX C

PHOTOGRAPHS

Photo 1: Overview of Wetland A, showing pond cypress knees

Photo 2: Pitcher plants, a genus of insectivorous herbaceous plants common in southeastern wetlands, occur in frequent scattered patches in Wetland A.

Photo 3: Virginia chain fern and red maple saplings in Wetland A

Photo 4: Upland vegetation north of Wetland A

Photo 5: Shallow pools of standing water in Wetland A

Photo 6: Overview of Wetland B (narrow swale in center)

Photo 7: Dense patch of wetland herbs in canopy gap in Wetland B

Photo 8: Northern edge of Wetland C (boundary in midsection of photo)

Photo 9: Overview of clearcut in central part of Site 15

Photo 10: Overview of main part of Wetland D

Photo 11: Denser vegetation in southwestern quadrant of Wetland D

Photo 12: Sparse rows of planted slash pine in Wetland D

Photo 13: Overview of Wetland E (drainage ditch). Surface soil in the pictured ditch segment is saturated.

Photo 14: Overview of Wetland F (excavation pit).

APPENDIX D

GEOSTATISTICAL ASSESSMENT REPORT

NEWFIELDS

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TO: Mark Davidson, Mark Jonnet, Mark Richardson, and Michael Maughon
FROM: Michael Wild/ Shahrokh Rouhani –NewFields Atlanta
PROJECT: Cecil Field Range 15
SUBJECT: Range 15 Geostatistical Assessment
DATE: 10/19/2004

Gentleman,

This memorandum summarizes the results of geostatistical analyses of soil data within Site 15 of the Jacksonville Naval Air Station (NAS) Cecil Field (Site 15). The purpose of this assessment was to develop remedial cutlines based on human health and ecological standards. This memorandum has also been revised twice since its original submittal on December 1, 2003. The first revision in August 2004 includes remedial cutlines based on three-times soil cleanup target levels (SCTLs) for Benzo(a)pyrene equivalent (BaPEq) as desired by Florida Department of Environmental Protection (FDEP).[1] This proposed guidance is termed the 3X rule. The latest revision includes four new sampling results taken on September 30, 2004. These samples were taken at locations proposed in the August 2004 version of this memo. A new section was added to the end of this memo to address the results of the latest samples. With the inclusion of the latest samples, delineation of lead and BaPEq is considered to be accurate and complete

TTNUS has already developed standards for Site 15. Instructions for their application are shown below:

- Estimate excavation cutlines of areas where lead is greater than 6500 parts per million (ppm) due to acute human health concerns;
- Determine remedial action limit (RAL) cutline of lead so that the mean concentration of any two acre unit is below the 2512 ppm mammalian ecological standard;
- Determine RAL cutline of BaPEq in soils so that the site-wide upper confidence limit (UCL) of the mean is below 2,250 parts per billion (ppb);
- Estimate excavation cutlines of BaPEq in soils for all areas greater than 6,750 ppb (three times 2,250 ppb).
- Combine and finalize cutlines for lead and BaPEq.

This memo is organized by the tasks listed above. In addition to these tasks, this memo also discusses the need for supplemental and confirmatory samples.

Removal of Lead Above 6500 ppm

Surficial lead concentrations were provided by Mark Jonnet of TTNUS. These samples are shown on Figure 1. In order to delineate areas greater than 6500 ppm, a geostatistical assessment was performed. A standard geostatistical assessment is performed in three steps:

- **Exploratory data analysis** to analyze the spatial and statistical distribution of lead.
- **Structural analysis** to determine the spatial correlation of lead samples.
- **Estimation** to delineate a surface of lead concentrations within the investigated zone.

[1] *Guidance for Comparing Site Contaminant Concentration Data with Soil Cleanup Target Levels (Draft)*, FDEP, February 25, 2004.

Exploratory Data Analysis

Part of the exploratory analysis is to examine the spatial distribution of lead. As indicated on Figure 1, lead clearly demonstrates a northwest to southeast trend as a result of rounds fired from the similarly aligned trap and skeet ranges. This trend is further explored in the structural analysis.

A probability plot[2] was used to determine the statistical distribution of lead samples. The probability for all surficial samples is shown as Figure 2. This figure demonstrates a population breakpoint at approximately 5000 ppm. Lead concentrations greater than 5000 ppm, which account for 12 out of 460 samples collected, can be considered anomalous to population of lead samples. The site-wide average concentration for lead is 990 ppm, which includes the anomalous values.

Segmented populations are often construed as log-normally distributed, as the shape of a probability plot for a segmented dataset is similar to that of a log-normal dataset. Transformation of the lead to log values (Figure 3) demonstrates that lead is not log normally distributed and that the segmented population is still apparent.

Structural Analysis

A geostatistical analysis must be initiated by a variogram[3] or structural analysis for quantifying the correlation between data points. The spatial structures of field data are determined through computation of sample variograms. For this purpose, all pairs of measurement values in a dataset are compared to each other in order to provide a consistent measure of their degree of spatial correlation. The resulting differences between paired measurements are then grouped according to their separation distance and the orientation of their separation vector.

The variogram of the lead samples is shown by Figure 4. This figure includes both a non-directional and a directional variogram. As noted in the exploratory analysis, the lead samples have a directional trend from northwest to southeast. This trend was confirmed in the structural analysis and was determined to be strongest at 130 degrees. At this angle, the range of correlation was approximately 400 feet. Perpendicular to this angle, the range was approximately 260 feet.

Both the directional and non-directional variogram excluded the anomalous lead values greater than 5000 ppm. These samples, however, will be used in the estimation of lead concentrations for Site 15.

Estimation

Upon determination of the variogram model, the geostatistical estimation process known as point or block kriging can be performed as:

$$Z_o^* = \sum_{i=1}^{n} \lambda_i z_j$$

---

[2] Probability plots are highly effective graphical tools for determining the type of the statistical distribution of measured values of a contaminant (e.g., DON, 2002). A straight-line probability plot indicates that the data are normally distributed. If the data are log-transformed, then the straight-line would imply a log-normal distribution. A segmented probability plot usually suggests the presence of multiple populations among measured values. In many instances, the presence of multiple populations can be attributed to the co-existence of residual and hot spot data.

[3] EPA/600/4-88/033a defines the variogram as the plot of the variance (one-half the mean squared difference) of paired sample results as a function of their separation distance.

where,

Z_o^*	=	Estimated point or block value centered at x_o,
z_i	=	Measured value at x_i,
λ_i	=	Estimation weight of z_i.

The computations of the above estimation weights are conducted on the basis of two criteria, which are: (1) non-bias condition and (2) minimum estimation variance. In statistical terms, geostatistical estimates are best linear unbiased estimates. Any point or block estimate, Z_o^*, comes with its own measure of accuracy in the form of an estimation (kriging) standard deviation, usually denoted as σ_o. The estimation standard deviation value can be used to calculate a 95% UCL.

Point kriging was used to estimate lead concentrations in the surficial soils of Site 15. The iso-concentration map of the estimated values is shown as Figure 5. Areas greater than 6500 ppm are shown in red.

Removal of Lead to Meet Ecological Standard

Domain Exceedance

The ecological standard of 2512 ppm is applied over a two-acre domain. Block kriging of the lead values was used to determine domains that exceeded this standard after removal of lead concentrations greater than 6500 ppm. For this purpose, an approximation of block kriging was used. This approximation averages point kriged estimated values within a polygonal domain of any shape or position. This method was used to allow for the random placement of a domain grid rather than the fixed block cells of the geostatistical software. This method also allows replacement of removed zones with lead concentrations representative of clean fill. Figure 6 demonstrates domains that exceed 2512 ppm.

RAL and Cutline Determination

As noted on Figure 6, two domains exceed the ecological standard even with removal of the highest lead concentration zones due to acute human health concerns. This means that further removal is required in the vicinity of these domains in order to meet ecological standards.

RAL is iteratively determined so that any two acre parcel would be less than 2512 ppm. Spatial Analyst for ArcGIS extension was used to replace estimated lead cells greater than the RAL with a concentration of five ppm, which is an estimate of clean fill. The cells of the estimated lead and clean fill were then re-summarized within each two-acre domain. Using this method, the RAL is determined to be 4000 ppm. Removal of lead greater than 4000 ppm is only required within or in the vicinity of the two exceeded domains. Figure 7 shows the 4000 ppm cutlines as well as the 6500 ppm cutlines.

Removal of BaPEq to Meet Site-Wide Human Health Standard

Surficial BaPEq concentrations were calculated and provided by TTNUS. The BaPEq concentrations are meant to represent carcinogenic polyaromatic hydrocarbons (cPAHs). The presence of cPAHs is likely the result of burning old ammunition and igniting surplus rockets to destroy the propellants. The presence of some cPAHs may also be the result of forest fires. Figure 8 demonstrates the BaPEq results for the site.

Exploratory Data Analysis

Unlike the lead samples, the BaPEq results do not depict an apparent directional trend. Also, higher concentration areas of BaPEq are not correlated to the elevated lead samples. Samples were collected using

a sampling grid except in the region of the former burn chamber. A higher density of samples is clustered in this area.

The probability for all surficial samples is shown on Figure 9. This figure includes two plots: one with no limits to the Y axis (concentration) and a second that limits the dataset to values less the 500,000 ppb. These plots demonstrate a population breakpoint at approximately 10,000 ppb. BaPEq concentrations greater than 10,000 ppb, which account for 47 out of 366 samples, are anomalous with respect to the population of the other BaPEq samples. The site-wide average concentration for BaPEq is 15,100 ppb, which includes the anomalous values. The 95% UCL is 21,500 ppb

Figure 10 demonstrates the probability plot of log transformed values. As with the lead dataset, the BaPEq sample values depict a segmented population and are not log-normally distributed.

Structural Analysis

The variogram analysis of BaPEq values over the entire site resulted in noisy sample variograms. A moving window variogram analysis indicated that these noisy results are attributed to the dense cluster of elevated BaPEq values around the former burn chamber. Upon removal of this cluster of data, variogram analyses are redone. The resulting variogram of BaPEq (Figure 11) yields a well-defined spatial structure with no directional tendency.

Estimation

Point estimation of the BaPEq values is performed, as shown on Figure 12. This figure also plots the measured values on top of the estimated surface. Due to the presence of some very high concentrations of BaPEq in certain areas, the kriged estimates are overestimated as compared to measured values. Therefore, the estimated surface of BaPEq can be considered as a conservative estimate of concentrations in soil.

Domain Exceedance

Exposure to cPAHs is on a site-wide basis. Therefore, all of Site 15 is considered as the exposure domain. From the exploratory data analysis, the average and 95% UCL of the site BaPEq are 15,100 and 21,500 ppb, respectively. However, these estimates are impacted by the clustered nature of the samples that are biased toward the impacted area (Figure 8). To correct this bias, block kriging is performed. The block kriged average over the site is 9,440 ppb, with a 95% UCL of 12,900 ppb.

RAL and Cutline Determination

RAL is iteratively determined so that site-wide 95% UCL would be less than 2,250 ppb. Spatial Analyst for ArcGIS extension was used to replace estimated BaPEq cells greater than the RAL with a concentration of 100 ppb, which is a conservative estimate of clean fill according to TTNUS. The cells of the estimated BaPEq and clean fill were then re-summarized over the site. Using this method, the RAL was determined to be 35,000 ppb.

A validation of this RAL was performed using the measured BaPEq values. If the measured values are limited to only those less than 35,000 ppb, the 95% UCL is 2,200 ppb, which is below the 2,250 ppb standard (see Figure 13). The 95% UCL drops to 2,070 ppb if the measured values greater than 35,000 ppb are replaced with 100 ppb.

Removal of BaPEq to Meet 3X Rule

Cutline Determination

FDEP has proposed guidance to remove "hotspots" that may remain as the result of removals based on 95% UCL calculations. This guidance suggests removing point locations greater than three times applicable SCTLs, which for BaPEq would be 6,750 ppb (FDEP 2004, Item 8, page 6).

According to an April 12, 2004 memorandum by Ted Simon, Region IV EPA, cPAHs do not produce acute (short-term) toxic exposure and, consequently, the 3X rule is not applicable for random point location exposure. However, non-random exposure may exist in areas that could be frequented by a receptor, such as roads, bike paths and remnants of site structures.[4]

Originally, only areas deemed potential non-random sites that exceeded 6,750 ppb were delineated by NewFields and submitted to EFD South on May 11, 2004. Finally though, FDEP preferred that all areas greater than 6,750 ppb be delineated.

These areas were delineated by hand to ensure that all samples exceeding 6,750 were included. This delineation is provided as Figure 14 and includes all BaPEq values adjacent to sample locations.

Site-Wide 95% UCL using Three-times Rule

The site-wide 95% UCL for BaPEq was calculated using the remaining less than 6,750 samples. The resulting value was 797 ppb. The 95% UCL drops to 695 ppb if the measured values greater than 6,750 ppb are replaced with 100 ppb. This is more than three times lower than the 2,250 ppb site-wide standard.

Cutlines for Lead and BaPEq

Cutlines were produced for both Lead and BaPEq. The risk-based lead contours shown in Figure 7 were revised slightly by hand to improve excavation implementation in the field. The BaPEq contours presented in Figure 14, which were preferred by FDEP, were combined with the revised lead contours. These cutlines and the results for both Lead and BaPEq are shown in Figure 15. The BaPEq and Lead cutlines do not overlap.

The excavated areas are 1.84 acres for lead and 5.33 acres for BaPEq. Assuming a one foot excavation depth, the total excavation volume would be approximately 11,500 cubic yards.

Supplemental Sampling

Site 15 has been thoroughly sampled for both lead and cPAHs. Variogram analysis demonstrates ranges of correlation of over 300 – 400 feet for lead and 275 feet for BaPEq. Sampling density for both parameters is typically 100 feet or less. Consequently, this site could even be considered oversampled. However, there are areas that present that warrant sampling before or during excavation. These areas demonstrate high concentrations of lead or BaPEq, near excavation cutlines and without adjacent samples (shown on Figure 16). The addition of these samples to the GIS should improve the accuracy of the delineated cutlines and resolve the impact of an anomalously high lead sample in the southern portion of the site.

The proposed supplemental samples were collected on September 30, 2004. The next section addresses the results of these samples and their impact to the analyses performed as part of this memorandum.

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[4] According to Mark Davidson, Southern Engineering Field Division Naval Facilities Engineering Command (EFD South), all site structures have been removed.

Inclusion of Supplemental Samples and Revised Cutlines

The September 30, 2004 samples were added to the GIS and the geostatistical analysis of both lead and BaPEq was recalculated. These samples had no impact on the measured spatial correlation of either constituent dataset. However, as expected, the samples did improve the accuracy of the delineated cutlines.

Both the lead and the BaPEq cutlines were revised to include the results of these samples. Figure 17 demonstrates the revised cutlines and all measured values of lead and BaPEq. The most notable difference is the expansion of the BaPEq contour to include a new sampling result that exceeded 6,750 ppb. The sample result of 12,423 ppb was well below nearby estimated kriged values of 83,000 ppb shown in Figure 12. Other cutlines were revised slightly inward to account for the less than expected lead and BaPEq results. The two new lead results adjacent to the southernmost cutline demonstrated that Site 15's highest lead concentration of 41,400 ppm was either erroneous or very limited in spatial extent.

Conclusions

With the inclusion of the latest samples, delineation of lead and BaPEq is considered to be accurate and complete. Also, confirmation (post-excavation) samples are not warranted due to three facts:

- The removed soils will be replaced with clean fill,
- The horizontal sampling density is less than half of the measured spatial correlation, and
- The BaPEq cutlines using the 3X rule over-excavates the site and produces a site-wide UCL more than three times <u>lower</u> than the 2,250 ppb site-wide standard.

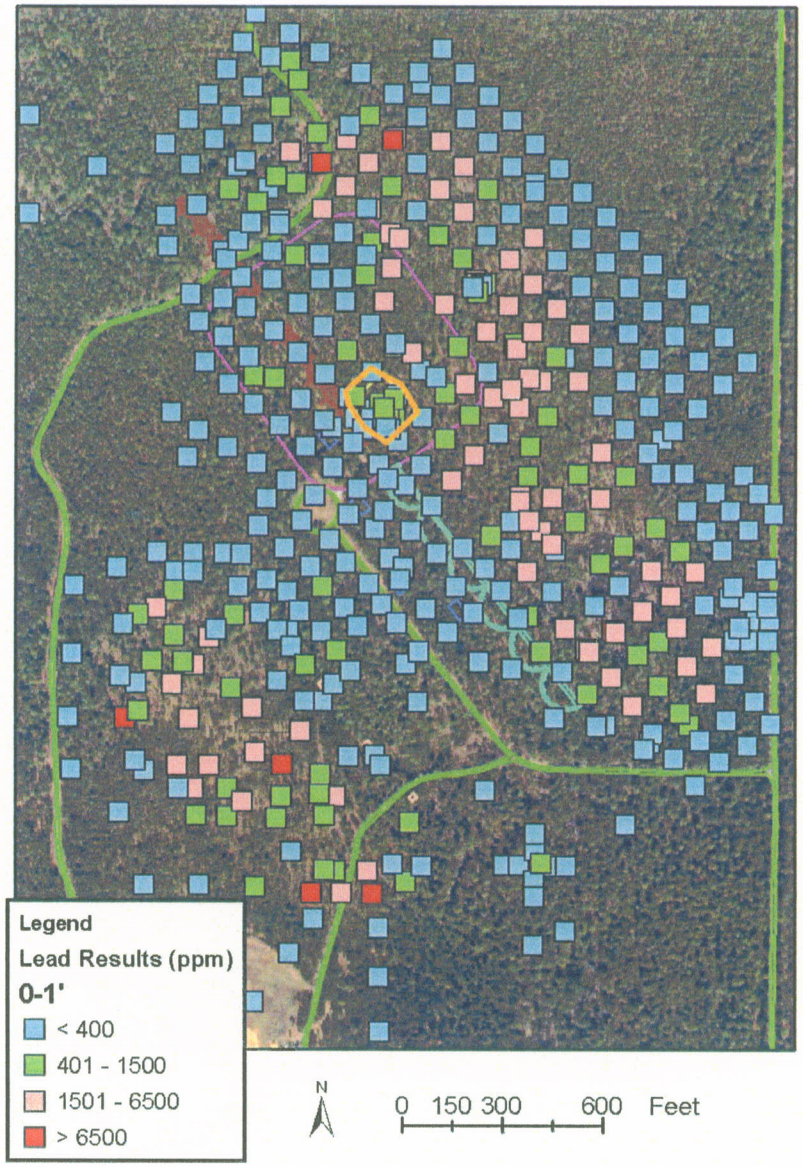


Figure Notes:

This figure demonstrates average lead soil concentrations in the surficial soils at Site 15.

Figure 1
Post Plot of All Data
COC: Lead

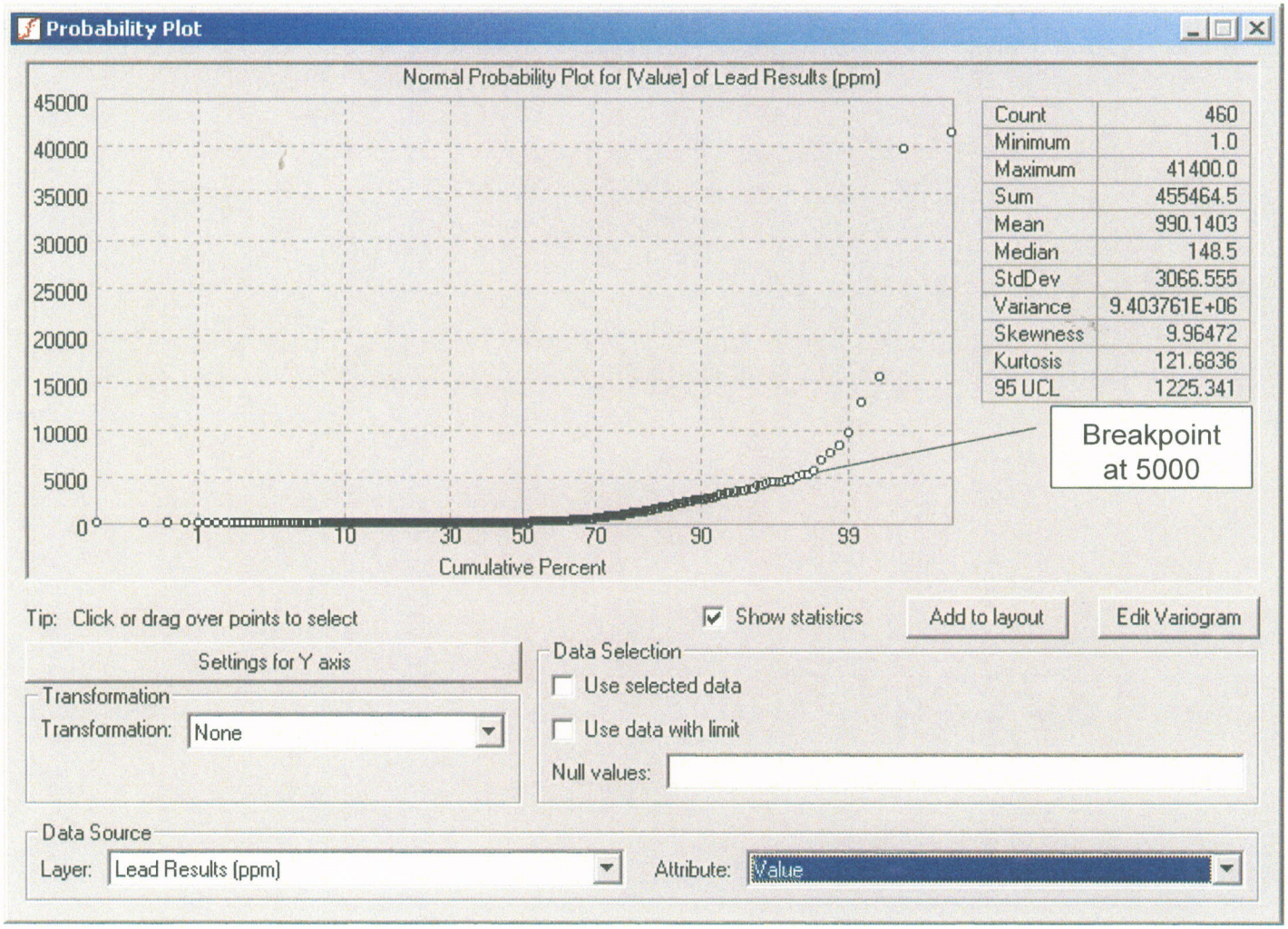


Figure Notes:

This figure demonstrates average lead soil concentrations for all sample locations. The data demonstrate multiple populations.

Figure 2
Probability Plot of All Data
COC: Lead

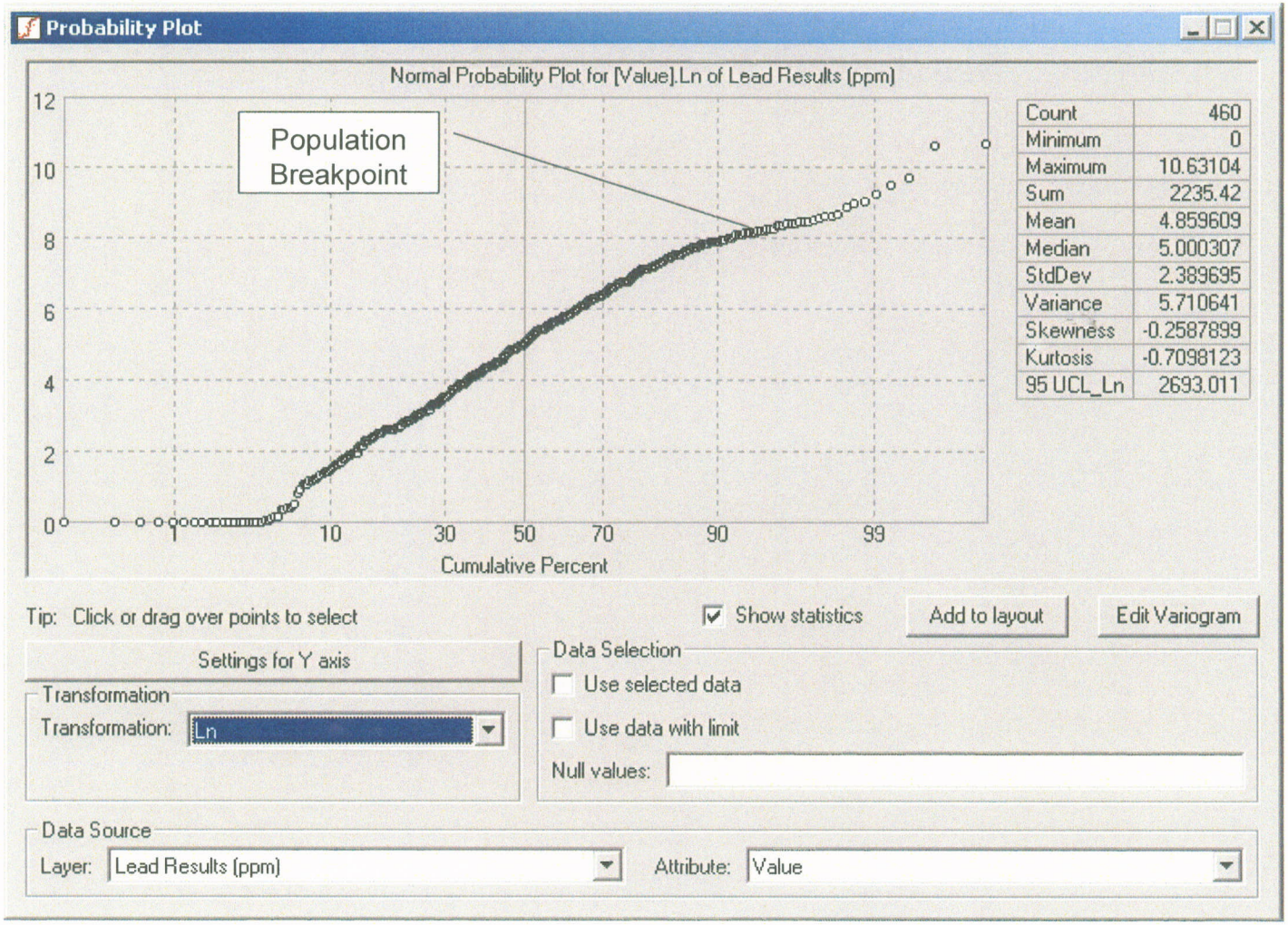
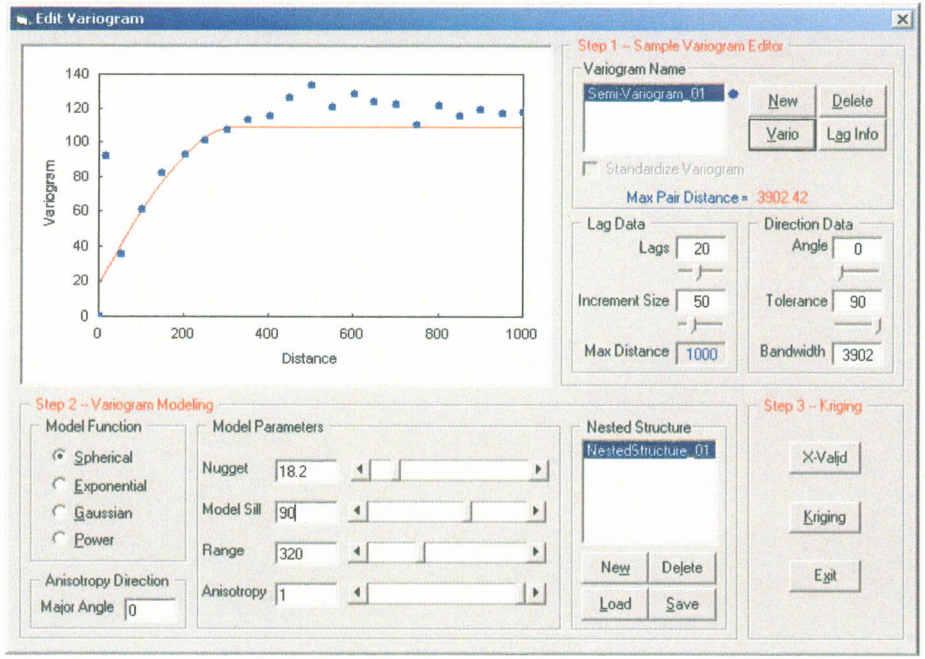


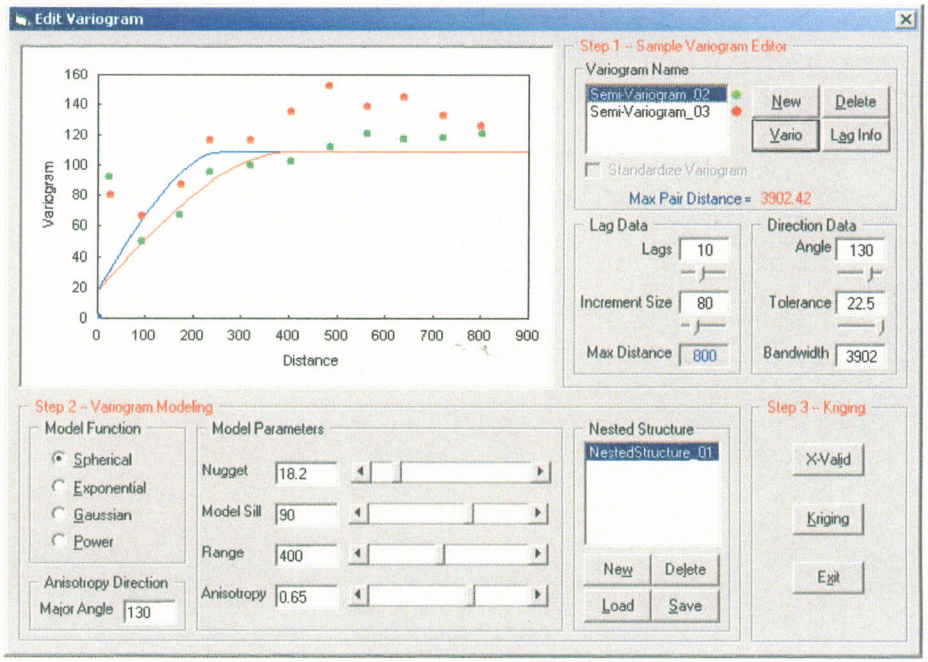
Figure Notes:

This figure demonstrates the log of average lead soil concentrations. The data do not demonstrate a log-normal distribution.

Figure 3
Probability Plot of Log-Transformed Data
COC: Lead



Non-Directional Variogram



Directional Variogram

Figure Notes:

This figure indicates correlational structure using all available site data with concentrations less than 5,000 mg/kg. A directional preference was determined at 130°. Data was converted to parts per 10^4 before variography.

Figure 4
Non-directional and Directional Variograms
Dataset: < 5,000 mg/kg
COC: Lead

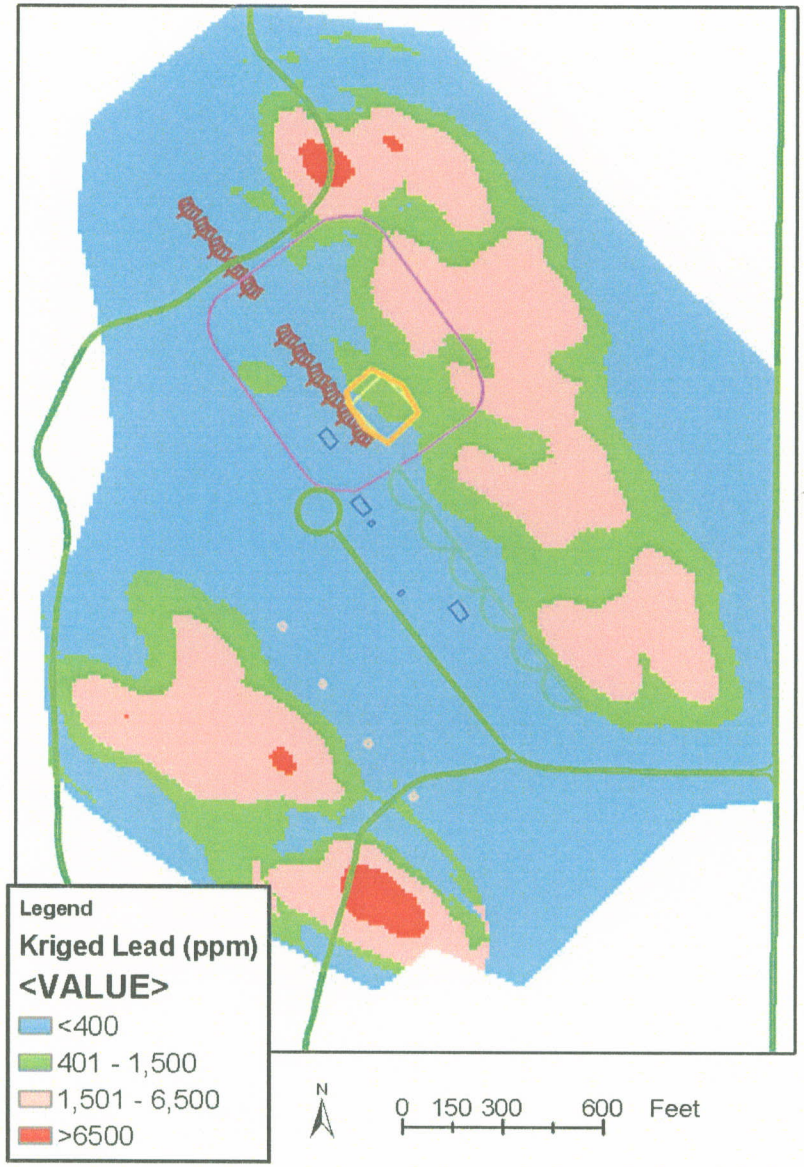


Figure Notes:

This figure demonstrates the point kriged isoconcentration surface of estimated lead in the surficial soils at Site 15.

Figure 5
Kriged Isoconcentration Surface
COC: Lead

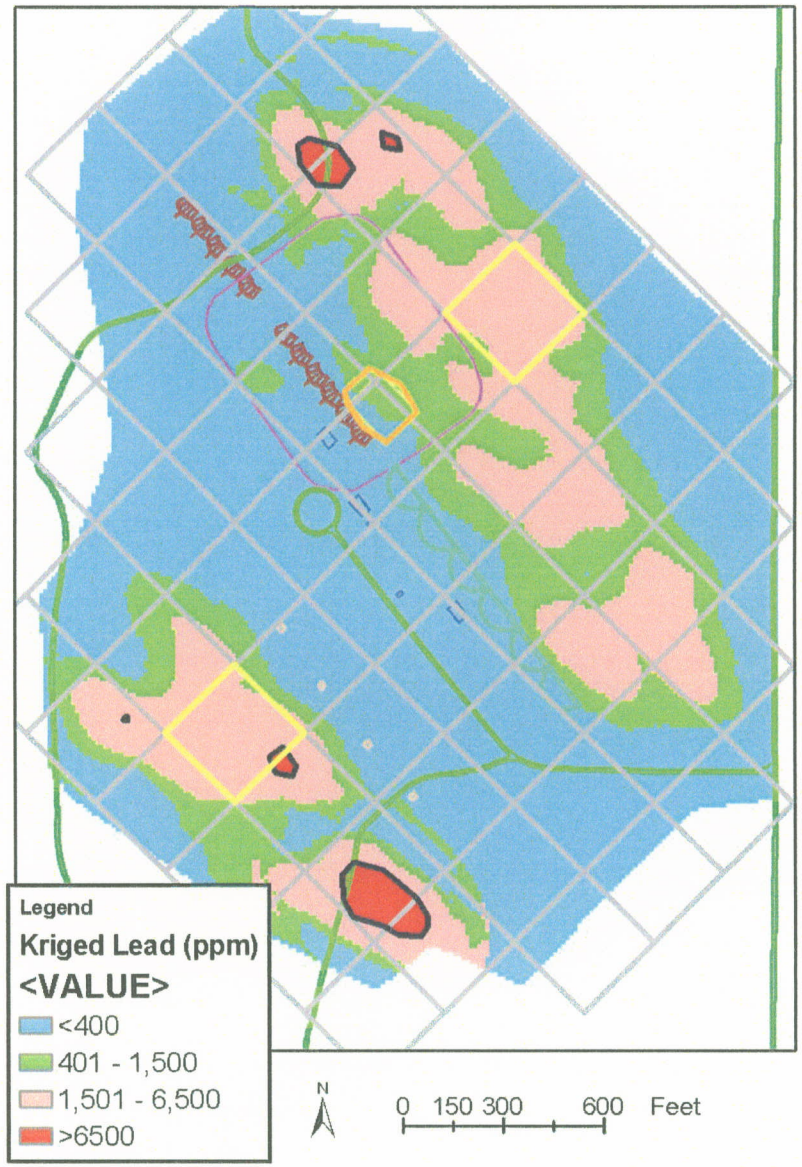


Figure Notes:

This figure demonstrates the block summarized concentrations of the point kriged isoconcentration surface. Highlighted domains exceed 2512 ppm. These exceedances are present after the 6500 ppm zones have been removed.

Figure 6
Domain Exceedances
COC: Lead

Figure Notes:

This figure demonstrates the 4000 ppm RAL required to achieve a 2512 ppm value or less for any two-acre domain. Note that the RAL is limited to only areas in the vicinity of exceeded domains.

Figure 7
RAL Cutlines
COC: Lead

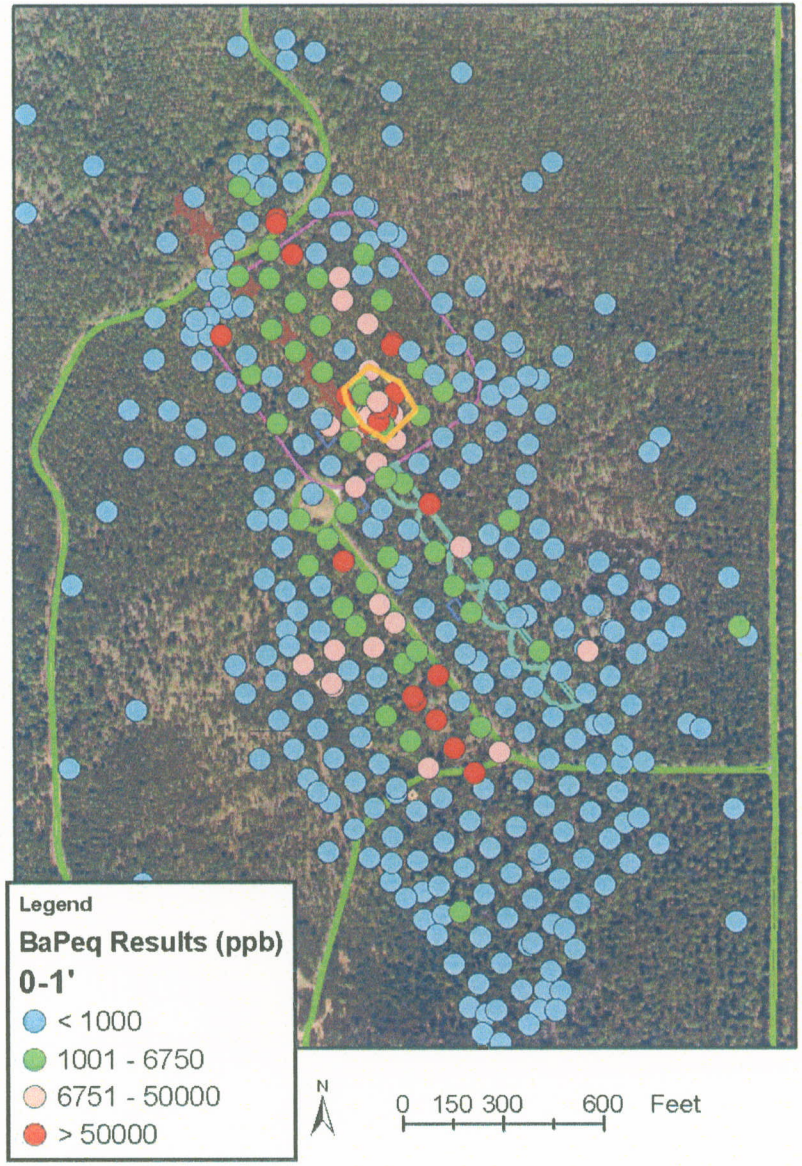
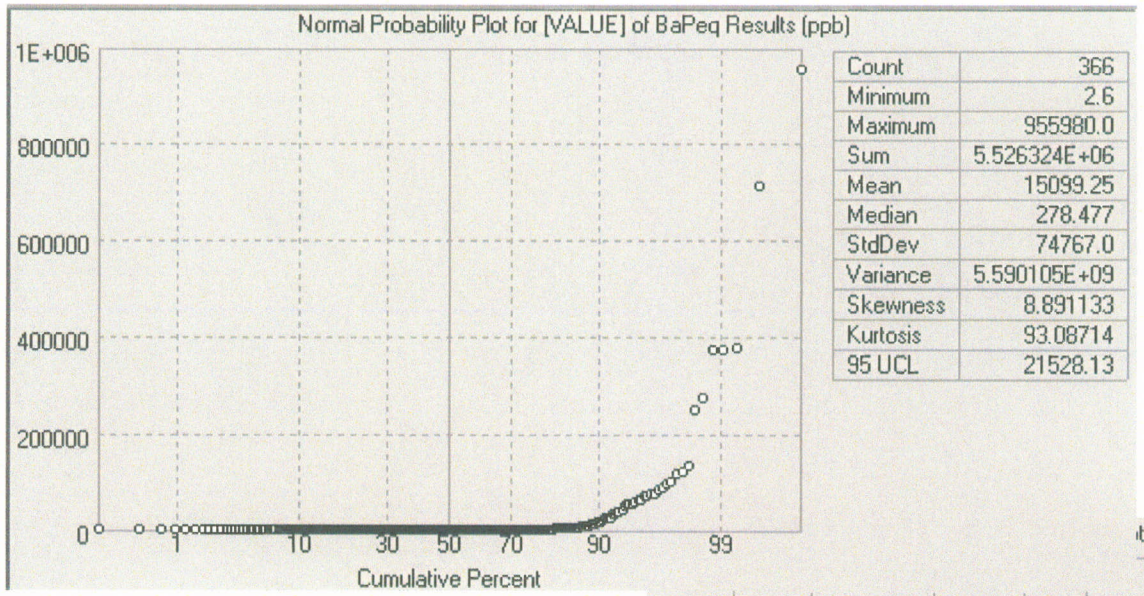


Figure Notes:

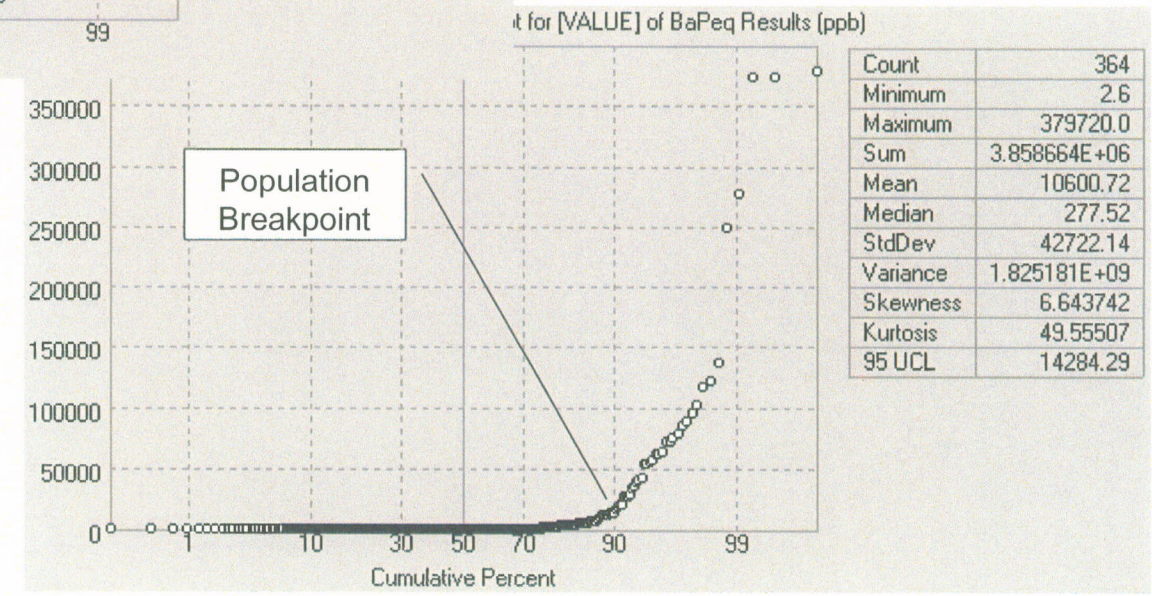
This figure demonstrates benzo(a)pyrene equivalent concentrations in the surficial soils at Site 15. The approximate location of the burn chamber,shown in orange, is in the north central portion of the site.

Figure 8
Post Plot of All Data
COC: BaPEq



Count	366
Minimum	2.6
Maximum	955980.0
Sum	5.526324E+06
Mean	15099.25
Median	278.477
StdDev	74767.0
Variance	5.590105E+09
Skewness	8.891133
Kurtosis	93.08714
95 UCL	21528.13

A



Count	364
Minimum	2.6
Maximum	379720.0
Sum	3.858664E+06
Mean	10600.72
Median	277.52
StdDev	42722.14
Variance	1.825181E+09
Skewness	6.643742
Kurtosis	49.55507
95 UCL	14284.29

B

Figure Notes:

This figure demonstrates average BaPEq soil in the 0-1' interval. Plot B is limited to values less than 500,000 ppb. These figures demonstrate multiple populations. The dominant population is less than 10,000 ppb.

Figure 9
Probability Plot of Data
- All and Limited Datasets
COC: BaPEq

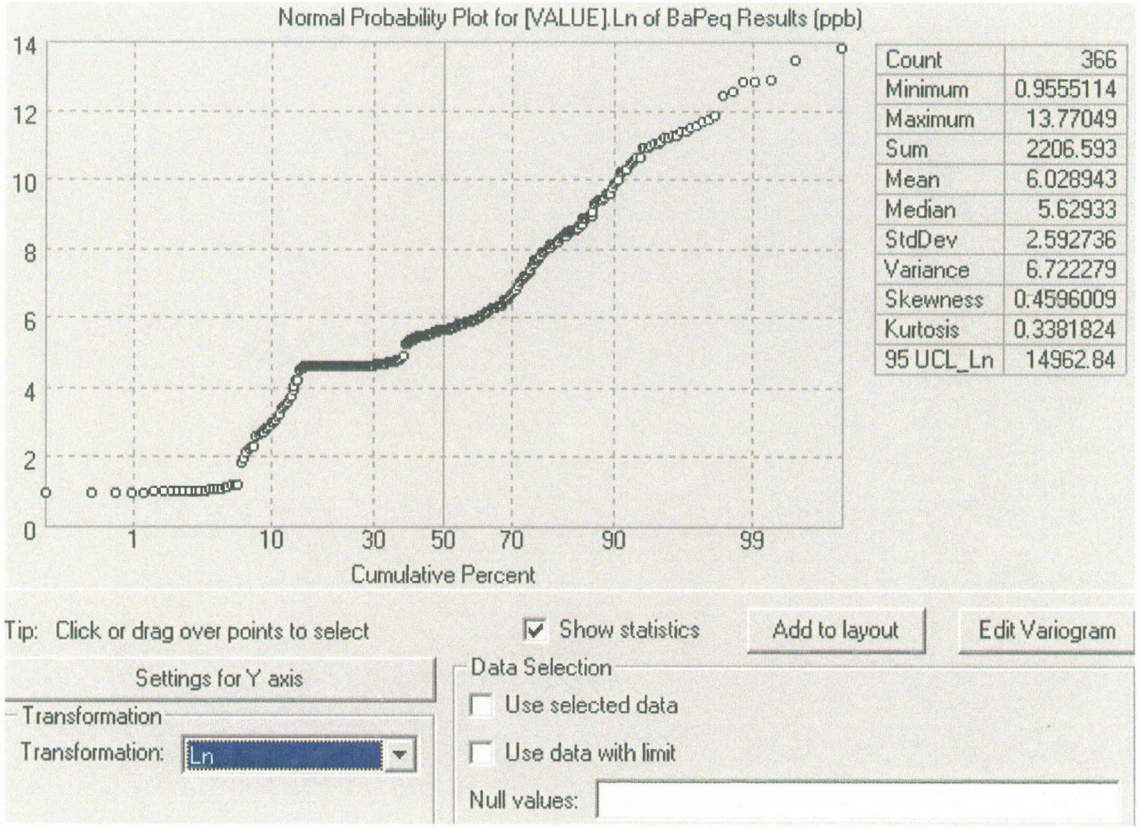


Figure Notes:

This figure demonstrates the log of BaPEq soil concentrations. The data demonstrate multiple populations and do not demonstrate a log normal distribution.

Figure 10
Probability Plot of Log-Transformed Data
COC: BaPEq

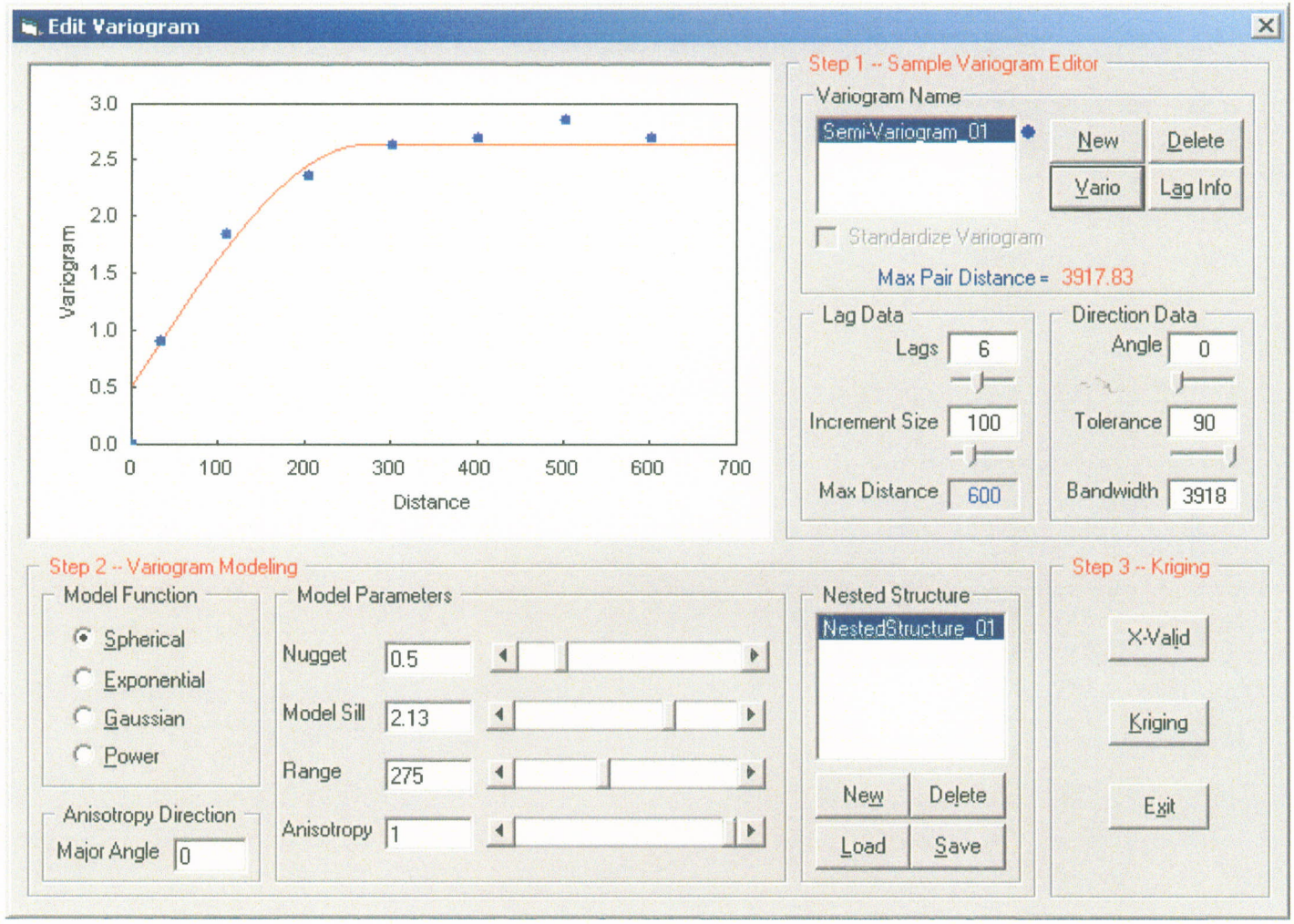


Figure Notes:

This figure indicates correlational structure using site data less than 10,000 ug/kg and excluding a sampling cluster. No directional tendency was detected. The data was divided by 1,000 before variography.

Figure 11
Non-directional Variogram
Dataset: < 10,000 ug/kg
COC: BAPe

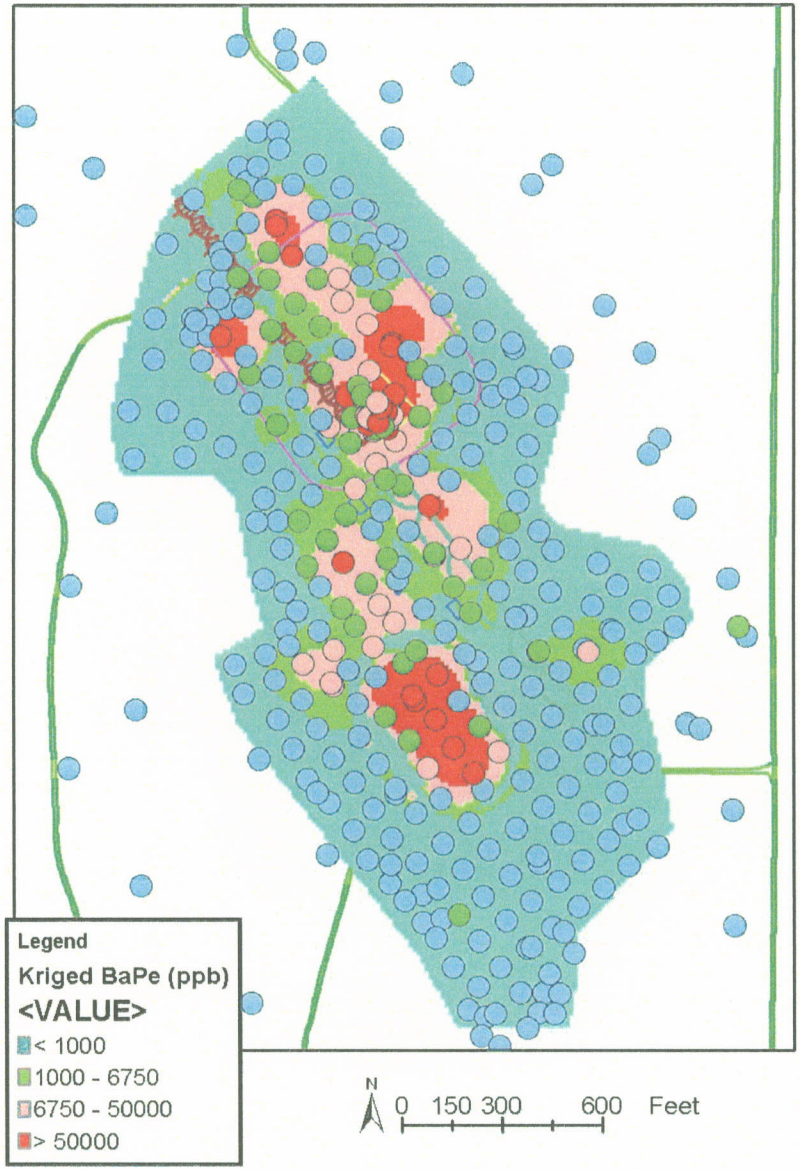


Figure Notes:

This figure demonstrates the point kriged isoconcentration surface of estimated BaPEq in the surficial soils at Site 15. The measured samples are included for comparison purposes.

Figure 12
Kriged Isoconcentration Surface
COC: BaPEq

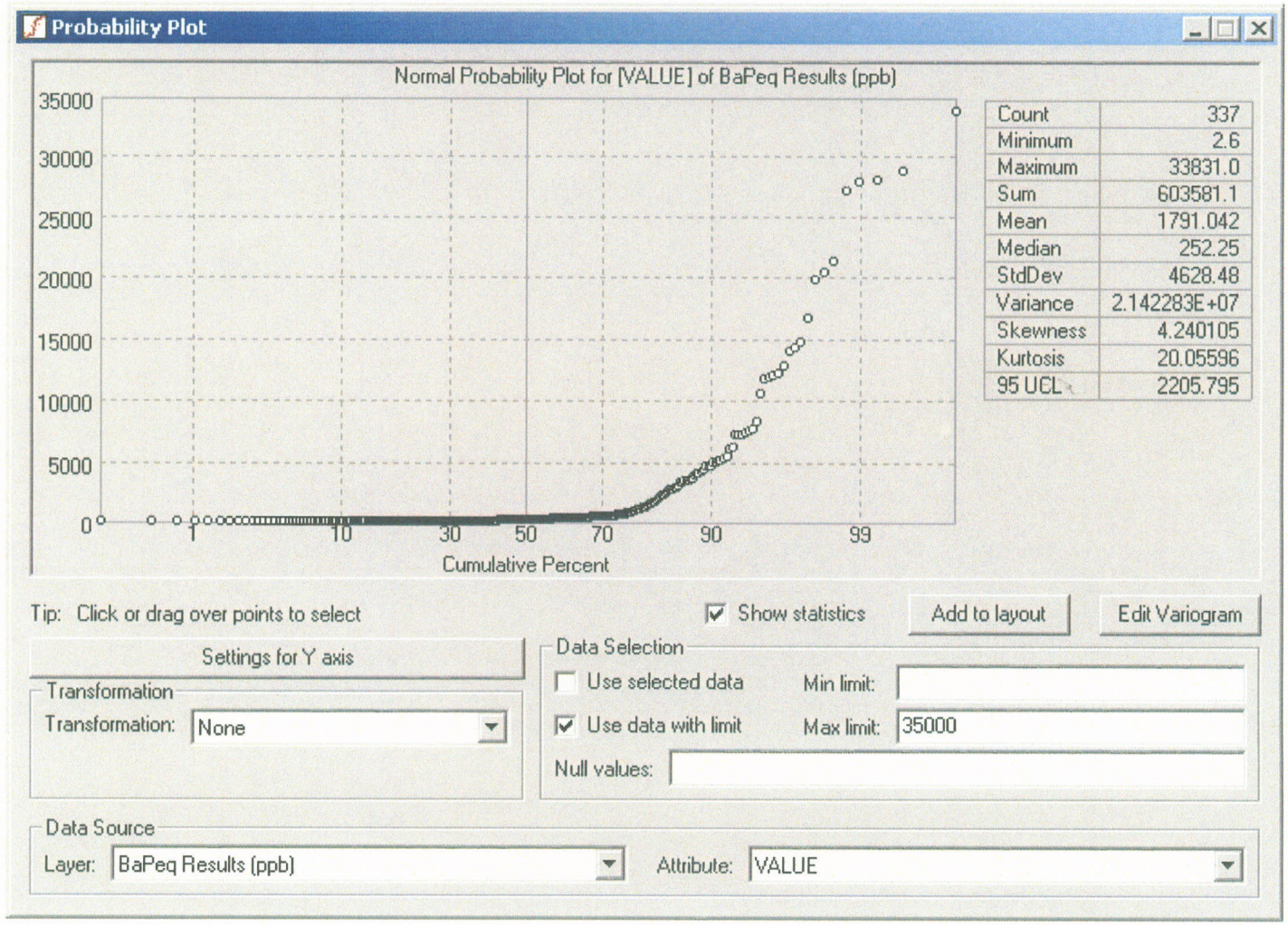


Figure Notes:

This figure demonstrates the probability plot of measured values less than 35,000 ppb. This produces a 95 UCL of 2205 and a mean of 1791 ppb.

Figure 13
Probability Plot of Data
Limited to < 35,000 ppb
COC: BaPEq

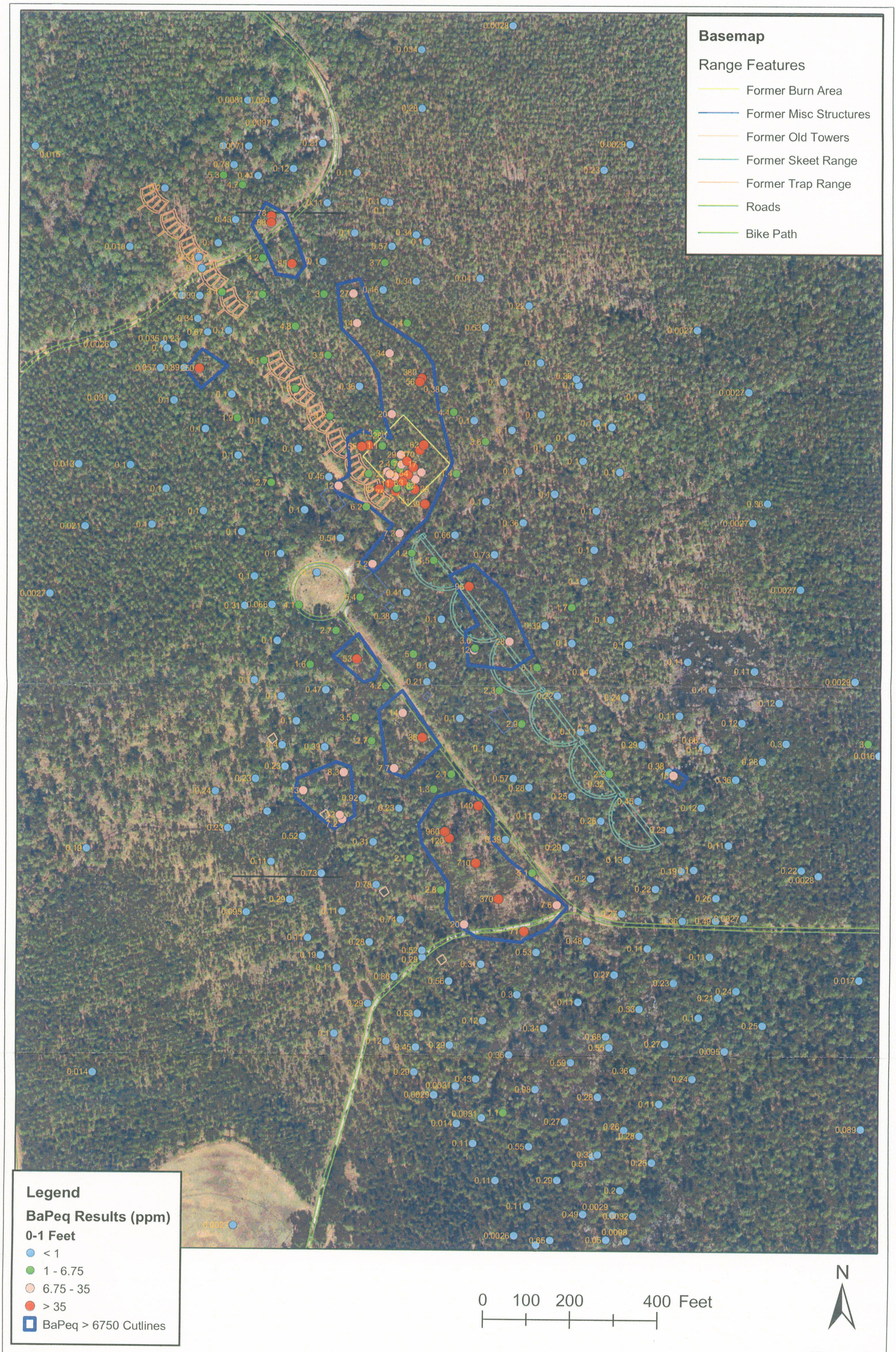


Figure 14
BaPeq Results with Cutlines

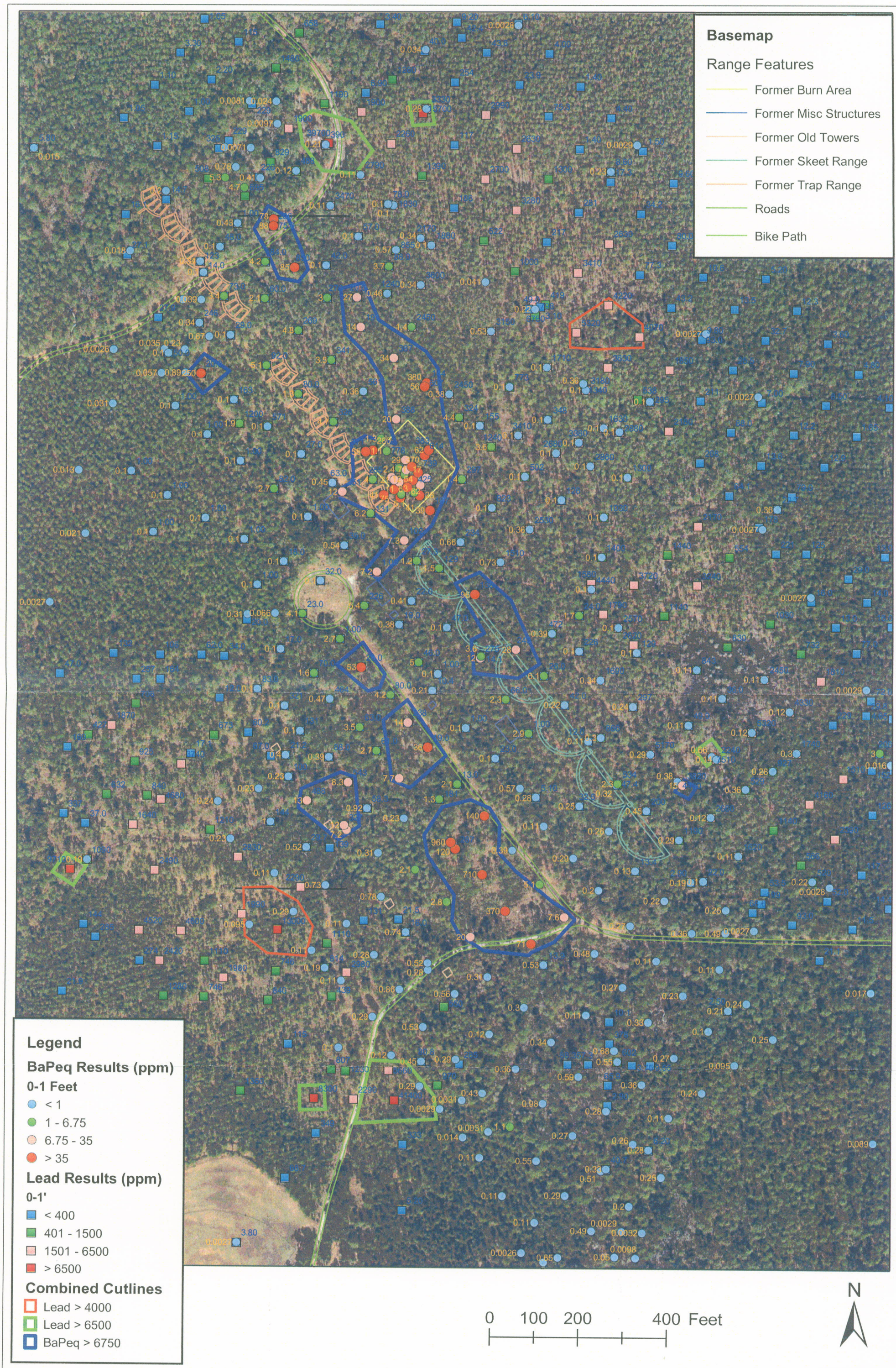


Figure 15
Combined Lead and BaPeq Results with Cutlines

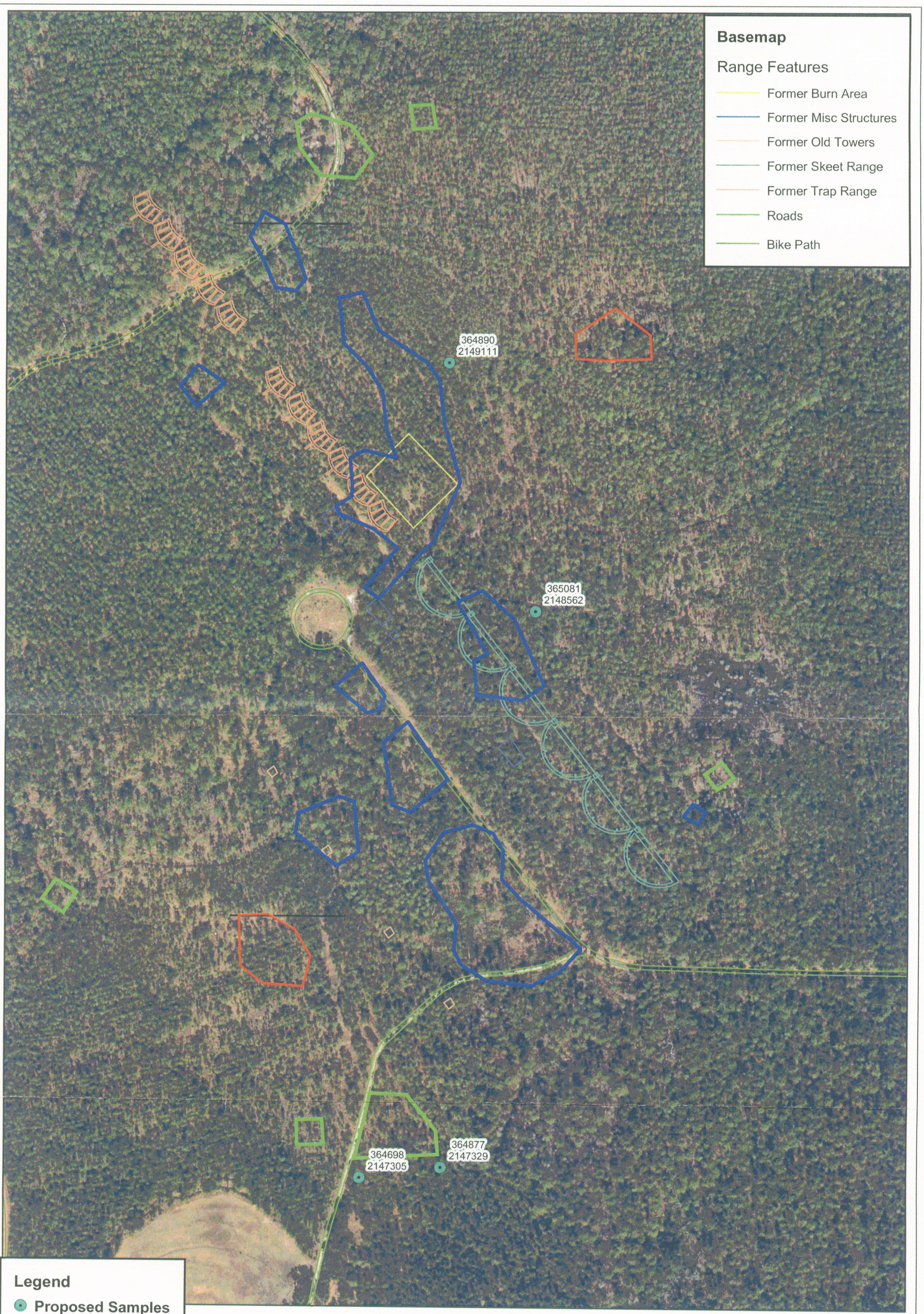


Figure 16
Proposed Pre-Excavation Samples

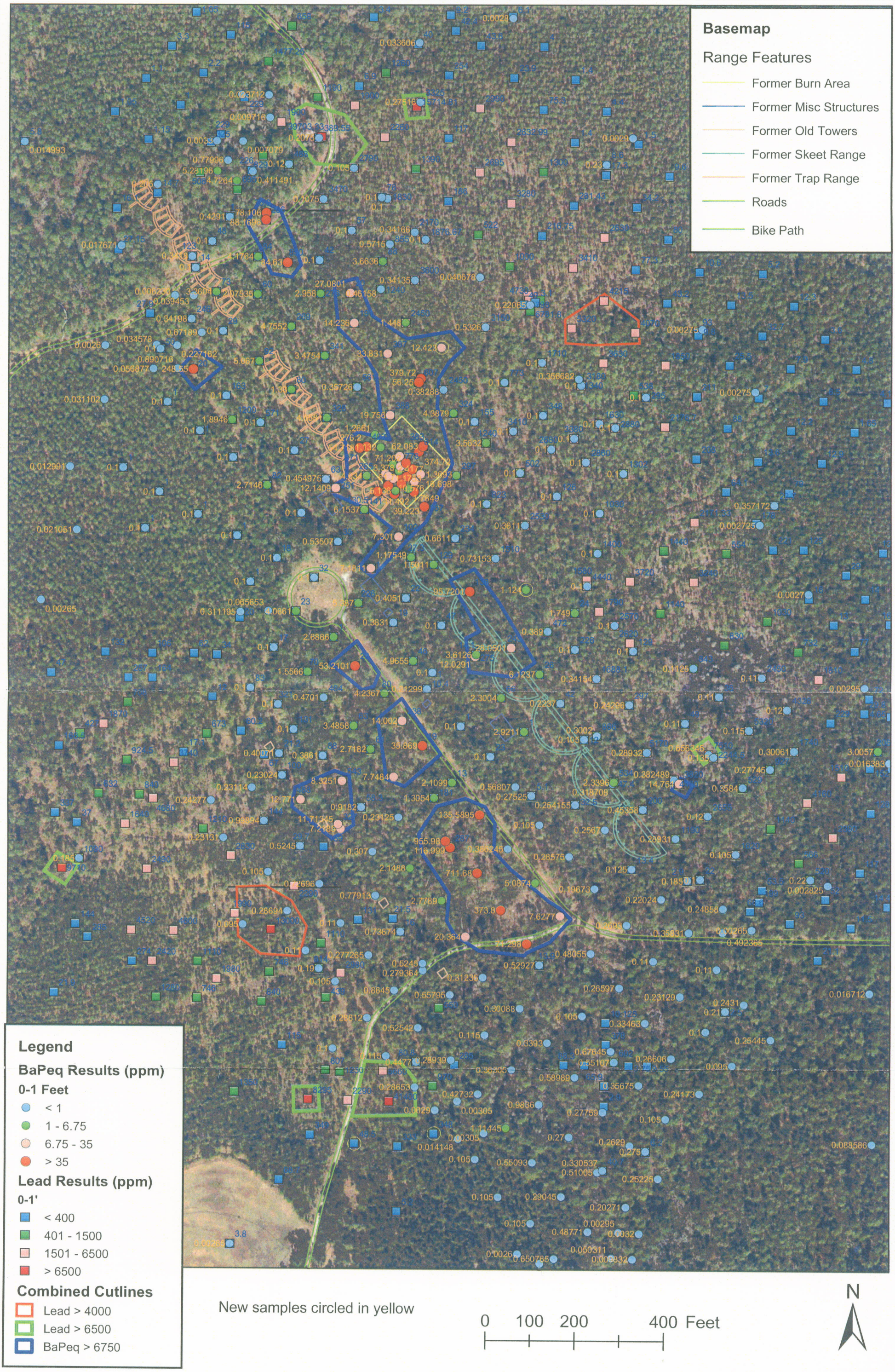


Figure 17
Combined Lead and BaPeq results with Revised Cutlines

APPENDIX E

ANALYTICAL RESULTS DATA BASE

E-1: SOIL

- E-1.1: Screening Soil Analytical Results (August 1994 - April 1995)
- E-1.2: Confirmatory Soil Analytical Results (July 1995 - August 1995)
- E-1.3: Soil Analytical Results (May 1997 - December 1997)
- E-1.4: Supplemental Soil Analytical Results (April 1997 - June 1999)
- E-1.5: Supplemental Soil Analytical Results (May 2003 - August 2003)

E-2: GROUNDWATER

E-3: SEDIMENT

E-4: SURFACE WATER

E-5 ECOLOGICAL

- E-5.1: Invertebrate Analytical Results
- E-5.2: Invertebrate Soil Analytical Results

E-6 ADDITIONAL DATA

- E-6.1: Toxicity Soil Analytical Results
- E-6.2: Sieve and Lead Soil Analytical Results
- E-6.3: SPLP Soil Analytical Results

E-1: SOIL

E-1.1: SCREENING SOIL ANALYTICAL RESULTS
(AUGUST 1994 - APRIL 1995)

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001	CF15SS002	CF15SS003	CF15SS004	CF15SS005	CF15SS006
SAMPLE NUMBER	CF-15-SS001 [08/01/94]	CF-15-SS002 [08/01/94]	CF-15-SS003 [08/01/94]	CF-15-SS004 [08/01/94]	CF-15-SS005 [08/01/94]	CF-15-SS006 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	2900	200 U	200 U	200 U
BENZO(A)ANTHRACENE	520	530	6600	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	410	5300	3400	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	1100	1700	21000	13000	640	420
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	7100	1000	200 U	200 U
PYRENE	1500	2100	17000	10000	610	310
Inorganics (mg/kg)						
LEAD	19	22	129	234	823	502

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007	CF15SS008	CF15SS009	CF15SS010	CF15SS011	CF15SS012
SAMPLE NUMBER	CF-15-SS007 [08/01/94]	CF-15-SS008 [08/01/94]	CF-15-SS009 [08/01/94]	CF-15-SS010 [08/01/94]	CF-15-SS011 [08/01/94]	CF-15-SS012 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	230000	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	11000	410	240
BENZO(A)ANTHRACENE	50000	7500	69000	40000	890	1800
BENZO(A)PYRENE	200 U	5600	200 U	9300	870	2200
BENZO(B)FLUORANTHENE	400 U	6200	400 U	33000	850	2000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	9200	610	890
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	18000	520	1200
CHRYSENE	56000	200 U	70000	43000	200 U	1200
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	21000	400 U	960
FLUORANTHENE	130000	21000	200000	99000	3100	4200
FLUORENE	400 U	400 U	400 U	13000	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	14000	1200	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	38000	6000	60000	28000	200 U	1100
PYRENE	180000	16000	190000	110000	3200	4400
Inorganics (mg/kg)						
LEAD	226	0	102	167	297	1240

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013	CF15SS013	CF15SS014	CF15SS015	CF15SS016	CF15SS017
SAMPLE NUMBER	CF-15-SS013 [08/01/94]	CF-15-SS013 [08/01/94]-D	CF-15-SS014 [08/01/94]	CF-15-SS015 [08/01/94]	CF-15-SS016 [08/01/94]	CF-15-SS017 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	4800	22000	280000	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	1600	25000	200 U
BENZO(A)ANTHRACENE	200 U	200 U	1200	4000	56000	48000
BENZO(A)PYRENE	200 U	200 U	200 U	4100	51000	34000
BENZO(B)FLUORANTHENE	400 U	400 U	1000	4200	48000	41000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	2100	400 U	29000
BENZO(K)FLUORANTHENE	200 U	200 U	410	1900	200 U	16000
CHRYSENE	200 U	200 U	970	4700	89000	13000
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	1200	400 U	19000
FLUORANTHENE	400 U	400 U	2900	14000	220000	130000
FLUORENE	400 U	400 U	460	2100	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	690	4600	88000	34000
PYRENE	200 U	200 U	3100	16000	230000	120000
Inorganics (mg/kg)						
LEAD	32		35	139	503	383

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS018	CF15SS019	CF15SS020	CF15SS021	CF15SS021	CF15SS022
SAMPLE NUMBER	CF-15-SS018 [08/01/94]	CF-15-SS019 [08/01/94]	CF-15-SS020 [08/01/94]	CF-15-SS021 [08/01/94]	CF-15-SS021 [08/01/94]-D	CF-15-SS022 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	190000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	740	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	2800	200 U	200 U	550	200 U	200 U
BENZO(A)PYRENE	2900	200 U	200 U	460	200 U	50000
BENZO(B)FLUORANTHENE	3000	400 U	400 U	820	400 U	44000
BENZO(G,H,I)PERYLENE	1500	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	1500	200 U	200 U	250	200 U	200 U
CHRYSENE	2900	200 U	200 U	450	200 U	97000
DIBENZO(A,H)ANTHRACENE	760	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	8700	400 U	400 U	1100	400 U	150000
FLUORENE	400 U	400 U	400 U	400 U	400 U	22000
INDENO(1,2,3-CD)PYRENE	1300	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	2500	200 U	200 U	310	200 U	45000
PYRENE	5100	200 U	200 U	1200	200 U	170000
Inorganics (mg/kg)						
LEAD	324	18	0	63		371

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS023	CF15SS024	CF15SS025	CF15SS026	CF15SS027	CF15SS028
SAMPLE NUMBER	CF-15-SS023 [08/01/94]	CF-15-SS024 [08/01/94]	CF-15-SS025 [08/01/94]	CF-15-SS026 [08/01/94]	CF-15-SS027 [08/01/94]	CF-15-SS028 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	6200	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	35000	200 U	350	200 U	200 U
BENZO(A)ANTHRACENE	25000	140000	200 U	560	200 U	200 U
BENZO(A)PYRENE	17000	17000	200 U	1900	200 U	4000
BENZO(B)FLUORANTHENE	400 U	51000	400 U	1500	400 U	4200
BENZO(G,H,I)PERYLENE	400 U	50000	400 U	1000	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	33000	200 U	780	200 U	2800
CHRYSENE	25000	120000	200 U	1800	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	15000	400 U	500	400 U	400 U
FLUORANTHENE	72000	380000	400 U	4400	480	12000
FLUORENE	400 U	400 U	400 U	570	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	47000	200 U	990	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	19000	120000	200 U	980	200 U	200 U
PYRENE	67000	280000	200 U	4200	390	14000
Inorganics (mg/kg)						
LEAD	388	607	0	82	27	328

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS029	CF15SS030	CF15SS031	CF15SS032	CF15SS033	CF15SS034
SAMPLE NUMBER	CF-15-SS029 [08/01/94]	CF-15-SS030 [08/01/94]	CF-15-SS031 [08/01/94]	CF-15-SS032 [08/01/94]	CF-15-SS033 [08/01/94]	CF-15-SS034 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	16000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	5600	200 U	200 U	880	200 U
BENZO(A)ANTHRACENE	260	19000	200 U	200 U	200 U	4500
BENZO(A)PYRENE	200 U	19000	200 U	200 U	200 U	2900
BENZO(B)FLUORANTHENE	400 U	18000	400 U	400 U	400 U	3300
BENZO(G,H,I)PERYLENE	400 U	13000	400 U	400 U	400 U	2100
BENZO(K)FLUORANTHENE	200 U	11000	200 U	200 U	200 U	1400
CHRYSENE	260	21000	200 U	200 U	200 U	4300
DIBENZO(A,H)ANTHRACENE	400 U	10000	400 U	400 U	400 U	1400
FLUORANTHENE	800	48000	400 U	400 U	670	11000
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	10000	200 U	200 U	200 U	1700
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	250	16000	200 U	200 U	200 U	3300
PYRENE	750	52000	200 U	200 U	200 U	8800
Inorganics (mg/kg)						
LEAD	561	387	0	0	571	80

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS034	CF15SS035	CF15SS036	CF15SS037	CF15SS038	CF15SS039
SAMPLE NUMBER	CF-15-SS034 [08/01/94]-D	CF-15-SS035 [08/01/94]	CF-15-SS036 [08/01/94]	CF-15-SS037 [08/01/94]	CF-15-SS038 [08/01/94]	CF-15-SS039 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	51000	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	2200	200 U	2200	200 U	200 U	200 U
BENZO(A)ANTHRACENE	8700	4000	9000	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	2600	6000	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	6700	2600	7800	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	7600	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	7400	200 U	3500	200 U	200 U	200 U
CHRYSENE	7700	4400	11000	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	6500	400 U	400 U	400 U
FLUORANTHENE	26000	13000	22000	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	5200	200 U	200 U	200 U	200 U
PYRENE	24000	13000	24000	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD		341	191	0	0	163

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS040	CF15SS041	CF15SS042	CF15SS043	CF15SS044	CF15SS045
SAMPLE NUMBER	CF-15-SS040 [08/01/94]	CF-15-SS041 [08/01/94]	CF-15-SS042 [08/01/94]	CF-15-SS043 [08/01/94]	CF-15-SS044 [08/01/94]	CF-15-SS045 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	12000	200 U	200 U	200 U
BENZO(A)ANTHRACENE	47000	6300	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	3400	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	3400	26000	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	1700	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	36000	4200	37000	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	100000	15000	97000	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	1800	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	4400	42000	200 U	200 U	200 U
PYRENE	110000	17000	100000	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	92	269	276	0	0	

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS046	CF15SS047	CF15SS047	CF15SS048	CF15SS049	CF15SS050
SAMPLE NUMBER	CF-15-SS046 [08/01/94]	CF-15-SS047 [08/01/94]	CF-15-SS047 [08/01/94]-D	CF-15-SS048 [08/01/94]	CF-15-SS049 [08/01/94]	CF-15-SS050 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	8200
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	34000	12000	540
BENZO(A)ANTHRACENE	200 U	4700	3500	200 U	200 U	1600
BENZO(A)PYRENE	200 U	2500	200 U	74000	35000	710
BENZO(B)FLUORANTHENE	400 U	400 U	2800	77000	37000	2200
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	25000	14000	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	42000	24000	1100
CHRYSENE	200 U	5000	3700	100000	200 U	2100
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	330
FLUORANTHENE	400 U	14000	9800	240000	120000	5500
FLUORENE	400 U	22000	400 U	400 U	18000	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	22000	17000	540
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	4100	3100	100000	39000	1200
PYRENE	200 U	16000	11000	250000	130000	5400
Inorganics (mg/kg)						
LEAD	29	60		850	334	60

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS050	CF15SS051	CF15SS052	CF15SS053	CF15SS054	CF15SS055
SAMPLE NUMBER	CF-15-SS050 [08/01/94]-D	CF-15-SS051 [08/01/94]	CF-15-SS052 [08/01/94]	CF-15-SS053 [08/01/94]	CF-15-SS054 [08/01/94]	CF-15-SS055 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	14000	2000 U	2000 U	2000 U	410000	280000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	740	200 U	4200	200 U	26000	21000
BENZO(A)ANTHRACENE	2000	200 U	12000	27000	110000	71000
BENZO(A)PYRENE	780	25000	13000	200 U	17000	47000
BENZO(B)FLUORANTHENE	2600	25000	15000	21000	75000	61000
BENZO(G,H,I)PERYLENE	1200	400 U	4000	400 U	34000	28000
BENZO(K)FLUORANTHENE	1000	14000	8900	200 U	26000	24000
CHRYSENE	2700	39000	19000	25000	82000	200 U
DIBENZO(A,H)ANTHRACENE	720	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	6000	81000	34000	70000	290000	210000
FLUORENE	1200	400 U	7000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	1100	200 U	6900	200 U	24000	26000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	1900	24000	13000	15000	93000	77000
PYRENE	5800	97000	29000	69000	270000	190000
Inorganics (mg/kg)						
LEAD		244	434	169	579	425

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS056	CF15SS057	CF15SS058	CF15SS059	CF15SS060	CF15SS060	CF15SS060
SAMPLE NUMBER	CF-15-SS056 [08/01/94]	CF-15-SS057 [08/01/94]	CF-15-SS058 [08/01/94]	CF-15-SS059 [08/01/94]	CF15SS060	CF-15-SS060 [08/01/94]	CF-15-SS060 [08/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	5/6/1997	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)							
ACENAPHTHENE	2000 U	2000 U	2000 U	140000		2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U		4000 U	4000 U
ANTHRACENE	25000	22000	2600	200 U		37000	200 U
BENZO(A)ANTHRACENE	61000	70000	7100	200 U		120000	15000
BENZO(A)PYRENE	200 U	37000	8400	200 U		200 U	4800
BENZO(B)FLUORANTHENE	14000	12000	8700	29000		16000	22000
BENZO(G,H,I)PERYLENE	41000	34000	2900	400 U		17000	12000
BENZO(K)FLUORANTHENE	68000	17000	4500	12000		80000	8800
CHRYSENE	200 U	200 U	11000	38000		200 U	200 U
DIBENZO(A,H)ANTHRACENE	46000	30000	400 U	400 U		48000	400 U
FLUORANTHENE	38000	130000	22000	100000		250000	50000
FLUORENE	400 U	400 U	5000	400 U		400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	3400	200 U		200 U	10000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U		2000 U	2000 U
PHENANTHRENE	67000	26000	7200	200 U		53000	14000
PYRENE	150000	73000	26000	100000		140000	44000
Inorganics (mg/kg)							
LEAD	739	275	293	431	824		

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS061	CF15SS062	CF15SS063	CF15SS064	CF15SS064	CF15SS065
SAMPLE NUMBER	CF-15-SS061 [08/01/94]	CF-15-SS062 [08/01/94]	CF-15-SS063 [08/01/94]	CF-15-SS064 [08/01/94]	CF-15-SS064 [08/01/94]-D	CF-15-SS065 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	4800	2000 U	2000 U	8500
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	18000	770	4200	6400	560
BENZO(A)ANTHRACENE	21000	66000	200 U	200 U	200 U	2400
BENZO(A)PYRENE	200 U	200 U	1400	24000	26000	2400
BENZO(B)FLUORANTHENE	16000	400 U	1700	22000	28000	3000
BENZO(G,H,I)PERYLENE	400 U	38000	600	14000	7200	400 U
BENZO(K)FLUORANTHENE	200 U	47000	760	11000	11000	1600
CHRYSENE	23000	200 U	200 U	200 U	200 U	2900
DIBENZO(A,H)ANTHRACENE	400 U	400 U	820	400 U	400 U	1800
FLUORANTHENE	52000	120000	2300	60000	74000	6300
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	12000	6800	1400
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	13000	22000	590	17000	22000	1200
PYRENE	56000	66000	2900	36000	40000	7100
Inorganics (mg/kg)						
LEAD	265	314	13	778		46

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS065	CF15SS066	CF15SS067	CF15SS068	CF15SS069	CF15SS070
SAMPLE NUMBER	CF-15-SS065 [09/01/94]-D	CF-15-SS066 [09/01/94]	CF-15-SS067 [09/01/94]	CF-15-SS068 [09/01/94]	CF-15-SS069 [09/01/94]	CF-15-SS070 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	13000	2000 U	2000 U	2500	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	27000	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	20000	530	300	200 U
BENZO(A)PYRENE	4000	200 U	60000	400	200 U	200 U
BENZO(B)FLUORANTHENE	6300	400 U	43000	650	400 U	400 U
BENZO(G,H,I)PERYLENE	15000	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	2200	200 U	52000	280	200 U	200 U
CHRYSENE	200 U	200 U	200 U	730	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	26000	400 U	400 U	400 U
FLUORANTHENE	9000	400 U	170000	1800	750	400 U
FLUORENE	400 U	400 U	31000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	1700	200 U	29000	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	1400	200 U	57000	300	200 U	200 U
PYRENE	9200	200 U	140000	2100	980	200 U
Inorganics (mg/kg)						
LEAD		47	138	1510	2530	126

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS071	CF15SS072	CF15SS073	CF15SS074	CF15SS075	CF15SS076
SAMPLE NUMBER	CF-15-SS071 [09/01/94]	CF-15-SS072 [09/01/94]	CF-15-SS073 [09/01/94]	CF-15-SS074 [09/01/94]	CF-15-SS075 [09/01/94]	CF-15-SS076 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	41000	163000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	2900	11000
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	2000	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	10000	24000
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	12000	27000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	7300	16000
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	8900	14000
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	21000	83000
FLUORENE	400 U	400 U	400 U	400 U	4100	14000
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	3400	10000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2700	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	7000	29000
PYRENE	200 U	200 U	200 U	200 U	28000	66000
Inorganics (mg/kg)						
LEAD	2860	2880	295	0	275	243

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS077	CF15SS078	CF15SS079	CF15SS080	CF15SS081	CF15SS082
SAMPLE NUMBER	CF-15-SS077 [09/01/94]	CF-15-SS078 [09/01/94]	CF-15-SS079 [09/01/94]	CF-15-SS080 [09/01/94]	CF-15-SS081 [09/01/94]	CF-15-SS082 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	3600	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	570	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	1300	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	1700	400 U	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	1100	200 U	200 U	200 U	200 U
CHRYSENE	1000	2000	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	2500	3000	400 U	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	560	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	400	710	200 U	200 U	200 U	200 U
PYRENE	2000	4300	200 U	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	472	24	4440	1400	1030	5470

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS083	CF15SS084	CF15SS084	CF15SS085	CF15SS086	CF15SS087
SAMPLE NUMBER	CF-15-SS083 [09/01/94]	CF-15-SS084 [09/01/94]	CF-15-SS084 [09/01/94]-D	CF-15-SS085 [09/01/94]	CF-15-SS086 [09/01/94]	CF-15-SS087 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	200 U	200 U
PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	2680	3380		1630	3410	348

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS088	CF15SS089	CF15SS090	CF15SS091	CF15SS092	CF15SS093
SAMPLE NUMBER	CF-15-SS088 [09/01/94]	CF-15-SS089 [09/01/94]	CF-15-SS090 [09/01/94]	CF-15-SS091 [09/01/94]	CF-15-SS092 [09/01/94]	CF-15-SS093 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	14000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	650
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	510	1100
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	1100
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	880	1600
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	2100	4500
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	630	1500
PYRENE	200 U	200 U	200 U	200 U	2400	5300
Inorganics (mg/kg)						
LEAD	3180	155	773	1710	2450	3150

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS094	CF15SS094	CF15SS095	CF15SS096	CF15SS097	CF15SS098
SAMPLE NUMBER	CF-15-SS094 [09/01/94]	CF-15-SS094 [09/01/94]-D	CF-15-SS095 [09/01/94]	CF-15-SS096 [09/01/94]	CF-15-SS097 [09/01/94]	CF-15-SS098 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	6700	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	510	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	1100	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	1000	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	1200	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	640	200 U	200 U	200 U
CHRYSENE	200 U	700	1600	350	200 U	580
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	320
FLUORANTHENE	400 U	400 U	4000	610	400 U	1300
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	1700	200 U	200 U	360
PYRENE	200 U	200 U	4200	500	200 U	1700
Inorganics (mg/kg)						
LEAD	30115		3620	3600	1430	1240

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS099	CF15SS100	CF15SS101	CF15SS102	CF15SS103	CF15SS104
SAMPLE NUMBER	CF-15-SS099 [09/01/94]	CF-15-SS100 [09/01/94]	CF-15-SS101 [09/01/94]	CF-15-SS102 [09/01/94]	CF-15-SS103 [09/01/94]	CF-15-SS104 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	140000	11000	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	11000	800	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	910	200 U	200 U
BENZO(A)PYRENE	310	200 U	17000	2900	200 U	200 U
BENZO(B)FLUORANTHENE	400	400 U	21000	3300	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	8600	1300	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	13000	1900	200 U	200 U
CHRYSENE	500	200 U	200 U	3600	660	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	7100	400 U	400 U	400 U
FLUORANTHENE	9800	400 U	72000	4300	840	400 U
FLUORENE	400 U	400 U	12000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	7400	1200	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	2400	200 U	36000	2200	630	200 U
PYRENE	800	200 U	200 U	2200	630	200 U
Inorganics (mg/kg)						
LEAD	855	1830	20	88	2170	42

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS104	CF15SS105	CF15SS106	CF15SS107	CF15SS108	CF15SS109
SAMPLE NUMBER	CF-15-SS104 [09/01/94]-D	CF-15-SS105 [09/01/94]	CF-15-SS106 [09/01/94]	CF-15-SS107 [09/01/94]	CF-15-SS108 [09/01/94]	CF-15-SS109 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	10000	15000	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	770	990	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	2200	560	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	2500	2400	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	3000	2900	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	1300	1300	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	1700	1700	200 U
CHRYSENE	200 U	200 U	200 U	3400	3400	980
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	1300	400 U
FLUORANTHENE	400 U	400 U	450	6100	6600	1900
FLUORENE	400 U	400 U	400 U	950	1300	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	1200	1100	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	2000	2800	200 U
PYRENE	200 U	200 U	1000	2000	1900	200 U
Inorganics (mg/kg)						
LEAD		57	78	73	84	246

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS110	CF15SS111	CF15SS112	CF15SS113	CF15SS114	CF15SS114
SAMPLE NUMBER	CF-15-SS110 [09/01/94]	CF-15-SS111 [09/01/94]	CF-15-SS112 [09/01/94]	CF-15-SS113 [09/01/94]	CF-15-SS114 [09/01/94]	CF-15-SS114 [09/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2300	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	3800	4000	820
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	910
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	2600	200 U	500
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	5700	9200	2200
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	200 U	500
PYRENE	200 U	200 U	200 U	8700	200 U	3200
Inorganics (mg/kg)						
LEAD	50	0	0	23	0	

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS115	CF15SS116	CF15SS117	CF15SS118	CF15SS119	CF15SS120
SAMPLE NUMBER	CF-15-SS115 [09/01/94]	CF-15-SS116 [10/01/94]	CF-15-SS117 [10/01/94]	CF-15-SS118 [10/01/94]	CF-15-SS119 [10/01/94]	CF-15-SS120 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	230000	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	14000	200 U	200 U	200 U	460	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	31000	200 U	200 U	200 U	1200	200 U
BENZO(B)FLUORANTHENE	36000	400 U	400 U	400 U	1300	400 U
BENZO(G,H,I)PERYLENE	15000	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	20000	200 U	200 U	200 U	650	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	17000	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	93000	400 U	400 U	400 U	3700	400 U
FLUORENE	19000	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	14000	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	38000	200 U	200 U	200 U	1100	200 U
PYRENE	33000	200 U	200 U	200 U	2900	200 U
Inorganics (mg/kg)						
LEAD	28	83	17	321	70	131

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS121	CF15SS122	CF15SS123	CF15SS124	CF15SS125	CF15SS125
SAMPLE NUMBER	CF-15-SS121 [10/01/94]	CF-15-SS122 [10/01/94]	CF-15-SS123 [10/01/94]	CF-15-SS124 [10/01/94]	CF-15-SS125 [10/01/94]	CF-15-SS125 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	4800	200 U	620	800	200 U	1300
BENZO(A)ANTHRACENE	200 U	550	1900	2100	200 U	1800
BENZO(A)PYRENE	200 U	200 U	2700	3200	200 U	4200
BENZO(B)FLUORANTHENE	400 U	400 U	2200	4000	400 U	5000
BENZO(G,H,I)PERYLENE	14000	400 U	1700	2200	400 U	2300
BENZO(K)FLUORANTHENE	13000	200 U	1300	2300	200 U	3100
CHRYSENE	200 U	200 U	2800	3700	200 U	5400
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	49000	400 U	5400	7100	2200	10000
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	1600	2000	200 U	2200
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	14000	200 U	1300	2000	610	2800
PYRENE	39000	200 U	3800	5400	1700	6500
Inorganics (mg/kg)						
LEAD	464	88	63	80	61	

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS126	CF15SS127	CF15SS128	CF15SS129	CF15SS130	CF15SS131
SAMPLE NUMBER	CF-15-SS126 [10/01/94]	CF-15-SS127 [10/01/94]	CF-15-SS128 [10/01/94]	CF-15-SS129 [10/01/94]	CF-15-SS130 [10/01/94]	CF-15-SS131 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	15000	12000	200 U	430	1100	200 U
BENZO(A)ANTHRACENE	43000	27000	200 U	1200	3600	200 U
BENZO(A)PYRENE	200 U	36000	200 U	1700	5000	200 U
BENZO(B)FLUORANTHENE	55000	400 U	400 U	1700	5200	400 U
BENZO(G,H,I)PERYLENE	33000	18000	400 U	1000	400 U	400 U
BENZO(K)FLUORANTHENE	53000	22000	200 U	860	2800	200 U
CHRYSENE	72000	51000	200 U	1800	5700	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	140000	110000	400 U	3900	9400	400 U
FLUORENE	25000	18000	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	33000	16000	200 U	1000	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	120000	33000	200 U	910	2700	200 U
PYRENE	380000	84000	200 U	3100	13000	200 U
Inorganics (mg/kg)						
LEAD	238	19	0	66	26	226

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS132	CF15SS133	CF15SS134	CF15SS135	CF15SS135	CF15SS136
SAMPLE NUMBER	CF-15-SS132 [10/01/94]	CF-15-SS133 [10/01/94]	CF-15-SS134 [10/01/94]	CF-15-SS135 [10/01/94]	CF-15-SS135 [10/01/94]-D	CF-15-SS136 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	500	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	26000	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	730	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	540
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	28000	2600	400 U	1800
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	1800	200 U	1200
PYRENE	200 U	200 U	31000	2700	200 U	1100
Inorganics (mg/kg)						
LEAD	2570	23	0	42		6630

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS137	CF15SS138	CF15SS139	CF15SS140	CF15SS141	CF15SS141
SAMPLE NUMBER	CF-15-SS137 [10/01/94]	CF-15-SS138 [10/01/94]	CF-15-SS139 [10/01/94]	CF-15-SS140 [10/01/94]	CF-15-SS141 [10/01/94]	CF-15-SS141 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	340000	12000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	560	61000	1600
BENZO(A)ANTHRACENE	200 U	200 U	200 U	970	120000	3400
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	65000	8700
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	140000	5700
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	29000	2700
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	46000	3900
CHRYSENE	200 U	200 U	200 U	1100	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	68000	3000
FLUORANTHENE	400 U	400 U	400 U	3600	420000	9700
FLUORENE	400 U	400 U	400 U	400 U	58000	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	40000	2300
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	2300	160000	2700
PYRENE	200 U	200 U	200 U	3500	84000	15000
Inorganics (mg/kg)						
LEAD	129	14	48	0	206	

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS142	CF15SS143	CF15SS144	CF15SS145	CF15SS146	CF15SS147
SAMPLE NUMBER	CF-15-SS142 [10/01/94]	CF-15-SS143 [10/01/94]	CF-15-SS144 [10/01/94]	CF-15-SS145 [10/01/94]	CF-15-SS146 [10/01/94]	CF-15-SS147 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	1790	3720	1440	3940	64.1	13.6

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS148	CF15SS149	CF15SS150	CF15SS151	CF15SS152	CF15SS153
SAMPLE NUMBER	CF-15-SS148 [10/01/94]	CF-15-SS149 [10/01/94]	CF-15-SS150 [10/01/94]	CF-15-SS151 [10/01/94]	CF-15-SS152 [10/01/94]	CF-15-SS153 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	12.2	8.5	4.8	2620	1140	3240

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS154	CF15SS155	CF15SS156	CF15SS157	CF15SS158	CF15SS159
SAMPLE NUMBER	CF-15-SS154 [10/01/94]	CF-15-SS155 [10/01/94]	CF-15-SS156 [10/01/94]	CF-15-SS157 [10/01/94]	CF-15-SS158 [10/01/94]	CF-15-SS159 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	554	178	79	12.9	3.3 U	4.1

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS160	CF15SS161	CF15SS161	CF15SS162	CF15SS163	CF15SS164
SAMPLE NUMBER	CF-15-SS160 [10/01/94]	CF-15-SS161 [10/01/94]	CF-15-SS161 [10/01/94]-D	CF-15-SS162 [10/01/94]	CF-15-SS163 [10/01/94]	CF-15-SS164 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	208	31	145	7	7.9	3.6

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS165	CF15SS166	CF15SS167	CF15SS168	CF15SS169	CF15SS170
SAMPLE NUMBER	CF-15-SS165 [10/01/94]	CF-15-SS166 [10/01/94]	CF-15-SS167 [10/01/94]	CF-15-SS168 [10/01/94]	CF-15-SS169 [10/01/94]	CF-15-SS170 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2110	211	25.5	32.7	12.3	538

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS171	CF15SS171	CF15SS172	CF15SS173	CF15SS174	CF15SS175
SAMPLE NUMBER	CF-15-SS171 [10/01/94]	CF-15-SS171 [10/01/94]-D	CF-15-SS172 [10/01/94]	CF-15-SS173 [10/01/94]	CF-15-SS174 [10/01/94]	CF-15-SS175 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	1600	2100	9.8	13.5	5.2	3630

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS176	CF15SS177	CF15SS178	CF15SS179	CF15SS180	CF15SS181
SAMPLE NUMBER	CF-15-SS176 [10/01/94]	CF-15-SS177 [10/01/94]	CF-15-SS178 [10/01/94]	CF-15-SS179 [10/01/94]	CF-15-SS180 [10/01/94]	CF-15-SS181 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	4070	43.2	10.6	3.1 U	5320	4190

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS181	CF15SS182	CF15SS183	CF15SS184	CF15SS185	CF15SS186
SAMPLE NUMBER	CF-15-SS181 [10/01/94]-D	CF-15-SS182 [10/01/94]	CF-15-SS183 [10/01/94]	CF-15-SS184 [10/01/94]	CF-15-SS185 [10/01/94]	CF-15-SS186 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	4240	77.3	80	2.9	419	3410

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS187	CF15SS188	CF15SS189	CF15SS190	CF15SS191	CF15SS191
SAMPLE NUMBER	CF-15-SS187 [10/01/94]	CF-15-SS188 [10/01/94]	CF-15-SS189 [10/01/94]	CF-15-SS190 [10/01/94]	CF-15-SS191 [10/01/94]	CF-15-SS191 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2630	34.2	9.6	1000	388	45.5

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS192	CF15SS193	CF15SS194	CF15SS195	CF15SS196	CF15SS197
SAMPLE NUMBER	CF-15-SS192 [10/01/94]	CF-15-SS193 [10/01/94]	CF-15-SS194 [10/01/94]	CF-15-SS195 [10/01/94]	CF-15-SS196 [10/01/94]	CF-15-SS197 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	769	17.3	3 U	522	3280	1300

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS198	CF15SS199	CF15SS200	CF15SS201	CF15SS201	CF15SS202
SAMPLE NUMBER	CF-15-SS198 [10/01/94]	CF-15-SS199 [10/01/94]	CF-15-SS200 [10/01/94]	CF-15-SS201 [10/01/94]	CF-15-SS201 [10/01/94]-D	CF-15-SS202 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2.8 U	4.4	186	2540	2850	5250

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS203	CF15SS204	CF15SS205	CF15SS206	CF15SS207	CF15SS208
SAMPLE NUMBER	CF-15-SS203 [10/01/94]	CF-15-SS204 [10/01/94]	CF-15-SS205 [10/01/94]	CF-15-SS206 [10/01/94]	CF-15-SS207 [10/01/94]	CF-15-SS208 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	75.3	2.8 U	1390	117	2990	23.9

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS209	CF15SS210	CF15SS211	CF15SS211	CF15SS212	CF15SS213
SAMPLE NUMBER	CF-15-SS209 [10/01/94]	CF-15-SS210 [10/01/94]	CF-15-SS211 [10/01/94]	CF-15-SS211 [10/01/94]-D	CF-15-SS212 [10/01/94]	CF-15-SS213 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE		210 U	210 U			
ACENAPHTHYLENE		210 U	210 U			
ANTHRACENE		210 U	210 U			
BENZO(A)ANTHRACENE		210 U	210 U			
BENZO(A)PYRENE		210 U	210 U			
BENZO(B)FLUORANTHENE		210 U	210 U			
BENZO(G,H,I)PERYLENE		210 U	210 U			
BENZO(K)FLUORANTHENE		210 U	210 U			
CHRYSENE		210 U	210 U			
DIBENZO(A,H)ANTHRACENE		210 U	210 U			
FLUORANTHENE		210 U	210 U			
FLUORENE		210 U	210 U			
INDENO(1,2,3-CD)PYRENE		210 U	210 U			
NAPHTHALENE		210 U	210 U			
PHENANTHRENE		210 U	210 U			
PYRENE		210 U	210 U			
Inorganics (mg/kg)						
LEAD	4	3470	2310	3270	2260	25000

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS214	CF15SS215	CF15SS216	CF15SS217	CF15SS218	CF15SS219
SAMPLE NUMBER	CF-15-SS214 [10/01/94]	CF-15-SS215 [10/01/94]	CF-15-SS216 [10/01/94]	CF-15-SS217 [10/01/94]	CF-15-SS218 [10/01/94]	CF-15-SS219 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE				240 U		
ACENAPHTHYLENE				240 U		
ANTHRACENE				240 U		
BENZO(A)ANTHRACENE				240 U		
BENZO(A)PYRENE				240 U		
BENZO(B)FLUORANTHENE				240 U		
BENZO(G,H,I)PERYLENE				240 U		
BENZO(K)FLUORANTHENE				240 U		
CHRYSENE				240 U		
DIBENZO(A,H)ANTHRACENE				240 U		
FLUORANTHENE				240 U		
FLUORENE				240 U		
INDENO(1,2,3-CD)PYRENE				240 U		
NAPHTHALENE				240 U		
PHENANTHRENE				240 U		
PYRENE				240 U		
Inorganics (mg/kg)						
LEAD	254	43.8	6.1	488	65500	1900

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS220	CF15SS221	CF15SS221	CF15SS222	CF15SS223	CF15SS224
SAMPLE NUMBER	CF-15-SS220 [10/01/94]	CF-15-SS221 [10/01/94]	CF-15-SS221 [10/01/94]-D	CF-15-SS222 [10/01/94]	CF-15-SS223 [10/01/94]	CF-15-SS224 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						220 U
ACENAPHTHYLENE						220 U
ANTHRACENE						220 U
BENZO(A)ANTHRACENE						690
BENZO(A)PYRENE						630
BENZO(B)FLUORANTHENE						890
BENZO(G,H,I)PERYLENE						390
BENZO(K)FLUORANTHENE						810
CHRYSENE						1100
DIBENZO(A,H)ANTHRACENE						220 U
FLUORANTHENE						1200
FLUORENE						220 U
INDENO(1,2,3-CD)PYRENE						220 U
NAPHTHALENE						220 U
PHENANTHRENE						340
PYRENE						1300
Inorganics (mg/kg)						
LEAD	1260	40	40	9.2	3.2	90.2

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS224	CF15SS225	CF15SS226	CF15SS227	CF15SS228	CF15SS229
SAMPLE NUMBER	CF-15-SS224 [10/01/94]-D	CF-15-SS225 [10/01/94]	CF-15-SS226 [10/01/94]	CF-15-SS227 [10/01/94]	CF-15-SS228 [10/01/94]	CF-15-SS229 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE		200 U	210 U	9900 U	200 U	210 U
ACENAPHTHYLENE		200 U	210 U	9900 U	200 U	210 U
ANTHRACENE		200 U	210 U	9900 U	200 U	210 U
BENZO(A)ANTHRACENE		200 U	930	120000	240	280
BENZO(A)PYRENE		200 U	900	96000	200 U	210 U
BENZO(B)FLUORANTHENE		200 U	1400	120000	400	460
BENZO(G,H,I)PERYLENE		200 U	990	73000	200 U	210 U
BENZO(K)FLUORANTHENE		200 U	1300	9900 U	200 U	460
CHRYSENE		250	1400	140000	250	1100
DIBENZO(A,H)ANTHRACENE		200 U	210 U	11000	200 U	210 U
FLUORANTHENE		200 U	1800	170000	200 U	260
FLUORENE		200 U	210 U	9900 U	200 U	210 U
INDENO(1,2,3-CD)PYRENE		200 U	530	44000	200 U	210 U
NAPHTHALENE		200 U	210 U	9900 U	200 U	210 U
PHENANTHRENE		200 U	530	45000	200 U	210 U
PYRENE		200 U	1800	160000	200 U	290
Inorganics (mg/kg)						
LEAD	26.4		181		5.1	866

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS210	CF15SS230	CF15SS230	CF15SS231	CF15SS232	CF15SS233	CF15SS234
SAMPLE NUMBER	CF15SS210 [12/01/94]	CF-15-SS230 [10/01/94]	CF15SS230 [03/01/95]	CF-15-SS231 [10/01/94]	CF15SS232 [03/01/95]	CF15SS233 [03/01/95]	CF15SS234 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	10/1/1994	3/1/1995	10/1/1994	3/1/1995	3/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	220 U		210 U			190 U	210 U
ACENAPHTHYLENE	220 U		210 U			190 U	210 U
ANTHRACENE	220 U		210 U			190 U	210 U
BENZO(A)ANTHRACENE	220 U		210 U			200	450
BENZO(A)PYRENE	220 U		210 U			190 U	260
BENZO(B)FLUORANTHENE	220 U		210 U			190 U	350
BENZO(G,H,I)PERYLENE	220 U		210 U			190 U	320
BENZO(K)FLUORANTHENE	220 U		210 U			190 U	300
CHRYSENE	220 U		410			290	680
DIBENZO(A,H)ANTHRACENE	220 U		210 U			190 U	210 U
FLUORANTHENE	220 U		210 U			230	310
FLUORENE	220 U		210 U			190 U	210 U
INDENO(1,2,3-CD)PYRENE	220 U		210 U			190 U	210 U
NAPHTHALENE	220 U		210 U			190 U	210 U
PHENANTHRENE	220 U		210 U			190 U	210 U
PYRENE	220 U		210 U			190 U	360
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS210	CF15SS230	CF15SS230	CF15SS231	CF15SS232	CF15SS233	CF15SS234
SAMPLE NUMBER	CF15SS210 [12/01/94]	CF-15-SS230 [10/01/94]	CF15SS230 [03/01/95]	CF-15-SS231 [10/01/94]	CF15SS232 [03/01/95]	CF15SS233 [03/01/95]	CF15SS234 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	10/1/1994	3/1/1995	10/1/1994	3/1/1995	3/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD		297		17.1	67	100	144

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS234	CF15SS235	CF15SS236	CF15SS237	CF15SS238	CF15SS239	CF15SS239
SAMPLE NUMBER	CF15SS234 [01/01/95]-D	CF15SS235 [01/01/95]	CF15SS236 [01/01/95]	CF15SS237 [01/01/95]	CF15SS238 [01/01/95]	CF15SS239 [01/01/95]	CF15SS239 [01/01/95]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	210 U	2100 U	1000 U	210 U	210 U	1000 U	1000 U
ACENAPHTHYLENE	210 U	2100 U	1000 U	210 U	210 U	1000 U	1000 U
ANTHRACENE	210 U	2100 U	1000 U	210 U	210 U	1000 U	1000 U
BENZO(A)ANTHRACENE	1300	6900	5300	210 U	380	9100	3500
BENZO(A)PYRENE	1100	9300	5300	210 U	330	12000	4800
BENZO(B)FLUORANTHENE	1300	11000	5000	210 U	350	14000	5900
BENZO(G,H,I)PERYLENE	1400	5500	5400	210 U	460	9300	4100
BENZO(K)FLUORANTHENE	1300	12000	5800	210 U	280	15000	6700
CHRYSENE	4700	11000	7100	210 U	3200	14000	5900
DIBENZO(A,H)ANTHRACENE	210 U	2100 U	1500	210 U	210 U	1600	1000 U
FLUORANTHENE	1800	15000	7100	210 U	320	20000	7800
FLUORENE	210 U	2100 U	1000 U	210 U	210 U	1000 U	1000 U
INDENO(1,2,3-CD)PYRENE	560	5000	4300	210 U	210 U	7300	3100
NAPHTHALENE	270	2100 U	1000 U	210 U	210 U	1000 U	1000 U
PHENANTHRENE	610	4800	2400	210 U	210 U	5500	2400
PYRENE	1500	14000	6400	210 U	370	19000	6900
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS234	CF15SS235	CF15SS236	CF15SS237	CF15SS238	CF15SS239	CF15SS239
SAMPLE NUMBER	CF15SS234 [01/01/95]-D	CF15SS235 [01/01/95]	CF15SS236 [01/01/95]	CF15SS237 [01/01/95]	CF15SS238 [01/01/95]	CF15SS239 [01/01/95]	CF15SS239 [01/01/95]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD		488	543		29.7		

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS239	CF15SS240	CF15SS241	CF15SS242	CF15SS243	CF15SS244	CF15SS245
SAMPLE NUMBER	CF15SS239 [03/01/95]	CF15SS240 [01/01/95]	CF15SS241 [01/01/95]	CF15SS242 [01/01/95]	CF15SS243 [01/01/95]	CF15SS244 [01/01/95]	CF15SS245 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE		1000 U	210 U	230 U	250 U	210 U	220 U
ACENAPHTHYLENE		1000 U	210 U	230 U	250 U	210 U	220 U
ANTHRACENE		1000 U	210 U	230 U	250 U	210 U	220 U
BENZO(A)ANTHRACENE		4300	370	580	250 U	1200	220 U
BENZO(A)PYRENE		5700	210 U	480	250 U	1600	220 U
BENZO(B)FLUORANTHENE		6800	210 U	560	280	1800	220 U
BENZO(G,H,I)PERYLENE		4100	210 U	230 U	250 U	510	220 U
BENZO(K)FLUORANTHENE		7200	210 U	570	270	1800	220 U
CHRYSENE		6400	390	760	1300	1900	220 U
DIBENZO(A,H)ANTHRACENE		1000 U	210 U	230 U	250 U	210 U	220 U
FLUORANTHENE		9500	210 U	660	300	2700	220 U
FLUORENE		1000 U	210 U	230 U	250 U	210 U	220 U
INDENO(1,2,3-CD)PYRENE		3600	280	230 U	250 U	850	220 U
NAPHTHALENE		1000 U	210 U	230 U	250 U	210 U	220 U
PHENANTHRENE		3000	210 U	230 U	250 U	1100	220 U
PYRENE		8500	210 U	450	250 U	2300	220 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS239	CF15SS240	CF15SS241	CF15SS242	CF15SS243	CF15SS244	CF15SS245
SAMPLE NUMBER	CF15SS239 [03/01/95]	CF15SS240 [01/01/95]	CF15SS241 [01/01/95]	CF15SS242 [01/01/95]	CF15SS243 [01/01/95]	CF15SS244 [01/01/95]	CF15SS245 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	327					13	

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS246	CF15SS247	CF15SS248	CF15SS249	CF15SS249	CF15SS250	CF15SS251
SAMPLE NUMBER	CF15SS246 [01/01/95]	CF15SS247 [01/01/95]	CF15SS248 [01/01/95]	CF15SS249 [01/01/95]	CF15SS249 [01/01/95]-D	CF15SS250 [01/01/95]	CF15SS251 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	220 U	210 U	220 U	100000 U	21000 U	230 U	210 U
ACENAPHTHYLENE	220 U	210 U	220 U	100000 U	21000 U	230 U	210 U
ANTHRACENE	220 U	210 U	220 U	110000	21000 U	230 U	210 U
BENZO(A)ANTHRACENE	220 U	540	1300	1300000	270000	400	210 U
BENZO(A)PYRENE	220 U	530	1500	1100000	240000	320	210 U
BENZO(B)FLUORANTHENE	220 U	510	1700	1300000	280000	590	210 U
BENZO(G,H,I)PERYLENE	220 U	360	1200	820000	170000	230 U	210 U
BENZO(K)FLUORANTHENE	220 U	550	2200	1500000	290000	420	210 U
CHRYSENE	220 U	630	1800	1700000	360000	870	210 U
DIBENZO(A,H)ANTHRACENE	220 U	210 U	230	140000	29000	230 U	210 U
FLUORANTHENE	220 U	660	2600	2000000	420000	640	210 U
FLUORENE	220 U	210 U	220 U	100000 U	21000 U	230 U	210 U
INDENO(1,2,3-CD)PYRENE	220 U	330	950	560000	120000	290	210 U
NAPHTHALENE	220 U	210 U	220 U	100000 U	21000 U	230 U	210 U
PHENANTHRENE	220 U	210 U	670	600000	120000	230 U	210 U
PYRENE	220 U	650	2500	1800000	370000	600	210 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS246	CF15SS247	CF15SS248	CF15SS249	CF15SS249	CF15SS250	CF15SS251
SAMPLE NUMBER	CF15SS246 [01/01/95]	CF15SS247 [01/01/95]	CF15SS248 [01/01/95]	CF15SS249 [01/01/95]	CF15SS249 [01/01/95]-D	CF15SS250 [01/01/95]	CF15SS251 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							12

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS252	CF15SS252	CF15SS253	CF15SS254	CF15SS255	CF15SS256	CF15SS257
SAMPLE NUMBER	CF15SS252 [03/01/95]	CF15SS252 [03/01/95]-D	CF15SS253 [01/01/95]	CF15SS254 [01/01/95]	CF15SS255 [01/01/95]	CF15SS256 [01/01/95]	CF15SS257 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	230 U	220 U					
ACENAPHTHYLENE	230 U	220 U					
ANTHRACENE	230 U	220 U					
BENZO(A)ANTHRACENE	230 U	220 U					
BENZO(A)PYRENE	230 U	220 U					
BENZO(B)FLUORANTHENE	230 U	220 U					
BENZO(G,H,I)PERYLENE	230 U	220 U					
BENZO(K)FLUORANTHENE	230 U	220 U					
CHRYSENE	230 U	220 U					
DIBENZO(A,H)ANTHRACENE	230 U	220 U					
FLUORANTHENE	230 U	220 U					
FLUORENE	230 U	220 U					
INDENO(1,2,3-CD)PYRENE	230 U	220 U					
NAPHTHALENE	230 U	220 U					
PHENANTHRENE	230 U	220 U					
PYRENE	230 U	220 U					
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS252	CF15SS252	CF15SS253	CF15SS254	CF15SS255	CF15SS256	CF15SS257
SAMPLE NUMBER	CF15SS252 [03/01/95]	CF15SS252 [03/01/95]-D	CF15SS253 [01/01/95]	CF15SS254 [01/01/95]	CF15SS255 [01/01/95]	CF15SS256 [01/01/95]	CF15SS257 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	843		830	1030	16	29	13

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS258	CF15SS259	CF15SS260	CF15SS261	CF15SS262	CF15SS263	CF15SS263
SAMPLE NUMBER	CF15SS258 [01/01/95]	CF15SS259 [01/01/95]	CF15SS260 [01/01/95]	CF15SS261 [01/01/95]	CF15SS262 [01/01/95]	CF15SS263 [01/01/95]	CF15SS263 [01/01/95]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	210 U	230 U	180 U	2400 U	46000 U	210 U	210 U
ACENAPHTHYLENE	210 U	230 U	180 U	2400 U	46000 U	210 U	210 U
ANTHRACENE	210 U	230 U	180 U	2400 U	74000	210 U	210 U
BENZO(A)ANTHRACENE	210 U	230	790	2400 U	420000	270	380
BENZO(A)PYRENE	210 U	230 U	500	2400 U	520000	210 U	300
BENZO(B)FLUORANTHENE	210 U	230 U	530	2400 U	520000	210 U	540
BENZO(G,H,I)PERYLENE	210 U	230 U	180 U	2400 U	360000	210 U	210 U
BENZO(K)FLUORANTHENE	210 U	230 U	490	2400 U	710000	210 U	500
CHRYSENE	210 U	230 U	840	6900	580000	320	620
DIBENZO(A,H)ANTHRACENE	210 U	230 U	180 U	2400 U	65000	210 U	210 U
FLUORANTHENE	210 U	230 U	590	2400 U	1000000	230	590
FLUORENE	210 U	230 U	180 U	2400 U	46000 U	210 U	210 U
INDENO(1,2,3-CD)PYRENE	210 U	230 U	180 U	2400 U	250000	210 U	210 U
NAPHTHALENE	210 U	230 U	180 U	2400 U	46000 U	210 U	210 U
PHENANTHRENE	210 U	230 U	180	2400 U	370000	210 U	210 U
PYRENE	210 U	230 U	630	2400 U	900000	290	450
SPLP Semivolatiles (ug/L)							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS258	CF15SS259	CF15SS260	CF15SS261	CF15SS262	CF15SS263	CF15SS263
SAMPLE NUMBER	CF15SS258 [01/01/95]	CF15SS259 [01/01/95]	CF15SS260 [01/01/95]	CF15SS261 [01/01/95]	CF15SS262 [01/01/95]	CF15SS263 [01/01/95]	CF15SS263 [01/01/95]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD			16				

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS264	CF15SS265	CF15SS266	CF15SS267	CF15SS268	CF15SS269	CF15SS270
SAMPLE NUMBER	CF15SS264 [01/01/95]	CF15SS265 [01/01/95]	CF15SS266 [01/01/95]	CF15SS267 [01/01/95]	CF15SS268 [03/01/95]	CF15SS269 [03/01/95]	CF15SS270 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	210 U	210 U	220 U	250 U	220 U	220 U	220 U
ACENAPHTHYLENE	210 U	210 U	220 U	250 U	220 U	220 U	220 U
ANTHRACENE	210 U	210 U	220 U	250 U	220 U	220 U	220 U
BENZO(A)ANTHRACENE	210 U	220	1300	250 U	220 U	220 U	220 U
BENZO(A)PYRENE	210 U	210 U	1600	250 U	220 U	220 U	220 U
BENZO(B)FLUORANTHENE	210 U	210 U	2200	250 U	220 U	220 U	220 U
BENZO(G,H,I)PERYLENE	210 U	210 U	1600	250 U	220 U	220 U	220 U
BENZO(K)FLUORANTHENE	210 U	210 U	2300	250 U	220 U	220 U	220 U
CHRYSENE	210 U	210 U	2600	570	220 U	220 U	220 U
DIBENZO(A,H)ANTHRACENE	210 U	210 U	270	250 U	220 U	220 U	220 U
FLUORANTHENE	210 U	210 U	2800	250 U	220 U	220 U	220 U
FLUORENE	210 U	210 U	220 U	250 U	220 U	220 U	220 U
INDENO(1,2,3-CD)PYRENE	210 U	210 U	940	250 U	220 U	220 U	220 U
NAPHTHALENE	210 U	210 U	220 U	250 U	220 U	220 U	220 U
PHENANTHRENE	210 U	210 U	1100	250 U	220 U	220 U	220 U
PYRENE	210 U	210 U	2600	250 U	220 U	220 U	220 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS264	CF15SS265	CF15SS266	CF15SS267	CF15SS268	CF15SS269	CF15SS270
SAMPLE NUMBER	CF15SS264 [01/01/95]	CF15SS265 [01/01/95]	CF15SS266 [01/01/95]	CF15SS267 [01/01/95]	CF15SS268 [03/01/95]	CF15SS269 [03/01/95]	CF15SS270 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD		32.5	534	5170	49	36	2450

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS271	CF15SS272	CF15SS273	CF15SS274	CF15SS275	CF15SS276	CF15SS277
SAMPLE NUMBER	CF15SS271 [01/01/95]	CF15SS272 [01/01/95]	CF15SS273 [01/01/95]	CF15SS274 [01/01/95]	CF15SS275 [01/01/95]	CF15SS276 [01/01/95]	CF15SS277 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE					230 U	240 U	230 U
ACENAPHTHYLENE					230 U	240 U	230 U
ANTHRACENE					230 U	240 U	230 U
BENZO(A)ANTHRACENE					330	530	370
BENZO(A)PYRENE					230 U	570	310
BENZO(B)FLUORANTHENE					230 U	800	450
BENZO(G,H,I)PERYLENE					230 U	490	230 U
BENZO(K)FLUORANTHENE					230 U	840	490
CHRYSENE					970	3100	1100
DIBENZO(A,H)ANTHRACENE					230 U	240 U	230 U
FLUORANTHENE					230 U	890	530
FLUORENE					230 U	240 U	230 U
INDENO(1,2,3-CD)PYRENE					230 U	300	230 U
NAPHTHALENE					230 U	240 U	230 U
PHENANTHRENE					230 U	290	230 U
PYRENE					230 U	770	420
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS271	CF15SS272	CF15SS273	CF15SS274	CF15SS275	CF15SS276	CF15SS277
SAMPLE NUMBER	CF15SS271 [01/01/95]	CF15SS272 [01/01/95]	CF15SS273 [01/01/95]	CF15SS274 [01/01/95]	CF15SS275 [01/01/95]	CF15SS276 [01/01/95]	CF15SS277 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	732	13	14	13			

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS278	CF15SS279	CF15SS280	CF15SS281	CF15SS281	CF15SS282	CF15SS283
SAMPLE NUMBER	CF15SS278 [01/01/95]	CF15SS279 [01/01/95]	CF15SS280 [01/01/95]	CF15SS281 [01/01/95]	CF15SS281 [01/01/95]-D	CF15SS282 [01/01/95]	CF15SS283 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	2800 U	22000 U	200 U	230 U	230 U	220 U	210 U
ACENAPHTHYLENE	2800 U	22000 U	200 U	230 U	230 U	220 U	210 U
ANTHRACENE	2800 U	41000	380	230 U	230 U	220 U	210 U
BENZO(A)ANTHRACENE	11000	210000	2900	310	230 U	220 U	310
BENZO(A)PYRENE	15000	270000	3600	230 U	230 U	220 U	260
BENZO(B)FLUORANTHENE	18000	310000	4500	290	230 U	220 U	420
BENZO(G,H,I)PERYLENE	11000	220000	3000	230 U	230 U	220 U	210 U
BENZO(K)FLUORANTHENE	20000	350000	4300	290	230 U	220 U	460
CHRYSENE	24000	300000	4400	1100	350	2600	480
DIBENZO(A,H)ANTHRACENE	2800 U	33000	510	230 U	230 U	220 U	210 U
FLUORANTHENE	26000	560000	6400	290	230 U	220 U	350
FLUORENE	2800 U	22000 U	200 U	230 U	230 U	220 U	210 U
INDENO(1,2,3-CD)PYRENE	8400	150000	1900	230 U	230 U	220 U	210 U
NAPHTHALENE	2800 U	22000 U	200	230 U	230 U	220 U	210 U
PHENANTHRENE	8700	210000	2100	230 U	230 U	220 U	210 U
PYRENE	23000	480000	5600	280	230 U	220 U	360
SPLP Semivolatiles (ug/L)							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS278	CF15SS279	CF15SS280	CF15SS281	CF15SS281	CF15SS282	CF15SS283
SAMPLE NUMBER	CF15SS278 [01/01/95]	CF15SS279 [01/01/95]	CF15SS280 [01/01/95]	CF15SS281 [01/01/95]	CF15SS281 [01/01/95]-D	CF15SS282 [01/01/95]	CF15SS283 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							200

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS284	CF15SS285	CF15SS286	CF15SS287	CF15SS288	CF15SS289	CF15SS290
SAMPLE NUMBER	CF15SS284 [01/01/95]	CF15SS285 [03/01/95]	CF15SS286 [03/01/95]	CF15SS287 [03/01/95]	CF15SS288 [03/01/95]	CF15SS289 [03/01/95]	CF15SS290 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	2800 U	270 U	230 U	240 U			
ACENAPHTHYLENE	2800 U	270 U	230 U	240 U			
ANTHRACENE	2800 U	270 U	230 U	240 U			
BENZO(A)ANTHRACENE	8300	270 U	230 U	240 U			
BENZO(A)PYRENE	11000	270 U	230 U	240 U			
BENZO(B)FLUORANTHENE	11000	270 U	230 U	240 U			
BENZO(G,H,I)PERYLENE	5700	270 U	230 U	240 U			
BENZO(K)FLUORANTHENE	13000	270 U	230 U	240 U			
CHRYSENE	11000	270 U	230 U	240 U			
DIBENZO(A,H)ANTHRACENE	2800 U	270 U	230 U	240 U			
FLUORANTHENE	21000	270 U	230 U	240 U			
FLUORENE	2800 U	270 U	230 U	240 U			
INDENO(1,2,3-CD)PYRENE	2800	270 U	230 U	240 U			
NAPHTHALENE	2800 U	270 U	230 U	240 U			
PHENANTHRENE	12000	270 U	230 U	240 U			
PYRENE	19000	270 U	230 U	240 U			
SPLP Semivolatiles (ug/L)							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS284	CF15SS285	CF15SS286	CF15SS287	CF15SS288	CF15SS289	CF15SS290
SAMPLE NUMBER	CF15SS284 [01/01/95]	CF15SS285 [03/01/95]	CF15SS286 [03/01/95]	CF15SS287 [03/01/95]	CF15SS288 [03/01/95]	CF15SS289 [03/01/95]	CF15SS290 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	3820	6810	5320	3260	1810	77	16

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS291	CF15SS292	CF15SS293	CF15SS294	CF15SS295	CF15SS296	CF15SS297
SAMPLE NUMBER	CF15SS291 [01/01/95]	CF15SS292 [01/01/95]	CF15SS293 [01/01/95]	CF15SS294 [01/01/95]	CF15SS295 [01/01/95]	CF15SS296 [01/01/95]	CF15SS297 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE		230 U	230 U	270 U	270 U	6100 U	1100 U
ACENAPHTHYLENE		230 U	230 U	270 U	270 U	6100 U	1100 U
ANTHRACENE		230 U	230 U	270 U	270 U	6100 U	1100 U
BENZO(A)ANTHRACENE		230 U	450	270 U	270 U	32000	3000
BENZO(A)PYRENE		230 U	310	380	270 U	52000	4100
BENZO(B)FLUORANTHENE		230 U	290	270 U	270 U	56000	4900
BENZO(G,H,I)PERYLENE		230 U	230 U	270 U	270 U	36000	4000
BENZO(K)FLUORANTHENE		230 U	290	270 U	270 U	65000	5300
CHRYSENE		230 U	520	1100	500	48000	4600
DIBENZO(A,H)ANTHRACENE		230 U	230 U	270 U	270 U	6600	1100 U
FLUORANTHENE		230 U	320	440	270 U	70000	6300
FLUORENE		230 U	230 U	270 U	270 U	6100 U	1100 U
INDENO(1,2,3-CD)PYRENE		230 U	230	270 U	270 U	32000	2700
NAPHTHALENE		230 U	230 U	270 U	270 U	6100 U	1100 U
PHENANTHRENE		230 U	230 U	270 U	270 U	21000	2000
PYRENE		230 U	330	350	270 U	67000	5800
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS291	CF15SS292	CF15SS293	CF15SS294	CF15SS295	CF15SS296	CF15SS297
SAMPLE NUMBER	CF15SS291 [01/01/95]	CF15SS292 [01/01/95]	CF15SS293 [01/01/95]	CF15SS294 [01/01/95]	CF15SS295 [01/01/95]	CF15SS296 [01/01/95]	CF15SS297 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	0						

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS297	CF15SS298	CF15SS299	CF15SS300	CF15SS301	CF15SS302	CF15SS303
SAMPLE NUMBER	CF15SS297 [01/01/95]-D	CF15SS298 [01/01/95]	CF15SS299 [01/01/95]	CF15SS300 [01/01/95]	CF15SS301 [01/01/95]	CF15SS302 [03/01/95]	CF15SS303 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
ACENAPHTHYLENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
ANTHRACENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
BENZO(A)ANTHRACENE	5100	170 U	250 U	250 U	240 U	310 U	240 U
BENZO(A)PYRENE	7000	170 U	250 U	250 U	240 U	310 U	240 U
BENZO(B)FLUORANTHENE	8300	170 U	250 U	250 U	240 U	310 U	240 U
BENZO(G,H,I)PERYLENE	6400	170 U	250 U	250 U	240 U	310 U	240 U
BENZO(K)FLUORANTHENE	9000	170 U	250 U	250 U	240 U	310 U	240 U
CHRYSENE	7800	380	250 U	560	240 U	350	250
DIBENZO(A,H)ANTHRACENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
FLUORANTHENE	11000	170 U	250 U	250 U	240 U	310 U	240 U
FLUORENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
INDENO(1,2,3-CD)PYRENE	4500	170 U	250 U	250 U	240 U	310 U	240 U
NAPHTHALENE	1200 U	170 U	250 U	250 U	240 U	310 U	240 U
PHENANTHRENE	3600	170 U	250 U	250 U	240 U	310 U	240 U
PYRENE	10000	170 U	250 U	250 U	240 U	310 U	240 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS297	CF15SS298	CF15SS299	CF15SS300	CF15SS301	CF15SS302	CF15SS303
SAMPLE NUMBER	CF15SS297 [01/01/95]-D	CF15SS298 [01/01/95]	CF15SS299 [01/01/95]	CF15SS300 [01/01/95]	CF15SS301 [01/01/95]	CF15SS302 [03/01/95]	CF15SS303 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD			13.4	1190	1780	529	927

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS304	CF15SS305	CF15SS306	CF15SS307	CF15SS308	CF15SS309	CF15SS310
SAMPLE NUMBER	CF15SS304 [03/01/95]	CF15SS305 [01/01/95]	CF15SS306 [01/01/95]	CF15SS307 [01/01/95]	CF15SS308 [01/01/95]	CF15SS309 [01/01/95]	CF15SS310 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	260 U				220 U	250 U	230 U
ACENAPHTHYLENE	260 U				220 U	250 U	230 U
ANTHRACENE	260 U				220 U	250 U	230 U
BENZO(A)ANTHRACENE	260 U				430	250 U	230 U
BENZO(A)PYRENE	260 U				220 U	250 U	230 U
BENZO(B)FLUORANTHENE	260 U				220 U	250 U	230 U
BENZO(G,H,I)PERYLENE	260 U				220 U	250 U	230 U
BENZO(K)FLUORANTHENE	260 U				220 U	250 U	230 U
CHRYSENE	310				430	640	230 U
DIBENZO(A,H)ANTHRACENE	260 U				220 U	250 U	230 U
FLUORANTHENE	260 U				220 U	250 U	230 U
FLUORENE	260 U				220 U	250 U	230 U
INDENO(1,2,3-CD)PYRENE	260 U				220 U	250 U	230 U
NAPHTHALENE	260 U				220 U	250 U	230 U
PHENANTHRENE	260 U				220 U	250 U	230 U
PYRENE	260 U				220 U	250 U	230 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS304	CF15SS305	CF15SS306	CF15SS307	CF15SS308	CF15SS309	CF15SS310
SAMPLE NUMBER	CF15SS304 [03/01/95]	CF15SS305 [01/01/95]	CF15SS306 [01/01/95]	CF15SS307 [01/01/95]	CF15SS308 [01/01/95]	CF15SS309 [01/01/95]	CF15SS310 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	1740	229	72	12			

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS311	CF15SS312	CF15SS313	CF15SS314	CF15SS315	CF15SS316	CF15SS317
SAMPLE NUMBER	CF15SS311 [01/01/95]	CF15SS312 [01/01/95]	CF15SS313 [01/01/95]	CF15SS314 [01/01/95]	CF15SS315 [01/01/95]	CF15SS316 [01/01/95]	CF15SS317 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
ACENAPHTHYLENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
ANTHRACENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
BENZO(A)ANTHRACENE	260 U	2600 U	280	240	190 U	200 U	210 U
BENZO(A)PYRENE	260 U	2600 U	300	210 U	190 U	200 U	210 U
BENZO(B)FLUORANTHENE	260 U	2600 U	220 U	230	190 U	200 U	210 U
BENZO(G,H,I)PERYLENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
BENZO(K)FLUORANTHENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
CHRYSENE	580	2700	450	750	790	200 U	210 U
DIBENZO(A,H)ANTHRACENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
FLUORANTHENE	260 U	2600 U	600	220	190 U	200 U	210 U
FLUORENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
INDENO(1,2,3-CD)PYRENE	260 U	2600 U	300	210 U	190 U	200 U	210 U
NAPHTHALENE	260 U	2600 U	220 U	210 U	190 U	200 U	210 U
PHENANTHRENE	260 U	2600 U	240	210 U	190 U	200 U	210 U
PYRENE	260 U	2600 U	610	210 U	190 U	200 U	210 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS311	CF15SS312	CF15SS313	CF15SS314	CF15SS315	CF15SS316	CF15SS317
SAMPLE NUMBER	CF15SS311 [01/01/95]	CF15SS312 [01/01/95]	CF15SS313 [01/01/95]	CF15SS314 [01/01/95]	CF15SS315 [01/01/95]	CF15SS316 [01/01/95]	CF15SS317 [01/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995	1/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD						22	1620

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS318	CF15SS319	CF15SS320	CF15SS321	CF15SS322	CF15SS323	CF15SS324
SAMPLE NUMBER	CF15SS318 [01/01/95]	CF15SS319 [01/01/95]	CF15SS320 [12/01/94]	CF15SS321 [12/01/94]	CF15SS322 [12/01/94]	CF15SS323 [12/01/94]	CF15SS324 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS318	CF15SS319	CF15SS320	CF15SS321	CF15SS322	CF15SS323	CF15SS324
SAMPLE NUMBER	CF15SS318 [01/01/95]	CF15SS319 [01/01/95]	CF15SS320 [12/01/94]	CF15SS321 [12/01/94]	CF15SS322 [12/01/94]	CF15SS323 [12/01/94]	CF15SS324 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	1/1/1995	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	1140	4160	1510	206	0	226	829

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS325	CF15SS326	CF15SS327	CF15SS328	CF15SS329	CF15SS330	CF15SS331
SAMPLE NUMBER	CF15SS325 [12/01/94]	CF15SS326 [12/01/94]	CF15SS327 [12/01/94]	CF15SS328 [12/01/94]	CF15SS329 [12/01/94]	CF15SS330 [12/01/94]	CF15SS331 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS325	CF15SS326	CF15SS327	CF15SS328	CF15SS329	CF15SS330	CF15SS331
SAMPLE NUMBER	CF15SS325 [12/01/94]	CF15SS326 [12/01/94]	CF15SS327 [12/01/94]	CF15SS328 [12/01/94]	CF15SS329 [12/01/94]	CF15SS330 [12/01/94]	CF15SS331 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	1900	1190	6.9	3.4	508	229	229

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS332	CF15SS332	CF15SS333	CF15SS334	CF15SS335	CF15SS336	CF15SS337
SAMPLE NUMBER	CF15SS332 [12/01/94]	CF15SS332 [12/01/94]-D	CF15SS333 [12/01/94]	CF15SS334 [12/01/94]	CF15SS335 [12/01/94]	CF15SS336 [12/01/94]	CF15SS337 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS332	CF15SS332	CF15SS333	CF15SS334	CF15SS335	CF15SS336	CF15SS337
SAMPLE NUMBER	CF15SS332 [12/01/94]	CF15SS332 [12/01/94]-D	CF15SS333 [12/01/94]	CF15SS334 [12/01/94]	CF15SS335 [12/01/94]	CF15SS336 [12/01/94]	CF15SS337 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	2500	1110	658	33.1	2.3 U	2 U	2.2

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS338	CF15SS339	CF15SS340	CF15SS341	CF15SS342	CF15SS342	CF15SS343
SAMPLE NUMBER	CF15SS338 [12/01/94]	CF15SS339 [12/01/94]	CF15SS340 [12/01/94]	CF15SS341 [12/01/94]	CF15SS342 [12/01/94]	CF15SS342 [12/01/94]-D	CF15SS343 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS338	CF15SS339	CF15SS340	CF15SS341	CF15SS342	CF15SS342	CF15SS343
SAMPLE NUMBER	CF15SS338 [12/01/94]	CF15SS339 [12/01/94]	CF15SS340 [12/01/94]	CF15SS341 [12/01/94]	CF15SS342 [12/01/94]	CF15SS342 [12/01/94]-D	CF15SS343 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	115	2.3 U	6	2.1 U	2.2 U	2.2 U	3.3

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS344	CF15SS345	CF15SS346	CF15SS347	CF15SS348	CF15SS348	CF15SS349
SAMPLE NUMBER	CF15SS344 [12/01/94]	CF15SS345 [12/01/94]	CF15SS346 [12/01/94]	CF15SS347 [12/01/94]	CF15SS348 [12/01/94]	CF15SS348 [12/01/94]-D	CF15SS349 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS344	CF15SS345	CF15SS346	CF15SS347	CF15SS348	CF15SS348	CF15SS349
SAMPLE NUMBER	CF15SS344 [12/01/94]	CF15SS345 [12/01/94]	CF15SS346 [12/01/94]	CF15SS347 [12/01/94]	CF15SS348 [12/01/94]	CF15SS348 [12/01/94]-D	CF15SS349 [12/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994	12/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	2.1 U	5.1	6.7	695	31.2	24.6	20

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS350	CF15SS351	CF15SS352	CF15SS353	CF15SS354	CF15SS355	CF15SS356
SAMPLE NUMBER	CF15SS350 [03/01/95]	CF15SS351 [03/01/95]	CF15SS352 [03/01/95]	CF15SS353 [03/01/95]	CF15SS354 [03/01/95]	CF15SS355 [03/01/95]	CF15SS356 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE			200 U	210 U	190 U	190 U	200 U
ACENAPHTHYLENE			200 U	210 U	190 U	190 U	200 U
ANTHRACENE			200 U	210 U	190 U	190 U	200 U
BENZO(A)ANTHRACENE			200 U	210 U	210	190 U	200 U
BENZO(A)PYRENE			200 U	210 U	190 U	190 U	200 U
BENZO(B)FLUORANTHENE			200 U	210 U	190 U	190 U	200 U
BENZO(G,H,I)PERYLENE			200 U	210 U	190 U	190 U	200 U
BENZO(K)FLUORANTHENE			200 U	210 U	190 U	190 U	200 U
CHRYSENE			310	220	190	190 U	200 U
DIBENZO(A,H)ANTHRACENE			200 U	210 U	190 U	190 U	200 U
FLUORANTHENE			200 U	210 U	200	190 U	200 U
FLUORENE			200 U	210 U	190 U	190 U	200 U
INDENO(1,2,3-CD)PYRENE			200 U	210 U	190 U	190 U	200 U
NAPHTHALENE			200 U	210 U	190 U	190 U	200 U
PHENANTHRENE			200 U	210 U	190 U	190 U	200 U
PYRENE			200 U	210 U	210	190 U	200 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS350	CF15SS351	CF15SS352	CF15SS353	CF15SS354	CF15SS355	CF15SS356
SAMPLE NUMBER	CF15SS350 [03/01/95]	CF15SS351 [03/01/95]	CF15SS352 [03/01/95]	CF15SS353 [03/01/95]	CF15SS354 [03/01/95]	CF15SS355 [03/01/95]	CF15SS356 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	34	12					

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS357	CF15SS357	CF15SS358	CF15SS359	CF15SS360	CF15SS361	CF15SS362
SAMPLE NUMBER	CF15SS357 [03/01/95]	CF15SS357 [03/01/95]-D	CF15SS358 [03/01/95]	CF15SS359 [03/01/95]	CF15SS360 [03/01/95]	CF15SS361 [03/01/95]	CF15SS362 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
ACENAPHTHYLENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
ANTHRACENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
BENZO(A)ANTHRACENE	280 U	340	210 U	230 U	220 U	230	510 U
BENZO(A)PYRENE	280 U	290 U	210 U	230 U	220 U	200	510 U
BENZO(B)FLUORANTHENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
BENZO(G,H,I)PERYLENE	280 U	290 U	210 U	230 U	220 U	230	510 U
BENZO(K)FLUORANTHENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
CHRYSENE	320	430	210 U	320	220 U	310	840
DIBENZO(A,H)ANTHRACENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
FLUORANTHENE	280 U	290 U	210 U	230 U	220 U	250	510 U
FLUORENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
INDENO(1,2,3-CD)PYRENE	280 U	290 U	210 U	230 U	220 U	240	510 U
NAPHTHALENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
PHENANTHRENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
PYRENE	280 U	290 U	210 U	230 U	220 U	200 U	510 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS357	CF15SS357	CF15SS358	CF15SS359	CF15SS360	CF15SS361	CF15SS362
SAMPLE NUMBER	CF15SS357 [03/01/95]	CF15SS357 [03/01/95]-D	CF15SS358 [03/01/95]	CF15SS359 [03/01/95]	CF15SS360 [03/01/95]	CF15SS361 [03/01/95]	CF15SS362 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS363	CF15SS364	CF15SS365	CF15SS366	CF15SS367	CF15SS368	CF15SS369
SAMPLE NUMBER	CF15SS363 [03/01/95]	CF15SS364 [03/01/95]	CF15SS365 [03/01/95]	CF15SS366 [03/01/95]	CF15SS367 [03/01/95]	CF15SS368 [03/01/95]	CF15SS369 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
ACENAPHTHYLENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
ANTHRACENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
BENZO(A)ANTHRACENE	570	470	200 U	220 U	240 U	1000	230 U
BENZO(A)PYRENE	390	260 U	200 U	220 U	240 U	230 U	230 U
BENZO(B)FLUORANTHENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
BENZO(G,H,I)PERYLENE	520	300	200 U	220 U	240 U	230 U	230 U
BENZO(K)FLUORANTHENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
CHRYSENE	1300	330	290	220 U	390	2600	350
DIBENZO(A,H)ANTHRACENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
FLUORANTHENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
FLUORENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
INDENO(1,2,3-CD)PYRENE	450	260 U	200 U	220 U	240 U	230 U	230 U
NAPHTHALENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
PHENANTHRENE	330 U	260 U	200 U	220 U	240 U	230 U	230 U
PYRENE	470	260 U	200 U	220 U	240 U	230 U	230 U
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS363	CF15SS364	CF15SS365	CF15SS366	CF15SS367	CF15SS368	CF15SS369
SAMPLE NUMBER	CF15SS363 [03/01/95]	CF15SS364 [03/01/95]	CF15SS365 [03/01/95]	CF15SS366 [03/01/95]	CF15SS367 [03/01/95]	CF15SS368 [03/01/95]	CF15SS369 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS369	CF15SS370	CF15SS371	CF15SS372	CF15SS373	CF15SS374	CF15SS375
SAMPLE NUMBER	CF15SS369 [03/01/95]-D	CF15SS370 [03/01/95]	CF15SS371 [03/01/95]	CF15SS372 [03/01/95]	CF15SS373 [03/01/95]	CF15SS374 [03/01/95]	CF15SS375 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
ACENAPHTHYLENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
ANTHRACENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
BENZO(A)ANTHRACENE	230 U	200 U	210 U	370 U	210 U	200	190 U
BENZO(A)PYRENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
BENZO(B)FLUORANTHENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
BENZO(G,H,I)PERYLENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
BENZO(K)FLUORANTHENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
CHRYSENE	470	200 U	550	1300	210 U	730	190 U
DIBENZO(A,H)ANTHRACENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
FLUORANTHENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
FLUORENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
INDENO(1,2,3-CD)PYRENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
NAPHTHALENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
PHENANTHRENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
PYRENE	230 U	200 U	210 U	220 U	210 U	200 U	190 U
SPLP Semivolatiles (ug/L)							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS369	CF15SS370	CF15SS371	CF15SS372	CF15SS373	CF15SS374	CF15SS375
SAMPLE NUMBER	CF15SS369 [03/01/95]-D	CF15SS370 [03/01/95]	CF15SS371 [03/01/95]	CF15SS372 [03/01/95]	CF15SS373 [03/01/95]	CF15SS374 [03/01/95]	CF15SS375 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS376	CF15SS377	CF15SS378	CF15SS379	CF15SS380	CF15SS381	CF15SS382
SAMPLE NUMBER	CF15SS376 [03/01/95]	CF15SS377 [03/01/95]	CF15SS378 [03/01/95]	CF15SS379 [03/01/95]	CF15SS380 [03/01/95]	CF15SS381 [03/01/95]	CF15SS382 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	220 U						
ACENAPHTHYLENE	220 U						
ANTHRACENE	220 U						
BENZO(A)ANTHRACENE	220 U						
BENZO(A)PYRENE	220 U						
BENZO(B)FLUORANTHENE	220 U						
BENZO(G,H,I)PERYLENE	220 U						
BENZO(K)FLUORANTHENE	220 U						
CHRYSENE	350						
DIBENZO(A,H)ANTHRACENE	220 U						
FLUORANTHENE	220 U						
FLUORENE	220 U						
INDENO(1,2,3-CD)PYRENE	220 U						
NAPHTHALENE	220 U						
PHENANTHRENE	220 U						
PYRENE	220 U						
SPLP Semivolatiles (ug/L)							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS376	CF15SS377	CF15SS378	CF15SS379	CF15SS380	CF15SS381	CF15SS382
SAMPLE NUMBER	CF15SS376 [03/01/95]	CF15SS377 [03/01/95]	CF15SS378 [03/01/95]	CF15SS379 [03/01/95]	CF15SS380 [03/01/95]	CF15SS381 [03/01/95]	CF15SS382 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD		53.5	402	2390	126	93	52

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS383	CF15SS384	CF15SS384	CF15SS385	CF15SS386	CF15SS387	CF15SS388
SAMPLE NUMBER	CF15SS383 [03/01/95]	CF15SS384 [03/01/95]	CF15SS384 [03/01/95]-D	CF15SS385 [03/01/95]	CF15SS386 [03/01/95]	CF15SS387 [03/01/95]	CF15SS388 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS383	CF15SS384	CF15SS384	CF15SS385	CF15SS386	CF15SS387	CF15SS388
SAMPLE NUMBER	CF15SS383 [03/01/95]	CF15SS384 [03/01/95]	CF15SS384 [03/01/95]-D	CF15SS385 [03/01/95]	CF15SS386 [03/01/95]	CF15SS387 [03/01/95]	CF15SS388 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	117	15.8	11.1	21.1	11.5	14.4	10.8

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS389	CF15SS389	CF15SS390	CF15SS391	CF15SS392	CF15SS393	CF15SS394
SAMPLE NUMBER	CF15SS389 [03/01/95]	CF15SS389 [03/01/95]-D	CF15SS390 [03/01/95]	CF15SS391 [03/01/95]	CF15SS392 [03/01/95]	CF15SS393 [03/01/95]	CF15SS394 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE					480 U	350 U	220 U
ACENAPHTHYLENE					480 U	350 U	220 U
ANTHRACENE					480 U	350 U	220 U
BENZO(A)ANTHRACENE					2100	1200	520
BENZO(A)PYRENE					480	350 U	220 U
BENZO(B)FLUORANTHENE					480 U	350 U	220 U
BENZO(G,H,I)PERYLENE					480 U	350 U	220 U
BENZO(K)FLUORANTHENE					480 U	350 U	220 U
CHRYSENE					3200	3300	320
DIBENZO(A,H)ANTHRACENE					480 U	350 U	220 U
FLUORANTHENE					480 U	350 U	220 U
FLUORENE					480 U	350 U	220 U
INDENO(1,2,3-CD)PYRENE					480 U	350 U	220 U
NAPHTHALENE					480 U	350 U	220 U
PHENANTHRENE					480 U	350 U	220 U
PYRENE					480 U	350 U	220 U
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS389	CF15SS389	CF15SS390	CF15SS391	CF15SS392	CF15SS393	CF15SS394
SAMPLE NUMBER	CF15SS389 [03/01/95]	CF15SS389 [03/01/95]-D	CF15SS390 [03/01/95]	CF15SS391 [03/01/95]	CF15SS392 [03/01/95]	CF15SS393 [03/01/95]	CF15SS394 [03/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995	3/1/1995
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD	24.8	29.5	16.1	14.7			

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS394	CF15SS395	CF15SS396	CF15SS397	CF15SS398	CF15SS399	CF15SS400
SAMPLE NUMBER	CF15SS394 [03/01/95]-D	CF15SS395 [03/01/95]	CF15SS396 [03/01/95]	CF15SS397 [04/01/95]	CF15SS398 [04/01/95]	CF15SS399 [04/01/95]-D	CF15SS400 [04/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
ACENAPHTHYLENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
ANTHRACENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
BENZO(A)ANTHRACENE	220 U	310	270	540 U	750	240 U	600
BENZO(A)PYRENE	220 U	200 U	200 U	540 U	260 U	270	830
BENZO(B)FLUORANTHENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
BENZO(G,H,I)PERYLENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
BENZO(K)FLUORANTHENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
CHRYSENE	220 U	250	580	540 U	750	240 U	600
DIBENZO(A,H)ANTHRACENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
FLUORANTHENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
FLUORENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
INDENO(1,2,3-CD)PYRENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
NAPHTHALENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
PHENANTHRENE	220 U	200 U	200 U	540 U	260 U	240 U	370 U
PYRENE	220 U	200 U	200 U	540 U	260 U	240 U	390
SPLP Semivolatiles (ug/L)							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS394	CF15SS395	CF15SS396	CF15SS397	CF15SS398	CF15SS399	CF15SS400
SAMPLE NUMBER	CF15SS394 [03/01/95]-D	CF15SS395 [03/01/95]	CF15SS396 [03/01/95]	CF15SS397 [04/01/95]	CF15SS398 [04/01/95]	CF15SS399 [04/01/95]-D	CF15SS400 [04/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	3/1/1995	3/1/1995	3/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS401	CF15SS402	CF15SS403	CF15SS404	CF15SS405	CF15SS406	CF15SS407
SAMPLE NUMBER	CF15SS401 [04/01/95]	CF15SS402 [04/01/95]	CF15SS403 [04/01/95]	CF15SS404 [04/01/95]	CF15SS405 [04/01/95]	CF15SS406 [04/01/95]	CF15SS407 [04/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
BENZENE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLOROFORM							
CIS-1,2-DICHLOROETHENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
TOLUENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
Semivolatile Organics (ug/kg)							
1,2-DICHLOROBENZENE							
1,3-DICHLOROBENZENE							
1,4-DICHLOROBENZENE							
ACENAPHTHENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
ACENAPHTHYLENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
ANTHRACENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
BENZO(A)ANTHRACENE	630	250	460	210 U	210 U	210 U	230 U
BENZO(A)PYRENE	330	240 U	290	210 U	210 U	210 U	500
BENZO(B)FLUORANTHENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
BENZO(G,H,I)PERYLENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
BENZO(K)FLUORANTHENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
CHRYSENE	630	250	460	210 U	210 U	210 U	230 U
DIBENZO(A,H)ANTHRACENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
FLUORANTHENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
FLUORENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
INDENO(1,2,3-CD)PYRENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
NAPHTHALENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
PHENANTHRENE	260 U	240 U	250 U	210 U	210 U	210 U	230 U
PYRENE	260 U	240 U	250 U	210 U	210 U	210 U	420
SPLP Semivolatiles (ug/L)							

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS401	CF15SS402	CF15SS403	CF15SS404	CF15SS405	CF15SS406	CF15SS407
SAMPLE NUMBER	CF15SS401 [04/01/95]	CF15SS402 [04/01/95]	CF15SS403 [04/01/95]	CF15SS404 [04/01/95]	CF15SS405 [04/01/95]	CF15SS406 [04/01/95]	CF15SS407 [04/01/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995	4/1/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Inorganics (mg/kg)							
LEAD							

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SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS408	CF15SS409	CF15SS409	CF15SSB1S	CF15SSB1S	CF15SSB1S
SAMPLE NUMBER	CF15SS408 [04/01/95]	CF15SS409 [04/01/95]	CF15SS409R [04/01/95]	CF15SSB1S0 [10/01/94]	CF15SSB1S1 [10/01/94]	CF15SSB1S3 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	1-2	3-4
SAMPLE DATE	4/1/1995	4/1/1995	4/1/1995	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE				2 U	2 U	2 U
1,1,2,2-TETRACHLOROETHANE				2 U	2 U	2 U
1,1,2-TRICHLOROETHANE				2 U	2 U	2 U
1,1-DICHLOROETHANE				2 U	2 U	2 U
1,1-DICHLOROETHENE				4 U	4 U	4 U
1,2-DICHLOROETHANE				2 U	2 U	2 U
BENZENE				2 U	2 U	2 U
CARBON TETRACHLORIDE				2 U	2 U	2 U
CHLOROBENZENE				2 U	2 U	2 U
CHLOROFORM				2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE				2 U	2 U	2 U
ETHYLBENZENE				2 U	2 U	2 U
METHYLENE CHLORIDE				2 U	2 U	2 U
TOLUENE				2 U	2 U	2 U
TOTAL XYLENES				6 U	6 U	6 U
TRANS-1,2-DICHLOROETHENE				2 U	2 U	2 U
Semivolatile Organics (ug/kg)						
1,2-DICHLOROBENZENE				2 U	2 U	2 U
1,3-DICHLOROBENZENE				2 U	2 U	2 U
1,4-DICHLOROBENZENE				2 U	2 U	2 U
ACENAPHTHENE	220 U	250 U		7100	4900	6600
ACENAPHTHYLENE	220 U	250 U		4000 U	4000 U	4000 U
ANTHRACENE	220 U	250 U		300	200 U	200 U
BENZO(A)ANTHRACENE	220 U	250 U		200 U	200 U	200 U
BENZO(A)PYRENE	220 U	250 U		940	940	2200
BENZO(B)FLUORANTHENE	220 U	250 U		1000	1000	2200
BENZO(G,H,I)PERYLENE	220 U	250 U		400 U	400 U	400 U
BENZO(K)FLUORANTHENE	220 U	250 U		600	590	1200
CHRYSENE	220 U	250 U		200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	220 U	250 U		400 U	400 U	400 U
FLUORANTHENE	220 U	250 U		2700	3000	4700
FLUORENE	220 U	250 U		400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	220 U	250 U		200 U	200 U	890
NAPHTHALENE	220 U	250 U		2000 U	2000 U	2000 U
PHENANTHRENE	220 U	250 U		7300	1100	1300
PYRENE	220 U	250 U		3500	3400	200 U
SPLP Semivolatiles (ug/L)						

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS408	CF15SS409	CF15SS409	CF15SSB1S	CF15SSB1S	CF15SSB1S
SAMPLE NUMBER	CF15SS408 [04/01/95]	CF15SS409 [04/01/95]	CF15SS409R [04/01/95]	CF15SSB1S0 [10/01/94]	CF15SSB1S1 [10/01/94]	CF15SSB1S3 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	1-2	3-4
SAMPLE DATE	4/1/1995	4/1/1995	4/1/1995	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
ACENAPHTHENE			5 U			
ACENAPHTHYLENE			5 U			
ANTHRACENE			5 U			
BENZO(A)ANTHRACENE			5 U			
BENZO(A)PYRENE			5 U			
BENZO(B)FLUORANTHENE			5 U			
BENZO(G,H,I)PERYLENE			5 U			
BENZO(K)FLUORANTHENE			5 U			
CHRYSENE			5 U			
DIBENZO(A,H)ANTHRACENE			5 U			
FLUORANTHENE			5 U			
FLUORENE			5 U			
INDENO(1,2,3-CD)PYRENE			5 U			
NAPHTHALENE			5 U			
PHENANTHRENE			5 U			
PYRENE			5 U			
Inorganics (mg/kg)						
LEAD						

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB1S	CF15SSB2S	CF15SSB2S	CF15SSB2S	CF15SSB2S	CF15SSB2S
SAMPLE NUMBER	CF15SSB1S5 [10/01/94]	CF15SSB2S0 [10/01/94]	CF15SSB2S1 [10/01/94]	CF15SSB2S1 [10/01/94]-D	CF15SSB2S3 [10/01/94]	CF15SSB2S5 [10/01/94]
DEPTH	5-6	0-1	1-2	1-2	3-4	5-6
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE		2 U	2 U	2 U	2 U	2 U
1,1,2,2-TETRACHLOROETHANE		2 U	2 U	2 U	2 U	2 U
1,1,2-TRICHLOROETHANE		2 U	2 U	2 U	2 U	2 U
1,1-DICHLOROETHANE		2 U	2 U	2 U	2 U	2 U
1,1-DICHLOROETHENE		4 U	4 U	4 U	4 U	4 U
1,2-DICHLOROETHANE		2 U	2 U	2 U	2 U	2 U
BENZENE		2 U	2 U	2 U	2 U	2 U
CARBON TETRACHLORIDE		2 U	2 U	2 U	2 U	2 U
CHLOROBENZENE		2 U	2 U	2 U	2 U	2 U
CHLOROFORM		2 U	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE		2 U	2 U	2 U	2 U	2 U
ETHYLBENZENE		2 U	2 U	2 U	2 U	2 U
METHYLENE CHLORIDE		2 U	2 U	2 U	2 U	2 U
TOLUENE		2 U	2 U	2 U	2 U	2 U
TOTAL XYLENES		6 U	6 U	6 U	6 U	6 U
TRANS-1,2-DICHLOROETHENE		2 U	2 U	2 U	2 U	2 U
Semivolatile Organics (ug/kg)						
1,2-DICHLOROBENZENE		2 U	2 U	2 U	2 U	2 U
1,3-DICHLOROBENZENE		2 U	2 U	2 U	2 U	2 U
1,4-DICHLOROBENZENE		2 U	2 U	2 U	2 U	2 U
ACENAPHTHENE	2000 U	2000 U	2000 U	18000	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	270	200 U	200 U	9200	240	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	1200	810	1100	3500	200 U	200 U
BENZO(B)FLUORANTHENE	1500	960	1100	3900	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	2100	400 U	400 U
BENZO(K)FLUORANTHENE	960	590	660	2000	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	2600	2100	2900	400 U	1400	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	1800	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	740	820	1000	2800	730	200 U
PYRENE	3600	2700	3400	200 U	1500	200 U
SPLP Semivolatiles (ug/L)						

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB1S	CF15SSB2S	CF15SSB2S	CF15SSB2S	CF15SSB2S	CF15SSB2S
SAMPLE NUMBER	CF15SSB1S5 [10/01/94]	CF15SSB2S0 [10/01/94]	CF15SSB2S1 [10/01/94]	CF15SSB2S1 [10/01/94]-D	CF15SSB2S3 [10/01/94]	CF15SSB2S5 [10/01/94]
DEPTH	5-6	0-1	1-2	1-2	3-4	5-6
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD						

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB3S	CF15SSB3S	CF15SSB3S	CF15SSB3S	CF15SSB4S	CF15SSB4S
SAMPLE NUMBER	CF15SSB3S0 [10/01/94]	CF15SSB3S1 [10/01/94]	CF15SSB3S3 [10/01/94]	CF15SSB3S5 [10/01/94]	CF15SSB4S0 [10/01/94]	CF15SSB4S1 [10/01/94]
DEPTH	0-1	1-2	3-3	5-6	0-1	1-2
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE	2 U	2 U	2 U	2 U	2 U	2 U
1,1,2,2-TETRACHLOROETHANE	2 U	2 U	2 U	2 U	2 U	2 U
1,1,2-TRICHLOROETHANE	2 U	2 U	2 U	2 U	2 U	2 U
1,1-DICHLOROETHANE	2 U	2 U	2 U	2 U	2 U	2 U
1,1-DICHLOROETHENE	4 U	4 U	4 U	4 U	4 U	4 U
1,2-DICHLOROETHANE	2 U	2 U	2 U	2 U	2 U	2 U
BENZENE	2 U	2 U	2 U	2 U	2 U	2 U
CARBON TETRACHLORIDE	2 U	2 U	2 U	2 U	2 U	2 U
CHLOROBENZENE	2 U	2 U	2 U	2 U	2 U	2 U
CHLOROFORM	2 U	2 U	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	2 U	2 U	2 U	2 U	2 U	2 U
ETHYLBENZENE	2 U	2 U	2 U	2 U	2 U	2 U
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	2 U	2 U
TOLUENE	2 U	2 U	2 U	2 U	2 U	2 U
TOTAL XYLENES	6 U	6 U	6 U	6 U	6 U	6 U
TRANS-1,2-DICHLOROETHENE	2 U	2 U	2 U	2 U	2 U	2 U
Semivolatile Organics (ug/kg)						
1,2-DICHLOROBENZENE	2 U	2 U	2 U	2 U	2 U	2 U
1,3-DICHLOROBENZENE	2 U	2 U	2 U	2 U	2 U	2 U
1,4-DICHLOROBENZENE	2 U	2 U	2 U	2 U	2 U	2 U
ACENAPHTHENE	50000	7600	2000 U	22000	5800	5400
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	3700	620	8200	1300	200 U	330
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	10000	200 U	3100	4100	840	950
BENZO(B)FLUORANTHENE	12000	1200	950	4600	1100	1300
BENZO(G,H,I)PERYLENE	5900	400 U	400 U	2100	400 U	400 U
BENZO(K)FLUORANTHENE	6900	200 U	1700	2300	520	600
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	1300	400 U	400 U
FLUORANTHENE	2900	5800	1300	13000	2600	3200
FLUORENE	400 U	400 U	1100	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	3800	200 U	200 U	2100	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	10000	1700	2300	3800	720	880
PYRENE	33000	7200	200 U	15000	3300	3800
SPLP Semivolatiles (ug/L)						

APPENDIX C-1.1

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB3S	CF15SSB3S	CF15SSB3S	CF15SSB3S	CF15SSB4S	CF15SSB4S
SAMPLE NUMBER	CF15SSB3S0 [10/01/94]	CF15SSB3S1 [10/01/94]	CF15SSB3S3 [10/01/94]	CF15SSB3S5 [10/01/94]	CF15SSB4S0 [10/01/94]	CF15SSB4S1 [10/01/94]
DEPTH	0-1	1-2	3-3	5-6	0-1	1-2
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD						

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB4S	CF15SSB4S	CF15SSB4S
SAMPLE NUMBER	CF15SSB4S1 [10/01/94]-D	CF15SSB4S3 [10/01/94]	CF15SSB4S5 [10/01/94]
DEPTH	1-2	3-3	5-6
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)			
1,1,1-TRICHLOROETHANE	2 U	2 U	2 U
1,1,2,2-TETRACHLOROETHANE	2 U	2 U	2 U
1,1,2-TRICHLOROETHANE	2 U	2 U	2 U
1,1-DICHLOROETHANE	2 U	2 U	2 U
1,1-DICHLOROETHENE	4 U	4 U	4 U
1,2-DICHLOROETHANE	2 U	2 U	2 U
BENZENE	2 U	2 U	2 U
CARBON TETRACHLORIDE	2 U	2 U	2 U
CHLOROBENZENE	2 U	2 U	2 U
CHLOROFORM	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	2 U	2 U	2 U
ETHYLBENZENE	2 U	2 U	2 U
METHYLENE CHLORIDE	2 U	2 U	2 U
TOLUENE	2 U	2 U	2 U
TOTAL XYLENES	6 U	6 U	6 U
TRANS-1,2-DICHLOROETHENE	2 U	2 U	2 U
Semivolatile Organics (ug/kg)			
1,2-DICHLOROBENZENE	2 U	2 U	2 U
1,3-DICHLOROBENZENE	2 U	2 U	2 U
1,4-DICHLOROBENZENE	2 U	2 U	2 U
ACENAPHTHENE	2000 U	6200	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U
BENZO(A)ANTHRACENE	490	200 U	200 U
BENZO(A)PYRENE	1200	1300	720
BENZO(B)FLUORANTHENE	1300	1400	980
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	710	720	200 U
CHRYSENE	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U
FLUORANTHENE	2800	3100	2200
FLUORENE	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U
PHENANTHRENE	830	870	610
PYRENE	3500	3800	2600
SPLP Semivolatiles (ug/L)			

SCREENING SOIL ANALYTIC RESULTS (AUGUST 1994 - APRIL 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SSB4S	CF15SSB4S	CF15SSB4S
SAMPLE NUMBER	CF15SSB4S1 [10/01/94]-D	CF15SSB4S3 [10/01/94]	CF15SSB4S5 [10/01/94]
DEPTH	1-2	3-3	5-6
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL
ACENAPHTHENE			
ACENAPHTHYLENE			
ANTHRACENE			
BENZO(A)ANTHRACENE			
BENZO(A)PYRENE			
BENZO(B)FLUORANTHENE			
BENZO(G,H,I)PERYLENE			
BENZO(K)FLUORANTHENE			
CHRYSENE			
DIBENZO(A,H)ANTHRACENE			
FLUORANTHENE			
FLUORENE			
INDENO(1,2,3-CD)PYRENE			
NAPHTHALENE			
PHENANTHRENE			
PYRENE			
Inorganics (mg/kg)			
LEAD			

E-1.2: CONFIRMATORY SOIL ANALYTICAL RESULTS
(JULY 1995 - AUGUST 1995)

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001(Con)	CF15SS002 (Con)	CF15SS002 (Con)	CF15SS003 (Con)	CF15SS003 (Con)	CF15SS003 (Con)
SAMPLE NUMBER	CF15SS001 [07/18/95]	CF15SS002 [07/18/95]	CF15SS002 [07/18/95]-D	CF15SS003 [07/18/95]	CF15SS003 [07/18/95]-D	CF15SS003RE [07/18/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE	8 U	6 U	6 U	8 U	6 U	
1,1,2,2-TETRACHLOROETHANE	8 U	6 U	6 U	8 U	6 U	
1,1,2-TRICHLOROETHANE	8 U	6 U	6 U	8 U	6 U	
1,1-DICHLOROETHANE	8 U	6 U	6 U	8 U	6 U	
1,1-DICHLOROETHENE	8 U	6 U	6 U	8 U	6 U	
1,2-DICHLOROETHANE	8 U	6 U	6 U	8 U	6 U	
1,2-DICHLOROPROPANE	8 U	6 U	6 U	8 U	6 U	
2-BUTANONE	15 U	12 U	13 U	15 U	13 U	
2-HEXANONE	15 U	12 U	13 U	15 U	13 U	
4-METHYL-2-PENTANONE	15 U	12 U	13 U	15 U	13 U	
ACETONE	15 U	12 U	13 U	15 U	13 U	
BENZENE	8 U	6 U	6 U	8 U	6 U	
BROMODICHLOROMETHANE	8 U	6 U	6 U	8 U	6 U	
BROMOFORM	8 U	6 U	6 U	8 U	6 U	
BROMOMETHANE	15 U	12 U	13 U	15 U	13 U	
CARBON DISULFIDE	8 U	6 U	6 U	8 U	6 U	
CARBON TETRACHLORIDE	8 U	6 U	6 U	8 U	6 U	
CHLOROBENZENE	8 U	6 U	6 U	8 U	6 U	
CHLORODIBROMOMETHANE	8 U	6 U	6 U	8 U	6 U	
CHLOROETHANE	15 U	12 U	13 U	15 U	13 U	
CHLOROFORM	8 U	6 U	6 U	8 U	6 U	
CHLOROMETHANE	15 U	12 U	13 U	15 U	13 U	
CIS-1,3-DICHLOROPROPENE	8 U	6 U	6 U	8 U	6 U	
ETHYLBENZENE	8 U	6 U	6 U	8 U	6 U	
METHYLENE CHLORIDE	8 U	6 U	6 U	8 U	6 U	
STYRENE	8 U	6 U	6 U	8 U	6 U	
TETRACHLOROETHENE	8 U	6 U	6 U	8 U	6 U	
TOLUENE	8 U	6 U	6 U	8 U	6 U	
TOTAL 1,2-DICHLOROETHENE	8 U	6 U	6 U	8 U	6 U	
TOTAL XYLENES	8 U	6 U	6 U	8 U	6 U	
TRANS-1,3-DICHLOROPROPENE	8 U	6 U	6 U	8 U	6 U	
TRICHLOROETHENE	8 U	6 U	6 U	8 U	6 U	
VINYL CHLORIDE	15 U	12 U	13 U	15 U	13 U	
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
1,2-DICHLOROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
1,3,5-TRINITROBENZENE	250 U	250 U	250 U	2500 U	2500 U	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001(Con)	CF15SS002 (Con)	CF15SS002 (Con)	CF15SS003 (Con)	CF15SS003 (Con)	CF15SS003 (Con)
SAMPLE NUMBER	CF15SS001 [07/18/95]	CF15SS002 [07/18/95]	CF15SS002 [07/18/95]-D	CF15SS003 [07/18/95]	CF15SS003 [07/18/95]-D	CF15SS003RE [07/18/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
1,3-DICHLOROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
1,3-DINITROBENZENE	250 U	250 U	250 U	2500 U	2500 U	
1,4-DICHLOROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,4,5-TRICHLOROPHENOL	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
2,4,6-TRICHLOROPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,4-DICHLOROPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,4-DIMETHYLPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,4-DINITROPHENOL	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
2,4-DINITROTOLUENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2,6-DINITROTOLUENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2-CHLORONAPHTHALENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2-CHLOROPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2-METHYLNAPHTHALENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2-METHYLPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
2-NITROANILINE	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
2-NITROPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
3,3'-DICHLOROBENZIDINE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
3-NITROANILINE	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
4,6-DINITRO-2-METHYLPHENOL	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
4-BROMOPHENYL PHENYL ETHER	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
4-CHLORO-3-METHYLPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
4-CHLOROANILINE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
4-CHLOROPHENYL PHENYL ETHER	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
4-METHYLPHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
4-NITROANILINE	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
4-NITROPHENOL	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
ACENAPHTHENE	500 U	410 U	420 U	4600 J	1700 J	1700 J
ACENAPHTHYLENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
ANTHRACENE	500 U	410 U	420 U	17000 J	4600 J	7100 J
BENZO(A)ANTHRACENE	500 U	410 U	420 U	80000 J	40000 J	82000 J
BENZO(A)PYRENE	500 U	410 U	420 U	72000 J	37000 J	82000 J
BENZO(B)FLUORANTHENE	500 U	410 U	420 U	100000 J	51000 J	150000 J
BENZO(G,H,I)PERYLENE	500 U	410 U	420 U	21000 J	5400 J	6000 J
BENZO(K)FLUORANTHENE	500 U	410 U	420 U	38000 J	21000 J	51000 J
BIS(2-CHLOROETHOXY)METHANE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
BIS(2-CHLOROETHYL)ETHER	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001(Con)	CF15SS002 (Con)	CF15SS002 (Con)	CF15SS003 (Con)	CF15SS003 (Con)	CF15SS003 (Con)
SAMPLE NUMBER	CF15SS001 [07/18/95]	CF15SS002 [07/18/95]	CF15SS002 [07/18/95]-D	CF15SS003 [07/18/95]	CF15SS003 [07/18/95]-D	CF15SS003RE [07/18/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
BUTYL BENZYL PHTHALATE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
CARBAZOLE	500 U	410 U	420 U	14000 J	4000 J	4900 J
CHRYSENE	500 U	410 U	420 U	81000 J	41000 J	91000 J
DI-N-BUTYL PHTHALATE	3200	1700	1400	1700 J	760 J	31000 UJ
DI-N-OCTYL PHTHALATE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
DIBENZO(A,H)ANTHRACENE	500 U	410 U	420 U	9500 J	6000 J	24000 J
DIBENZOFURAN	500 U	410 U	420 U	2500 J	550 J	31000 UJ
DIETHYL PHTHALATE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
DIMETHYL PHTHALATE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
FLUORANTHENE	500 U	410 U	420 U	130000 J	57000 J	100000 J
FLUORENE	500 U	410 U	420 U	4400 J	900 J	31000 UJ
HEXACHLOROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
HEXACHLOROBUTADIENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
HEXACHLOROCYCLOPENTADIENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
HEXACHLOROETHANE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
INDENO(1,2,3-CD)PYRENE	500 U	410 U	420 U	24000 J	15000	60000 J
ISOPHORONE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
N-NITROSO-DI-N-PROPYLAMINE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
N-NITROSODIPHENYLAMINE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
NAPHTHALENE	500 U	410 U	420 U	3400 J	1500 J	31000 UJ
NITROBENZENE	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
PENTACHLOROPHENOL	1200 U	1000 U	1000 U	61000 UJ	26000 U	77000 UJ
PHENANTHRENE	500 U	410 U	420 U	72000 J	21000 J	34000 J
PHENOL	500 U	410 U	420 U	25000 UJ	10000 U	31000 UJ
PYRENE	500 U	410 U	420 U	90000 J	44000 J	76000 J
Pesticides/PCBs (ug/kg)						
4,4'-DDD	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
4,4'-DDE	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
4,4'-DDT	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ALDRIN	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
ALPHA-BHC	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
ALPHA-CHLORDANE	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
AROCLOR-1016	51 U	42 U	42 U	260 UJ	210 UJ	
AROCLOR-1221	100 U	83 U	84 U	510 UJ	420 UJ	
AROCLOR-1232	51 U	42 U	42 U	260 UJ	210 UJ	
AROCLOR-1242	51 U	42 U	42 U	260 UJ	210 UJ	
AROCLOR-1248	51 U	42 U	42 U	260 UJ	210 UJ	
AROCLOR-1254	51 U	42 U	42 U	260 UJ	210 UJ	

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001(Con)	CF15SS002 (Con)	CF15SS002 (Con)	CF15SS003 (Con)	CF15SS003 (Con)	CF15SS003 (Con)
SAMPLE NUMBER	CF15SS001 [07/18/95]	CF15SS002 [07/18/95]	CF15SS002 [07/18/95]-D	CF15SS003 [07/18/95]	CF15SS003 [07/18/95]-D	CF15SS003RE [07/18/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
AROCLOR-1260	51 U	42 U	42 U	260 UJ	210 UJ	
BETA-BHC	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
DELTA-BHC	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
DIELDRIN	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ENDOSULFAN I	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
ENDOSULFAN II	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ENDOSULFAN SULFATE	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ENDRIN	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ENDRIN ALDEHYDE	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
ENDRIN KETONE	5.1 U	4.2 U	4.2 U	26 UJ	21 UJ	
GAMMA-BHC (LINDANE)	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
GAMMA-CHLORDANE	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
HEPTACHLOR	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
HEPTACHLOR EPOXIDE	2.5 U	2.1 U	2.1 U	13 UJ	11 UJ	
METHOXYCHLOR	25 U	21 U	21 U	130 UJ	110 UJ	
TOXAPHENE	250 U	210 U	210 U	1300 UJ	1100 UJ	
Explosives (ug/kg)						
2,4,6-TRINITROTOLUENE	250 U	250 U	250 U	2500 U	2500 U	
2-AMINO-4,6-DINITROTOLUENE	250 U	250 U	250 U	2500 U	2500 U	
2-NITROTOLUENE	500 U	500 U	500 U	5000 U	5000 U	
3-NITROTOLUENE	500 U	500 U	500 U	5000 U	5000 U	
4-AMINO-2,6-DINITROTOLUENE	250 U	250 U	250 U	2500 U	2500 U	
4-NITROTOLUENE	500 U	500 U	500 U	5000 U	5000 U	
HMX	500 U	500 U	500 U	5000 U	5000 U	
RDX	500 U	500 U	500 U	5000 U	5000 U	
TETRYL	500 U	500 U	500 U	5000 U	5000 U	
Petroleum Hydrocarbons (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	54	16	13 U	130	120	
Inorganics (mg/kg)						
ALUMINUM	1190	1170	836	707	682	
ANTIMONY	5.3 U	5.1 U	0.91 U	0.81 U	1.1 U	
ARSENIC	1.4 J	1 U	0.99 U	1.2 U	1 U	
BARIUM	1.8	1.7	2.1	19.1	17	
BERYLLIUM	0.31 U	0.25 U	0.25 U	0.31 U	0.26 U	
CADMIUM	0.31 U	0.25 U	0.25 U	0.31 U	0.26 U	
CALCIUM	319 U	168 U	214 U	1520 J	700 J	
CHROMIUM	2	1.7	1.7	1.5 U	1.3 U	
COBALT	0.31 UJ	0.25 UJ	0.25 UJ	0.31 UJ	0.26 UJ	

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001(Con)	CF15SS002 (Con)	CF15SS002 (Con)	CF15SS003 (Con)	CF15SS003 (Con)	CF15SS003 (Con)
SAMPLE NUMBER	CF15SS001 [07/18/95]	CF15SS002 [07/18/95]	CF15SS002 [07/18/95]-D	CF15SS003 [07/18/95]	CF15SS003 [07/18/95]-D	CF15SS003RE [07/18/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995	7/18/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
COPPER	0.92 U	1.3 J	0.74 U	2.5 J	0.77 U	
IRON	148	149	95.6	209	157	
LEAD	909 J	742 J	37.1 J	82.3 J	69.5 J	
MAGNESIUM	44.7 U	47.5 U	27.1 U	80.1	45.9 U	
MANGANESE	2.2 U	2.2 U	1.7 U	5.1	2.1 U	
MERCURY	0.15 U	0.13 U	0.12 U	0.15 U	0.13 U	
NICKEL	0.92 UJ	0.75 UJ	0.74 UJ	0.92 UJ	0.77 UJ	
POTASSIUM	32.2	32.5	28.4 J	39.9	28.1 J	
SELENIUM	1.2 U	1 U	0.99 U	1.2 U	1 U	
SILVER	0.31 U	0.25 U	0.25 U	0.31 U	0.26 U	
SODIUM	309 U	332 U	284 U	404 U	247 U	
THALLIUM	1.5 U	1.3 U	1.2 U	1.5 U	1.3 U	
VANADIUM	2.2	2.3	1.2 J	1.4	1.1	
ZINC	4.8 U	1.8 U	2.9 U	6 U	5.4 U	
Miscellaneous Parameters (mg/kg)						
CYANIDE	0.23 U	0.27	0.2	0.23 U	0.19 U	
TOTAL ORGANIC CARBON						

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS003 (Con)	CF15SS004 (Con)	CF15SS005 (Con)	CF15SS005 (Con)	CF15SS006 (Con)	CF15SS006 (Con)
SAMPLE NUMBER	CF15SS003RE [07/18/95]-D	CF15SS004 [07/18/95]	CF15SS005 [07/19/95]	CF15SS005RE [07/19/95]	CF15SS006 [07/27/95]	CF15SS006DL [07/27/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/19/1995	7/19/1995	7/27/1995	7/27/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE		6 U	7 U		7 U	
1,1,2,2-TETRACHLOROETHANE		6 U	7 U		7 U	
1,1,2-TRICHLOROETHANE		6 U	7 U		7 U	
1,1-DICHLOROETHANE		6 U	7 U		7 U	
1,1-DICHLOROETHENE		6 U	7 U		7 U	
1,2-DICHLOROETHANE		6 U	7 U		7 U	
1,2-DICHLOROPROPANE		6 U	7 U		7 U	
2-BUTANONE		12 U	14 U		13 U	
2-HEXANONE		12 U	14 U		13 U	
4-METHYL-2-PENTANONE		12 U	14 U		13 U	
ACETONE		12 U	14 U		13 U	
BENZENE		6 U	7 U		7 U	
BROMODICHLOROMETHANE		6 U	7 U		7 U	
BROMOFORM		6 U	7 U		7 U	
BROMOMETHANE		12 U	14 U		13 U	
CARBON DISULFIDE		6 U	7 U		7 U	
CARBON TETRACHLORIDE		6 U	7 U		7 U	
CHLOROBENZENE		6 U	7 U		7 U	
CHLORODIBROMOMETHANE		6 U	7 U		7 U	
CHLOROETHANE		12 U	14 U		13 U	
CHLOROFORM		6 U	7 U		7 U	
CHLOROMETHANE		12 U	14 U		13 U	
CIS-1,3-DICHLOROPROPENE		6 U	7 U		7 U	
ETHYLBENZENE		6 U	7 U		7 U	
METHYLENE CHLORIDE		6 U	7 U		7 U	
STYRENE		6 U	7 U		7 U	
TETRACHLOROETHENE		6 U	7 U		7 U	
TOLUENE		6 U	7 U		7 U	
TOTAL 1,2-DICHLOROETHENE		6 U	7 U		7 U	
TOTAL XYLENES		6 U	7 U		7 U	
TRANS-1,3-DICHLOROPROPENE		6 U	7 U		7 U	
TRICHLOROETHENE		6 U	7 U		7 U	
VINYL CHLORIDE		12 U	14 U		13 U	
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
1,2-DICHLOROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
1,3,5-TRINITROBENZENE		250 U	250 U		250 UJ	

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS003 (Con)	CF15SS004 (Con)	CF15SS005 (Con)	CF15SS005 (Con)	CF15SS006 (Con)	CF15SS006 (Con)
SAMPLE NUMBER	CF15SS003RE [07/18/95]-D	CF15SS004 [07/18/95]	CF15SS005 [07/19/95]	CF15SS005RE [07/19/95]	CF15SS006 [07/27/95]	CF15SS006DL [07/27/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/19/1995	7/19/1995	7/27/1995	7/27/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
1,3-DINITROBENZENE		250 U	250 U		250 U	
1,4-DICHLOROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,2'-OXYBIS(1-CHLOROPROPANE)	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,4,5-TRICHLOROPHENOL	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
2,4,6-TRICHLOROPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,4-DICHLOROPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,4-DIMETHYLPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,4-DINITROPHENOL	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
2,4-DINITROTOLUENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2,6-DINITROTOLUENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2-CHLORONAPHTHALENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2-CHLOROPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2-METHYLNAPHTHALENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2-METHYLPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
2-NITROANILINE	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
2-NITROPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
3,3'-DICHLOROBENZIDINE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
3-NITROANILINE	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
4,6-DINITRO-2-METHYLPHENOL	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
4-BROMOPHENYL PHENYL ETHER	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
4-CHLORO-3-METHYLPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
4-CHLOROANILINE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
4-CHLOROPHENYL PHENYL ETHER	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
4-METHYLPHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
4-NITROANILINE	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
4-NITROPHENOL	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
ACENAPHTHENE	780 J	390 U	460 U	460 UJ	440 U	1100 U
ACENAPHTHYLENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
ANTHRACENE	2500 J	390 U	460 U	460 UJ	440 U	1100 U
BENZO(A)ANTHRACENE	13000 J	120 J	460 U	460 UJ	74 J	1100 U
BENZO(A)PYRENE	12000 J	110 J	460 U	460 UJ	92 J	1100 U
BENZO(B)FLUORANTHENE	16000 J	190 J	460 U	460 UJ	130 J	1100 U
BENZO(G,H,I)PERYLENE	5400 J	390 U	460 U	460 UJ	440 U	1100 U
BENZO(K)FLUORANTHENE	6700 J	74 J	460 U	460 UJ	440 U	1100 U
BIS(2-CHLOROETHOXY)METHANE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
BIS(2-CHLOROETHYL)ETHER	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
BIS(2-ETHYLHEXYL)PHTHALATE	1800 J	390 U	460 U	460 UJ	460	310 J

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS003 (Con)	CF15SS004 (Con)	CF15SS005 (Con)	CF15SS005 (Con)	CF15SS006 (Con)	CF15SS006 (Con)
SAMPLE NUMBER	CF15SS003RE [07/18/95]-D	CF15SS004 [07/18/95]	CF15SS005 [07/19/95]	CF15SS005RE [07/19/95]	CF15SS006 [07/27/95]	CF15SS006DL [07/27/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/19/1995	7/19/1995	7/27/1995	7/27/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	13000 UJ	390 U	460 U	460 UJ	440	340 J
CARBAZOLE	1300 J	390 U	460 U	460 UJ	440 U	1100 U
CHRYSENE	14000 J	160 J	460 U	460 UJ	82 J	1100 U
DI-N-BUTYL PHTHALATE	13000 UJ	310 J	460 U	460 UJ	6700	6600
DI-N-OCTYL PHTHALATE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
DIBENZO(A,H)ANTHRACENE	1500 J	390 U	460 U	460 UJ	440 U	1100 U
DIBENZOFURAN	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
DIETHYL PHTHALATE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
DIMETHYL PHTHALATE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
FLUORANTHENE	23000 J	180 J	460 U	460 UJ	130 J	1100 U
FLUORENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
HEXACHLOROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
HEXACHLOROBUTADIENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
HEXACHLOROCYCLOPENTADIENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
HEXACHLOROETHANE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
INDENO(1,2,3-CD)PYRENE	5000 J	49 J	460 U	460 UJ	440 U	1100 U
ISOPHORONE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
N-NITROSO-DI-N-PROPYLAMINE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
N-NITROSODIPHENYLAMINE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
NAPHTHALENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
NITROBENZENE	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
PENTACHLOROPHENOL	32000 UJ	940 U	1100 U	1100 UJ	1100 U	2600 U
PHENANTHRENE	12000 J	74 J	460 U	460 UJ	56 J	1100 U
PHENOL	13000 UJ	390 U	460 U	460 UJ	440 U	1100 U
PYRENE	16000 J	130 J	460 U	0 R	110 J	1100 U
Pesticides/PCBs (ug/kg)						
4,4'-DDD		20 U	4.6 U		4.4 U	
4,4'-DDE		20 U	4.6 U		4.4 U	
4,4'-DDT		20 U	4.6 U		4.4 U	
ALDRIN		9.8 U	2.3 U		0.21 R	
ALPHA-BHC		9.8 U	2.3 U		2.2 U	
ALPHA-CHLORDANE		9.8 U	2.3 U		2.2 U	
AROCLOR-1016		200 U	46 U		44 U	
AROCLOR-1221		390 U	92 U		89 U	
AROCLOR-1232		200 U	46 U		44 U	
AROCLOR-1242		200 U	46 U		44 U	
AROCLOR-1248		200 U	46 U		44 U	
AROCLOR-1254		200 U	46 U		44 U	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS003 (Con)	CF15SS004 (Con)	CF15SS005 (Con)	CF15SS005 (Con)	CF15SS006 (Con)	CF15SS006 (Con)
SAMPLE NUMBER	CF15SS003RE [07/18/95]-D	CF15SS004 [07/18/95]	CF15SS005 [07/19/95]	CF15SS005RE [07/19/95]	CF15SS006 [07/27/95]	CF15SS006DL [07/27/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/19/1995	7/19/1995	7/27/1995	7/27/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260		200 U	46 U		44 U	
BETA-BHC		9.8 U	2.3 U		2.2 U	
DELTA-BHC		9.8 U	2.3 U		2.2 U	
DIELDRIN		20 U	4.6 U		4.4 U	
ENDOSULFAN I		9.8 U	2.3 U		2.2 U	
ENDOSULFAN II		20 U	0.86 J		4.4 U	
ENDOSULFAN SULFATE		20 U	4.6 U		4.4 U	
ENDRIN		20 U	4.6 U		4.4 U	
ENDRIN ALDEHYDE		20 U	4.6 U		4.4 U	
ENDRIN KETONE		20 U	0.7 U		4.4 U	
GAMMA-BHC (LINDANE)		9.8 U	2.3 U		2.2 U	
GAMMA-CHLORDANE		9.8 U	2.3 U		2.2 U	
HEPTACHLOR		9.8 U	2.3 U		2.2 U	
HEPTACHLOR EPOXIDE		9.8 U	2.3 U		2.2 U	
METHOXYCHLOR		98 U	23 U		22 U	
TOXAPHENE		980 U	230 U		220 U	
Explosives (ug/kg)						
2,4,6-TRINITROTOLUENE		250 U	250 U		250 UJ	
2-AMINO-4,6-DINITROTOLUENE		250 U	250 U		250 U	
2-NITROTOLUENE		500 U	500 U		500 UJ	
3-NITROTOLUENE		500 U	500 U		500 U	
4-AMINO-2,6-DINITROTOLUENE		250 U	250 U		250 U	
4-NITROTOLUENE		500 U	500 U		500 U	
HMX		3001	500 U		500 U	
RDX		500 U	500 U		500 UJ	
TETRYL		500 U	500 U		500 U	
Petroleum Hydrocarbons (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS		69	14 U		65	
Inorganics (mg/kg)						
ALUMINUM		330	755		1250 J	
ANTIMONY		1.8 U	0.54 U		12.4	
ARSENIC		0.94 U	1.1 U		4.2 J	
BARIUM		5.8	1.9 U		1.6	
BERYLLIUM		0.24 U	0.27 U		0.27 U	
CADMIUM		0.24 U	0.27 U		0.27 U	
CALCIUM		469 U	183 U		149	
CHROMIUM		2.2	1.2 U		2	
COBALT		0.33 J	0.27 UJ		0.27 UJ	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS003 (Con)	CF15SS004 (Con)	CF15SS005 (Con)	CF15SS005 (Con)	CF15SS006 (Con)	CF15SS006 (Con)
SAMPLE NUMBER	CF15SS003RE [07/18/95]-D	CF15SS004 [07/18/95]	CF15SS005 [07/19/95]	CF15SS005RE [07/19/95]	CF15SS006 [07/27/95]	CF15SS006DL [07/27/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/18/1995	7/18/1995	7/19/1995	7/19/1995	7/27/1995	7/27/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER		2.8	0.82 U		1.9 U	
IRON		160	150		115 J	
LEAD		123 J	8.6 J		1340	
MAGNESIUM		28.9 U	20.8 U		34.8 U	
MANGANESE		2 U	1.3 U		1	
MERCURY		0.12 U	0.13 U		0.13 U	
NICKEL		0.79 J	0.82 UJ		1.2	
POTASSIUM		30.1	34.3		24.4 U	
SELENIUM		0.94 U	1.1 U		1.1 UJ	
SILVER		0.24 U	0.27 U		0.27 U	
SODIUM		247 U	248 U		246 UJ	
THALLIUM		1.2 U	1.4 U		1.3 U	
VANADIUM		1.5	1		1.5	
ZINC		5.4 U	2.7 U		3.9 U	
Miscellaneous Parameters (mg/kg)						
CYANIDE		0.25	0.21 U		0.2 U	
TOTAL ORGANIC CARBON					13000	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS008 (Con)
SAMPLE NUMBER	CF15SS007 [07/26/95]	CF15SS007RE [07/26/95]	CF15SB7 [07/26/95]	CF15SB7 [07/26/95]-D	CF15SB7RE [07/26/95]	CF15SS008 [07/13/95]	CF15SS008DL [07/13/95]
DEPTH	0-1	0-1	1-3	1-3	1-3	0-1	0-1
SAMPLE DATE	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/13/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U		6 U	6 U		5 U	
1,1,2,2-TETRACHLOROETHANE	6 U		6 U	6 U		5 U	
1,1,2-TRICHLOROETHANE	6 U		6 U	6 U		5 U	
1,1-DICHLOROETHANE	6 U		6 U	6 U		5 U	
1,1-DICHLOROETHENE	6 U		6 U	6 U		5 U	
1,2-DICHLOROETHANE	6 U		6 U	6 U		5 U	
1,2-DICHLOROPROPANE	6 U		6 U	6 U		5 U	
2-BUTANONE	13 U		12 U	12 U		11 U	
2-HEXANONE	13 U		12 U	12 U		11 U	
4-METHYL-2-PENTANONE	13 U		12 U	12 U		11 U	
ACETONE	13 U		12 U	12 U		6 J	
BENZENE	6 U		6 U	6 U		5 U	
BROMODICHLOROMETHANE	6 U		6 U	6 U		5 U	
BROMOFORM	6 U		6 U	6 U		5 U	
BROMOMETHANE	13 U		12 U	12 U		11 U	
CARBON DISULFIDE	6 U		6 U	6 U		5 U	
CARBON TETRACHLORIDE	6 U		6 U	6 U		5 U	
CHLOROBENZENE	6 U		6 U	6 U		5 U	
CHLORODIBROMOMETHANE	6 U		6 U	6 U		5 U	
CHLOROETHANE	13 U		12 U	12 U		11 U	
CHLOROFORM	6 U		6 U	6 U		5 U	
CHLOROMETHANE	13 U		12 U	12 U		11 U	
CIS-1,3-DICHLOROPROPENE	6 U		6 U	6 U		5 U	
ETHYLBENZENE	6 U		6 U	6 U		5 U	
METHYLENE CHLORIDE	6 U		6 U	6 U		5 U	
STYRENE	6 U		6 U	6 U		5 U	
TETRACHLOROETHENE	6 U		6 U	6 U		5 U	
TOLUENE	6 U		6 U	6 U		5 U	
TOTAL 1,2-DICHLOROETHENE	6 U		6 U	6 U		5 U	
TOTAL XYLENES	6 U		6 U	6 U		5 U	
TRANS-1,3-DICHLOROPROPENE	6 U		6 U	6 U		5 U	
TRICHLOROETHENE	6 U		6 U	6 U		5 U	
VINYL CHLORIDE	13 U		12 U	12 U		11 U	
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
1,2-DICHLOROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
1,3,5-TRINITROBENZENE	250 UJ		250 UJ	250 UJ		2500 U	

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS008 (Con)
SAMPLE NUMBER	CF15SS007 [07/26/95]	CF15SS007RE [07/26/95]	CF15SB7 [07/26/95]	CF15SB7 [07/26/95]-D	CF15SB7RE [07/26/95]	CF15SS008 [07/13/95]	CF15SS008DL [07/13/95]
DEPTH	0-1	0-1	1-3	1-3	1-3	0-1	0-1
SAMPLE DATE	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/13/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
1,3-DINITROBENZENE	250 U		250 U	250 U		2500 U	
1,4-DICHLOROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2,2'-OXYBIS(1-CHLOROPROPANE)	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2,4,5-TRICHLOROPHENOL	210000 UJ	160000 UJ	32000 U	20000 U	30000 UJ	180000 UJ	
2,4,6-TRICHLOROPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2,4-DICHLOROPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2,4-DIMETHYLPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2,4-DINITROPHENOL	210000 UJ	160000 UJ	32000 U	20000 U	30000 UJ	180000 UJ	
2,4-DINITROTOLUENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
2,6-DINITROTOLUENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2-CHLORONAPHTHALENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2-CHLOROPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2-METHYLNAPHTHALENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	3700 J	
2-METHYLPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
2-NITROANILINE	210000 UJ	160000 UJ	32000 U	20000 U	30000 UJ	180000 UJ	
2-NITROPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
3,3'-DICHLOROBENZIDINE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
3-NITROANILINE	210000 UJ	160000 UJ	32000 U	20000 U	30000 UJ	180000 UJ	
4,6-DINITRO-2-METHYLPHENOL	210000 UJ	160000 UJ	32000 U	20000 U	30000 U	180000 UJ	
4-BROMOPHENYL PHENYL ETHER	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
4-CHLORO-3-METHYLPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
4-CHLOROANILINE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
4-CHLOROPHENYL PHENYL ETHER	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
4-METHYLPHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
4-NITROANILINE	210000 UJ	160000 UJ	32000 U	20000 U	30000 U	180000 UJ	
4-NITROPHENOL	210000 UJ	160000 UJ	32000 U	20000 U	30000 U	180000 UJ	
ACENAPHTHENE	11000 J	9200 J	1200 J	1500 J	1900 J	13000 J	
ACENAPHTHYLENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
ANTHRACENE	42000 J	35000 J	5500 J	5300 J	1500 J	54000 J	
BENZO(A)ANTHRACENE	270000 J	250000 J	32000	36000	16000 J	280000 J	
BENZO(A)PYRENE	260000 J	260000 J	30000	35000	17000 J	250000 J	
BENZO(B)FLUORANTHENE	370000 J	370000 J	41000	53000	25000 J	370000 J	
BENZO(G,H,I)PERYLENE	120000 J	42000 J	14000	11000	2800 J	85000 J	
BENZO(K)FLUORANTHENE	140000 J	130000 J	17000	24000	11000 J	140000 J	
BIS(2-CHLOROETHOXY)METHANE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
BIS(2-CHLOROETHYL)ETHER	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
BIS(2-ETHYLHEXYL)PHTHALATE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS008 (Con)
SAMPLE NUMBER	CF15SS007 [07/26/95]	CF15SS007RE [07/26/95]	CF15SB7 [07/26/95]	CF15SB7 [07/26/95]-D	CF15SB7RE [07/26/95]	CF15SS008 [07/13/95]	CF15SS008DL [07/13/95]
DEPTH	0-1	0-1	1-3	1-3	1-3	0-1	0-1
SAMPLE DATE	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/13/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
CARBAZOLE	33000 J	29000 J	4000 J	4600 J	1200 J	43000 J	
CHRYSENE	320000 J	280000 J	35000	40000	19000 J	320000 J	
DI-N-BUTYL PHTHALATE	85000 UJ	64000 UJ	4200 J	5700 J	12000 UJ	72000 UJ	
DI-N-OCTYL PHTHALATE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
DIBENZO(A,H)ANTHRACENE	42000 J	41000 J	4500 J	3900 J	2300 J	45000 J	
DIBENZOFURAN	85000 UJ	3400 J	13000 U	460 J	12000 U	8000 J	
DIETHYL PHTHALATE	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
DIMETHYL PHTHALATE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
FLUORANTHENE	490000 J	440000 J	58000	63000	25000 J	510000 J	
FLUORENE	4900 J	4000 J	710 J	700 J	12000 U	9000 J	
HEXACHLOROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
HEXACHLOROBUTADIENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
HEXACHLOROCYCLOPENTADIENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
HEXACHLOROETHANE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
INDENO(1,2,3-CD)PYRENE	120000 J	120000 J	14000	11000	6900 J	130000 J	
ISOPHORONE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
N-NITROSO-DI-N-PROPYLAMINE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
N-NITROSODIPHENYLAMINE	85000 UJ	64000 UJ	13000 U	8100 U	12000 U	72000 UJ	
NAPHTHALENE	7300 J	6400 J	1100 J	860 J	12000 UJ	9700 J	
NITROBENZENE	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
PENTACHLOROPHENOL	210000 UJ	160000 UJ	32000 U	20000 U	30000 U	180000 UJ	
PHENANTHRENE	210000 J	170000 J	27000	26000	8300 J	270000 J	
PHENOL	85000 UJ	64000 UJ	13000 U	8100 U	12000 UJ	72000 UJ	
PYRENE	390000 J	340000 J	49000	51000	25000 J	400000 J	
Pesticides/PCBs (ug/kg)							
4,4'-DDD	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
4,4'-DDE	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
4,4'-DDT	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
ALDRIN	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
ALPHA-BHC	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
ALPHA-CHLORDANE	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
AROCLOR-1016	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ
AROCLOR-1221	430 UJ		400 UJ	410 UJ		7300 UJ	73000 UJ
AROCLOR-1232	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ
AROCLOR-1242	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ
AROCLOR-1248	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ
AROCLOR-1254	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS008 (Con)
SAMPLE NUMBER	CF15SS007 [07/26/95]	CF15SS007RE [07/26/95]	CF15SB7 [07/26/95]	CF15SB7 [07/26/95]-D	CF15SB7RE [07/26/95]	CF15SS008 [07/13/95]	CF15SS008DL [07/13/95]
DEPTH	0-1	0-1	1-3	1-3	1-3	0-1	0-1
SAMPLE DATE	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/13/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
AROCLOR-1260	220 UJ		200 UJ	200 UJ		3600 UJ	37000 UJ
BETA-BHC	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
DELTA-BHC	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
DIELDRIN	24 R		20 UJ	20 UJ		360 UJ	3700 UJ
ENDOSULFAN I	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
ENDOSULFAN II	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
ENDOSULFAN SULFATE	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
ENDRIN	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
ENDRIN ALDEHYDE	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
ENDRIN KETONE	22 UJ		20 UJ	20 UJ		360 UJ	3700 UJ
GAMMA-BHC (LINDANE)	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
GAMMA-CHLORDANE	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
HEPTACHLOR	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
HEPTACHLOR EPOXIDE	11 UJ		10 UJ	10 UJ		180 UJ	1800 UJ
METHOXYCHLOR	110 UJ		100 UJ	100 UJ		1800 UJ	18000 UJ
TOXAPHENE	1100 UJ		1000 UJ	1000 UJ		18000 UJ	180000 UJ
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	250 UJ		250 UJ	250 UJ		2500 U	
2-AMINO-4,6-DINITROTOLUENE	250 U		250 U	250 U		2500 U	
2-NITROTOLUENE	500 UJ		500 UJ	500 UJ		5000 U	
3-NITROTOLUENE	5000 U		500 U	500 U		5080	
4-AMINO-2,6-DINITROTOLUENE	250 U		250 U	250 U		2500 U	
4-NITROTOLUENE	5000 U		500 U	500 U		5000 U	
HMX	500 U		500 U	500 U		5000 U	
RDX	500 UJ		500 UJ	500 UJ		5000 U	
TETRYL	5000 U		500 U	500 U		5000 U	
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	300		21	24		130	
Inorganics (mg/kg)							
ALUMINUM	415 J		1170	1270		337	
ANTIMONY	1.4 J		0.49 U	0.49 U		9.7	
ARSENIC	2.6 J		0.98 UJ	0.98 UJ		5.4	
BARIUM	42		10	8.5		62.1	
BERYLLIUM	0.26 U		0.24 U	0.25 U		0.22 U	
CADMIUM	0.78		0.24 U	0.25 U		0.52	
CALCIUM	9350		677	581		3670 J	
CHROMIUM	1.5 U		1.5 U	1.9		1 U	
COBALT	0.27 J		0.24 UJ	0.25 UJ		0.34	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS008 (Con)
SAMPLE NUMBER	CF15SS007 [07/26/95]	CF15SS007RE [07/26/95]	CF15SB7 [07/26/95]	CF15SB7 [07/26/95]-D	CF15SB7RE [07/26/95]	CF15SS008 [07/13/95]	CF15SS008DL [07/13/95]
DEPTH	0-1	0-1	1-3	1-3	1-3	0-1	0-1
SAMPLE DATE	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/26/1995	7/13/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
COPPER	3.7 U		2.2 U	2.6 U		2.1	
IRON	721 J		180 J	218 J		327	
LEAD	205		18.9	20.9		614	
MAGNESIUM	203		29 U	35.1 U		104 U	
MANGANESE	30.9		1.4	1.6		17.5	
MERCURY	0.13 U		0.12 U	0.12 U		0.12 U	
NICKEL	1.3		1.3	1.4		0.65 U	
POTASSIUM	23.9		22.4 U	22.6 U		24.7 J	
SELENIUM	1 UJ		0.98 UJ	0.98 UJ		0.87 U	
SILVER	0.26 U		0.24 U	0.25 U		0.22 U	
SODIUM	225 UJ		158 UJ	135 UJ		123 U	
THALLIUM	1.3 U		1.2 U	1.2 U		1.1 U	
VANADIUM	0.97		0.88	1.2		0.78	
ZINC	32.6		3.9 U	3.4 U		39.1 U	
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.21 U		0.18 U	0.22 U		0.18 U	
TOTAL ORGANIC CARBON	8300		2700	1600			

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CF15SS008RE [07/13/95]	CF15SB8 [07/13/95]	CF15SB8DL [07/13/95]	CF15SS009 [07/11/95]	CF15SS009DL [07/11/95]	CF15SS009RE [07/11/95]	CF15SB9 [07/11/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	1-3
SAMPLE DATE	7/13/1995	7/13/1995	7/13/1995	7/11/1995	7/11/1995	7/11/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE		6 U		5 U			6 U
1,1,2,2-TETRACHLOROETHANE		6 U		5 U			6 U
1,1,2-TRICHLOROETHANE		6 U		5 U			6 U
1,1-DICHLOROETHANE		6 U		5 U			6 U
1,1-DICHLOROETHENE		6 U		5 U			6 U
1,2-DICHLOROETHANE		6 U		5 U			6 U
1,2-DICHLOROPROPANE		6 U		5 U			6 U
2-BUTANONE		12 U		11 U			12 U
2-HEXANONE		12 U		11 U			11 U
4-METHYL-2-PENTANONE		12 U		11 U			11 U
ACETONE		12 U		11 U			13
BENZENE		6 U		5 U			6 U
BROMODICHLOROMETHANE		6 U		5 U			6 U
BROMOFORM		6 U		5 U			6 U
BROMOMETHANE		12 U		11 U			12 U
CARBON DISULFIDE		6 U		5 U			6 U
CARBON TETRACHLORIDE		6 U		5 U			6 U
CHLOROBENZENE		6 U		5 U			6 U
CHLORODIBROMOMETHANE		6 U		5 U			6 U
CHLOROETHANE		12 U		11 U			12 U
CHLOROFORM		6 U		5 U			6 U
CHLOROMETHANE		12 U		11 U			12 U
CIS-1,3-DICHLOROPROPENE		6 U		5 U			6 U
ETHYLBENZENE		6 U		5 U			6 U
METHYLENE CHLORIDE		6 U		5 U			6 U
STYRENE		6 U		5 U			6 U
TETRACHLOROETHENE		6 U		5 U			6 U
TOLUENE		6 U		5 U			6 U
TOTAL 1,2-DICHLOROETHENE		6 U		5 U			6 U
TOTAL XYLENES		3 J		5 U			3 J
TRANS-1,3-DICHLOROPROPENE		6 U		5 U			6 U
TRICHLOROETHENE		6 U		5 U			6 U
VINYL CHLORIDE		12 U		11 U			12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
1,2-DICHLOROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
1,3,5-TRINITROBENZENE		2500 U		2500 U			250 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CF15SS008RE [07/13/95]	CF15SB8 [07/13/95]	CF15SB8DL [07/13/95]	CF15SS009 [07/11/95]	CF15SS009DL [07/11/95]	CF15SS009RE [07/11/95]	CF15SB9 [07/11/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	1-3
SAMPLE DATE	7/13/1995	7/13/1995	7/13/1995	7/11/1995	7/11/1995	7/11/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
1,3-DINITROBENZENE		2500 U		2500 U			250 U
1,4-DICHLOROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,2'-OXYBIS(1-CHLOROPROPANE)	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,4,5-TRICHLOROPHENOL	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
2,4,6-TRICHLOROPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,4-DICHLOROPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,4-DIMETHYLPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,4-DINITROPHENOL	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
2,4-DINITROTOLUENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2,6-DINITROTOLUENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2-CHLORONAPHTHALENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2-CHLOROPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2-METHYLNAPHTHALENE	73000 U	7800 U		45000 UJ		22000000 UJ	110 J
2-METHYLPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
2-NITROANILINE	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
2-NITROPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
3,3'-DICHLOROBENZIDINE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
3-NITROANILINE	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
4,6-DINITRO-2-METHYLPHENOL	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
4-BROMOPHENYL PHENYL ETHER	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
4-CHLORO-3-METHYLPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
4-CHLOROANILINE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
4-CHLOROPHENYL PHENYL ETHER	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
4-METHYLPHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
4-NITROANILINE	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
4-NITROPHENOL	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
ACENAPHTHENE	6000 J	930 J		7700 J		2600000 J	350 J
ACENAPHTHYLENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
ANTHRACENE	39000 J	2800 J		27000 J		10000000 J	680
BENZO(A)ANTHRACENE	210000 J	24000		180000 J		93000000 J	10000 J
BENZO(A)PYRENE	220000 J	29000		190000 J		110000000 J	9000 J
BENZO(B)FLUORANTHENE	330000 J	41000		290000 J		150000000 J	16000 J
BENZO(G,H,I)PERYLENE	120000 J	6000 J		83000 J		57000000 J	2800
BENZO(K)FLUORANTHENE	120000 J	16000		90000 J		55000000 J	4800 J
BIS(2-CHLOROETHOXY)METHANE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
BIS(2-CHLOROETHYL)ETHER	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
BIS(2-ETHYLHEXYL)PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CF15SS008RE [07/13/95]	CF15SB8 [07/13/95]	CF15SB8DL [07/13/95]	CF15SS009 [07/11/95]	CF15SS009DL [07/11/95]	CF15SS009RE [07/11/95]	CF15SB9 [07/11/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	1-3
SAMPLE DATE	7/13/1995	7/13/1995	7/13/1995	7/11/1995	7/11/1995	7/11/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
CARBAZOLE	29000 J	1900 J		20000 J		8400000 J	870
CHRYSENE	240000 J	30000		200000 J		100000000 J	9600 J
DI-N-BUTYL PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	2800
DI-N-OCTYL PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
DIBENZO(A,H)ANTHRACENE	37000 J	5200 J		30000 J		19000000 J	380 U
DIBENZOFURAN	4300 J	7800 U		3800 J		1100000 J	85 J
DIETHYL PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
DIMETHYL PHTHALATE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
FLUORANTHENE	460000 J	35000		310000 J		160000000 J	12000 J
FLUORENE	5000 J	7800 U		4000 J		22000000 UJ	110 J
HEXACHLOROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
HEXACHLOROBUTADIENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
HEXACHLOROCYCLOPENTADIENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
HEXACHLOROETHANE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
INDENO(1,2,3-CD)PYRENE	100000 J	13000		81000 J		51000000 J	2900
ISOPHORONE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
N-NITROSO-DI-N-PROPYLAMINE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
N-NITROSODIPHENYLAMINE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
NAPHTHALENE	6000 J	560 J		7000 J		2000000 J	320 J
NITROBENZENE	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
PENTACHLOROPHENOL	180000 UJ	19000 U		110000 UJ		54000000 UJ	930 U
PHENANTHRENE	210000 J	14000		140000 J		53000000 J	2900
PHENOL	73000 UJ	7800 U		45000 UJ		22000000 UJ	380 U
PYRENE	240000 J	28000		210000 J		99000000 J	230 J
Pesticides/PCBs (ug/kg)							
4,4'-DDD		39 U	390 U	360 UJ	3600 UJ		39 U
4,4'-DDE		39 U	390 U	360 UJ	3600 UJ		39 U
4,4'-DDT		39 U	390 U	360 UJ	3600 UJ		39 U
ALDRIN		20 U	200 U	180 UJ	1800 UJ		19 U
ALPHA-BHC		20 U	200 U	180 UJ	1800 UJ		19 U
ALPHA-CHLORDANE		20 U	200 U	180 UJ	1800 UJ		19 U
AROCLOR-1016		390 U	3900 U	3600 UJ	36000 UJ		390 U
AROCLOR-1221		780 U	7800 U	7200 UJ	72000 UJ		780 U
AROCLOR-1232		390 U	3900 U	3600 UJ	36000 UJ		390 U
AROCLOR-1242		390 U	3900 U	3600 UJ	36000 UJ		390 U
AROCLOR-1248		390 U	3900 U	3600 UJ	36000 UJ		390 U
AROCLOR-1254		390 U	3900 U	3600 UJ	36000 UJ		390 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CF15SS008RE [07/13/95]	CF15SB8 [07/13/95]	CF15SB8DL [07/13/95]	CF15SS009 [07/11/95]	CF15SS009DL [07/11/95]	CF15SS009RE [07/11/95]	CF15SB9 [07/11/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	1-3
SAMPLE DATE	7/13/1995	7/13/1995	7/13/1995	7/11/1995	7/11/1995	7/11/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260		390 U	3900 U	3600 UJ	36000 UJ		390 U
BETA-BHC		20 U	200 U	180 UJ	1800 UJ		19 U
DELTA-BHC		20 U	200 U	180 UJ	1800 UJ		19 U
DIELDRIN		39 U	390 U	360 UJ	3600 UJ		39 U
ENDOSULFAN I		20 U	200 U	180 UJ	1800 UJ		19 U
ENDOSULFAN II		39 U	390 U	360 UJ	3600 UJ		39 U
ENDOSULFAN SULFATE		39 U	390 U	360 UJ	3600 UJ		39 U
ENDRIN		39 U	390 U	360 UJ	3600 UJ		39 U
ENDRIN ALDEHYDE		39 U	390 U	360 UJ	3600 UJ		39 U
ENDRIN KETONE		39 U	390 U	360 UJ	3600 UJ		39 U
GAMMA-BHC (LINDANE)		20 U	200 U	180 UJ	1800 UJ		19 U
GAMMA-CHLORDANE		2 R	200 U	180 UJ	1800 UJ		19 U
HEPTACHLOR		20 U	200 U	180 UJ	1800 UJ		19 U
HEPTACHLOR EPOXIDE		20 U	200 U	180 UJ	1800 UJ		19 U
METHOXYCHLOR		200 U	2000 U	1800 UJ	18000 UJ		190 U
TOXAPHENE		2000 U	20000 U	18000 UJ	180000 UJ		1900 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE		2500 U		2500 U			250 U
2-AMINO-4,6-DINITROTOLUENE		2500 U		2500 U			250 U
2-NITROTOLUENE		5000 U		5000 U			500 U
3-NITROTOLUENE		5000 U		5000 U			500 U
4-AMINO-2,6-DINITROTOLUENE		2500 U		2500 U			250 U
4-NITROTOLUENE		5000 U		5000 U			500 U
HMX		5000 U		5000 U			500 U
RDX		5000 U		5000 U			500 U
TETRYL		5000 U		5000 U			500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS		44		450			12
Inorganics (mg/kg)							
ALUMINUM		1520		1180			1710
ANTIMONY		4.2		3.9			1.6 J
ARSENIC		0.93 U		3.8			0.92 U
BARIUM		15.4		107			3
BERYLLIUM		0.23 U		0.22 U			0.23 U
CADMIUM		0.23 U		0.92			0.23 U
CALCIUM		1600 J		8500 J			404 J
CHROMIUM		1.8 U		2.4 U			1.6 U
COBALT		0.23 U		0.22 U			0.23 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CF15SS008RE [07/13/95]	CF15SB8 [07/13/95]	CF15SB8DL [07/13/95]	CF15SS009 [07/11/95]	CF15SS009DL [07/11/95]	CF15SS009RE [07/11/95]	CF15SB9 [07/11/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	1-3
SAMPLE DATE	7/13/1995	7/13/1995	7/13/1995	7/11/1995	7/11/1995	7/11/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER		0.7 U		21.2			0.69 U
IRON		148		982			170
LEAD		27.8		407			3.7
MAGNESIUM		52.7 U		390			33.6 U
MANGANESE		3		32.2			2.1
MERCURY		0.12 U		0.21			0.11 U
NICKEL		0.7 U		1.3			0.73
POTASSIUM		21.3 U		28.4			21.2 U
SELENIUM		0.93 U		0.87 U			0.92 U
SILVER		0.23 U		0.62			0.23 U
SODIUM		150 U		171 U			194 U
THALLIUM		1.2 U		1.1 U			1.2 U
VANADIUM		1.2		1.2			1.4
ZINC		3.7 U		119 U			2.3 U
Miscellaneous Parameters (mg/kg)							
CYANIDE		0.19 U		0.14 U			0.15 U
TOTAL ORGANIC CARBON							

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)
SAMPLE NUMBER	CF15SB9DL [07/11/95]	CF15SS010 [07/12/95]	CF15SS010 [07/12/95]-D	CF15SS010DL [07/12/95]	CF15SS010DL [07/12/95]-D	CF15SB10 [07/12/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE		6 U	6 U			6 U
1,1,2,2-TETRACHLOROETHANE		6 U	6 U			6 U
1,1,2-TRICHLOROETHANE		6 U	6 U			6 U
1,1-DICHLOROETHANE		6 U	6 U			6 U
1,1-DICHLOROETHENE		6 U	6 U			6 U
1,2-DICHLOROETHANE		6 U	6 U			6 U
1,2-DICHLOROPROPANE		6 U	6 U			6 U
2-BUTANONE		11 U	11 U			12 U
2-HEXANONE		11 U	11 U			12 U
4-METHYL-2-PENTANONE		11 U	11 U			12 U
ACETONE		11 U	11 U			9 J
BENZENE		6 U	6 U			6 U
BROMODICHLOROMETHANE		6 U	6 U			6 U
BROMOFORM		6 U	6 U			6 U
BROMOMETHANE		11 U	11 U			12 U
CARBON DISULFIDE		6 U	6 U			6 U
CARBON TETRACHLORIDE		6 U	6 U			6 U
CHLOROBENZENE		6 U	6 U			6 U
CHLORODIBROMOMETHANE		6 U	6 U			6 U
CHLOROETHANE		11 U	11 U			12 U
CHLOROFORM		6 U	6 U			6 U
CHLOROMETHANE		11 U	11 U			12 U
CIS-1,3-DICHLOROPROPENE		6 U	6 U			6 U
ETHYLBENZENE		6 U	6 U			6 U
METHYLENE CHLORIDE		6 U	6 U			6 U
STYRENE		6 U	6 U			6 U
TETRACHLOROETHENE		6 U	6 U			6 U
TOLUENE		6 U	6 U			6 U
TOTAL 1,2-DICHLOROETHENE		6 U	6 U			6 U
TOTAL XYLENES		6 U	6 U			6 U
TRANS-1,3-DICHLOROPROPENE		6 U	6 U			6 U
TRICHLOROETHENE		6 U	6 U			6 U
VINYL CHLORIDE		11 U	11 U			12 U
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	2600 U	3700 U	3600 U			400 U
1,2-DICHLOROBENZENE	2600 U	3700 U	3600 U			400 U
1,3,5-TRINITROBENZENE		250 U	250 U			250 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)
SAMPLE NUMBER	CF15SB9DL [07/11/95]	CF15SS010 [07/12/95]	CF15SS010 [07/12/95]-D	CF15SS010DL [07/12/95]	CF15SS010DL [07/12/95]-D	CF15SB10 [07/12/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
1,3-DICHLOROBENZENE	2600 U	3700 U	3600 U			400 U
1,3-DINITROBENZENE		250 U	250 U			250 U
1,4-DICHLOROBENZENE	2600 U	3700 U	3600 U			400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	2600 U	3700 U	3600 U			400 U
2,4,5-TRICHLOROPHENOL	6200 U	9100 U	8800 U			960 U
2,4,6-TRICHLOROPHENOL	2600 U	3700 U	3600 U			400 U
2,4-DICHLOROPHENOL	2600 U	3700 U	3600 U			400 U
2,4-DIMETHYLPHENOL	2600 U	3700 U	3600 U			400 U
2,4-DINITROPHENOL	6200 U	9100 U	8800 U			960 U
2,4-DINITROTOLUENE	2600 U	3700 U	3600 U			400 U
2,6-DINITROTOLUENE	2600 U	3700 U	3600 U			400 U
2-CHLORONAPHTHALENE	2600 U	3700 U	3600 U			400 U
2-CHLOROPHENOL	2600 U	3700 U	3600 U			400 U
2-METHYLNAPHTHALENE	2600 U	3700 U	3600 U			400 U
2-METHYLPHENOL	2600 U	3700 U	3600 U			400 U
2-NITROANILINE	6200 U	9100 U	8800 U			960 U
2-NITROPHENOL	2600 U	3700 U	3600 U			400 U
3,3'-DICHLOROBENZIDINE	2600 U	3700 U	3600 U			400 U
3-NITROANILINE	6200 U	9100 U	8800 U			960 U
4,6-DINITRO-2-METHYLPHENOL	6200 U	9100 U	8800 U			960 U
4-BROMOPHENYL PHENYL ETHER	2600 U	3700 U	3600 U			400 U
4-CHLORO-3-METHYLPHENOL	2600 U	3700 U	3600 U			400 U
4-CHLOROANILINE	2600 U	3700 U	3600 U			400 U
4-CHLOROPHENYL PHENYL ETHER	2600 U	3700 U	3600 U			400 U
4-METHYLPHENOL	2600 U	3700 U	3600 U			400 U
4-NITROANILINE	6200 U	9100 U	8800 U			960 U
4-NITROPHENOL	6200 U	9100 U	8800 U			960 U
ACENAPHTHENE	340 J	650 J	460 J			400 U
ACENAPHTHYLENE	2600 U	3700 U	3600 U			400 U
ANTHRACENE	730 J	2000 J	2200 J			400 U
BENZO(A)ANTHRACENE	11000	13000	13000			77 J
BENZO(A)PYRENE	10000	14000	15000			120 J
BENZO(B)FLUORANTHENE	14000	20000	21000			150 J
BENZO(G,H,I)PERYLENE	4600	7200	7200			68 J
BENZO(K)FLUORANTHENE	5400	7600	8300			400 U
BIS(2-CHLOROETHOXY)METHANE	2600 U	3700 U	3600 U			400 U
BIS(2-CHLOROETHYL)ETHER	2600 U	3700 U	3600 U			400 U
BIS(2-ETHYLHEXYL)PHTHALATE	2600 U	3700 U	3600 U			400 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)
SAMPLE NUMBER	CF15SB9DL [07/11/95]	CF15SS010 [07/12/95]	CF15SS010 [07/12/95]-D	CF15SS010DL [07/12/95]	CF15SS010DL [07/12/95]-D	CF15SB10 [07/12/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
BUTYL BENZYL PHTHALATE	2600 U	3700 U	3600 U			400 U
CARBAZOLE	700 J	1600 J	1600 J			400 U
CHRYSENE	12000	15000	17000			92 J
DI-N-BUTYL PHTHALATE	3200	410 J	700 J			250 J
DI-N-OCTYL PHTHALATE	2600 U	3700 U	3600 U			400 U
DIBENZO(A,H)ANTHRACENE	2000 J	2700 J	2500 J			400 U
DIBENZOFURAN	2600 U	320 J	220 J			400 U
DIETHYL PHTHALATE	2600 U	3700 U	3600 U			400 U
DIMETHYL PHTHALATE	2600 U	3700 U	3600 U			400 U
FLUORANTHENE	13000	18000	23000			150 J
FLUORENE	2600 U	380 J	280 J			400 U
HEXACHLOROBENZENE	2600 U	3700 U	3600 U			400 U
HEXACHLOROBUTADIENE	2600 U	3700 U	3600 U			400 U
HEXACHLOROCYCLOPENTADIENE	2600 U	3700 U	3600 U			400 U
HEXACHLOROETHANE	2600 U	3700 U	3600 U			400 U
INDENO(1,2,3-CD)PYRENE	5000	7100	6800			63 J
ISOPHORONE	2600 U	3700 U	3600 U			400 U
N-NITROSO-DI-N-PROPYLAMINE	2600 U	3700 U	3600 U			400 U
N-NITROSODIPHENYLAMINE	2600 U	3700 U	3600 U			400 U
NAPHTHALENE	380 J	510 J	300 J			400 U
NITROBENZENE	2600 U	3700 U	3600 U			400 U
PENTACHLOROPHENOL	6200 U	9100 U	8800 U			960 U
PHENANTHRENE	3500	9400	11000			95 J
PHENOL	2600 U	3700 U	3600 U			400 U
PYRENE	11000	16000	18000			130 J
Pesticides/PCBs (ug/kg)						
4,4'-DDD	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
4,4'-DDE	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
4,4'-DDT	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ALDRIN	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
ALPHA-BHC	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
ALPHA-CHLORDANE	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
AROCLOR-1016	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U
AROCLOR-1221	7800 U	7600 UJ	7400 UJ	76000 UJ	74000 UJ	80 U
AROCLOR-1232	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U
AROCLOR-1242	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U
AROCLOR-1248	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U
AROCLOR-1254	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)
SAMPLE NUMBER	CF15SB9DL [07/11/95]	CF15SS010 [07/12/95]	CF15SS010 [07/12/95]-D	CF15SS010DL [07/12/95]	CF15SS010DL [07/12/95]-D	CF15SB10 [07/12/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
AROCLOR-1260	3900 U	3800 UJ	3700 UJ	38000 UJ	37000 UJ	40 U
BETA-BHC	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
DELTA-BHC	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
DIELDRIN	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ENDOSULFAN I	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
ENDOSULFAN II	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ENDOSULFAN SULFATE	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ENDRIN	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ENDRIN ALDEHYDE	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
ENDRIN KETONE	390 U	380 UJ	370 UJ	3800 UJ	3700 UJ	4 U
GAMMA-BHC (LINDANE)	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
GAMMA-CHLORDANE	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
HEPTACHLOR	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
HEPTACHLOR EPOXIDE	190 U	190 UJ	180 UJ	1900 UJ	1800 UJ	2 U
METHOXYCHLOR	1900 U	1900 UJ	1800 UJ	19000 UJ	18000 UJ	20 U
TOXAPHENE	19000 U	19000 UJ	18000 UJ	190000 UJ	180000 UJ	200 U
Explosives (ug/kg)						
2,4,6-TRINITROTOLUENE		250 U	250 U			250 U
2-AMINO-4,6-DINITROTOLUENE		250 U	250 U			250 U
2-NITROTOLUENE		500 U	500 U			500 U
3-NITROTOLUENE		500 U	500 U			500 U
4-AMINO-2,6-DINITROTOLUENE		250 U	250 U			250 U
4-NITROTOLUENE		500 U	500 U			500 U
HMX		500 U	500 U			500 U
RDX		500 U	500 U			500 U
TETRYL		500 U	500 U			500 U
Petroleum Hydrocarbons (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS		51	58			15
Inorganics (mg/kg)						
ALUMINUM		137 U	595 J			2270
ANTIMONY		3.1	0.89 J			1.8
ARSENIC		1.9	0.91			0.95 U
BARIUM		16.8	23.3			2.8
BERYLLIUM		0.22 U	0.22 U			0.24 U
CADMIUM		0.22 U	0.22 U			0.24 U
CALCIUM		597 J	895 J			683 J
CHROMIUM		1.3 U	1.6 U			1.9 U
COBALT		0.22 U	0.33 J			0.24 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)	CF15SS010 (Con)
SAMPLE NUMBER	CF15SB9DL [07/11/95]	CF15SS010 [07/12/95]	CF15SS010 [07/12/95]-D	CF15SS010DL [07/12/95]	CF15SS010DL [07/12/95]-D	CF15SB10 [07/12/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995
SAMPLE CODE	NORMAL	ORIG	DUP	ORIG	DUP	ORIG
COPPER		3.3	0.67 U			0.71 U
IRON		76.7 J	177 J			224
LEAD		223 J	32 J			3.1
MAGNESIUM		23.1 U	29.1 U			46.8 U
MANGANESE		2.2	1.7			1.1
MERCURY		0.11 U	0.11 U			0.12 U
NICKEL		0.67 U	0.67 U			0.89
POTASSIUM		20.6 U	20.6 U			21.8 U
SELENIUM		0.9 U	0.89 U			0.95 U
SILVER		0.22 U	0.22 U			0.24 U
SODIUM		148 U	163 U			211 U
THALLIUM		1.1 U	1.1 U			1.2 U
VANADIUM		0.41	1.4			1.3
ZINC		11.4 U	4.3 U			2.5 U
Miscellaneous Parameters (mg/kg)						
CYANIDE		0.17 U	0.15 U			0.17 U
TOTAL ORGANIC CARBON		12000	3700			4700

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS010 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS012 (Con)	CF15SS012 (Con)
SAMPLE NUMBER	CF15SB10 [07/12/95]-D	CF15SS011 [07/12/95]	CF15SS011DL [07/12/95]	CF15SS011RE [07/12/95]	CF15SB11 [07/12/95]	CF15SS012 [07/13/95]	CF15SB12 [07/13/95]
DEPTH	1-3	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/13/1995	7/13/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U	6 U			6 U	6 U	6 U
1,1,2,2-TETRACHLOROETHANE	6 U	6 U			6 U	6 U	6 U
1,1,2-TRICHLOROETHANE	6 U	6 U			6 U	6 U	6 U
1,1-DICHLOROETHANE	6 U	6 U			6 U	6 U	6 U
1,1-DICHLOROETHENE	6 U	6 U			6 U	6 U	6 U
1,2-DICHLOROETHANE	6 U	6 U			6 U	6 U	6 U
1,2-DICHLOROPROPANE	6 U	6 U			6 U	6 U	6 U
2-BUTANONE	12 U	11 U			12 U	11 U	12 U
2-HEXANONE	12 U	11 U			12 U	11 U	12 U
4-METHYL-2-PENTANONE	12 U	11 U			12 U	11 U	12 U
ACETONE	12 U	11 U			12 U	11 U	12 U
BENZENE	6 U	6 U			6 U	6 U	6 U
BROMODICHLOROMETHANE	6 U	6 U			6 U	6 U	6 U
BROMOFORM	6 U	6 U			6 U	6 U	6 U
BROMOMETHANE	12 U	11 U			12 U	11 U	12 U
CARBON DISULFIDE	6 U	6 U			6 U	6 U	6 U
CARBON TETRACHLORIDE	6 U	6 U			6 U	6 U	6 U
CHLOROBENZENE	6 U	6 U			6 U	6 U	6 U
CHLORODIBROMOMETHANE	6 U	6 U			6 U	6 U	6 U
CHLOROETHANE	12 U	11 U			12 U	11 U	12 U
CHLOROFORM	6 U	6 U			6 U	6 U	6 U
CHLOROMETHANE	12 U	11 U			12 U	11 U	12 U
CIS-1,3-DICHLOROPROPENE	6 U	6 U			6 U	6 U	6 U
ETHYLBENZENE	6 U	6 U			6 U	6 U	6 U
METHYLENE CHLORIDE	6 U	6 U			6 U	6 U	6 U
STYRENE	6 U	6 U			6 U	6 U	6 U
TETRACHLOROETHENE	6 U	6 U			6 U	6 U	6 U
TOLUENE	6 U	6 U			6 U	6 U	6 U
TOTAL 1,2-DICHLOROETHENE	6 U	6 U			6 U	6 U	6 U
TOTAL XYLENES	6 U	6 U			6 U	6 U	4 J
TRANS-1,3-DICHLOROPROPENE	6 U	6 U			6 U	6 U	6 U
TRICHLOROETHENE	6 U	6 U			6 U	6 U	6 U
VINYL CHLORIDE	12 U	11 U			12 U	11 U	12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
1,2-DICHLOROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
1,3,5-TRINITROBENZENE	250 U	2500 U			250 U	250 U	250 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS010 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS012 (Con)	CF15SS012 (Con)
SAMPLE NUMBER	CF15SB10 [07/12/95]-D	CF15SS011 [07/12/95]	CF15SS011DL [07/12/95]	CF15SS011RE [07/12/95]	CF15SB11 [07/12/95]	CF15SS012 [07/13/95]	CF15SB12 [07/13/95]
DEPTH	1-3	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/13/1995	7/13/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
1,3-DINITROBENZENE	250 U	2500 U			250 U	250 U	250 U
1,4-DICHLOROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,4,5-TRICHLOROPHENOL	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
2,4,6-TRICHLOROPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,4-DICHLOROPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,4-DIMETHYLPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,4-DINITROPHENOL	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
2,4-DINITROTOLUENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2,6-DINITROTOLUENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2-CHLORONAPHTHALENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2-CHLOROPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2-METHYLNAPHTHALENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2-METHYLPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
2-NITROANILINE	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
2-NITROPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
3,3'-DICHLOROBENZIDINE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
3-NITROANILINE	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
4,6-DINITRO-2-METHYLPHENOL	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
4-BROMOPHENYL PHENYL ETHER	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
4-CHLORO-3-METHYLPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
4-CHLOROANILINE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
4-CHLOROPHENYL PHENYL ETHER	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
4-METHYLPHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
4-NITROANILINE	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
4-NITROPHENOL	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
ACENAPHTHENE	360 U	3500 J		3100000 J	380 U	1200 J	330 U
ACENAPHTHYLENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
ANTHRACENE	360 U	11000 J		14000000 J	32 J	3000 J	330 U
BENZO(A)ANTHRACENE	120 J	86000 J		59000000 J	260 J	27000	56 J
BENZO(A)PYRENE	150 J	83000 J		69000000 J	250 J	28000	58 J
BENZO(B)FLUORANTHENE	200 J	110000 J		97000000 J	320 J	35000	94 J
BENZO(G,H,I)PERYLENE	67 J	24000 J		33000000 J	110 J	3900 J	330 U
BENZO(K)FLUORANTHENE	120 J	43000 J		32000000 J	140 J	16000	40 J
BIS(2-CHLOROETHOXY)METHANE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
BIS(2-CHLOROETHYL)ETHER	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	52 J	19000 UJ		23000000 UJ	380 U	7400 U	330 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS010 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS012 (Con)	CF15SS012 (Con)
SAMPLE NUMBER	CF15SB10 [07/12/95]-D	CF15SS011 [07/12/95]	CF15SS011DL [07/12/95]	CF15SS011RE [07/12/95]	CF15SB11 [07/12/95]	CF15SS012 [07/13/95]	CF15SB12 [07/13/95]
DEPTH	1-3	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/13/1995	7/13/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
CARBAZOLE	360 U	9100 J		9600000 J	27 J	3000 J	330 U
CHRYSENE	160 J	94000 J		67000000 J	300 J	32000	75 J
DI-N-BUTYL PHTHALATE	170 J	19000 UJ		23000000 UJ	99 J	7400 U	330 U
DI-N-OCTYL PHTHALATE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
DIBENZO(A,H)ANTHRACENE	360 U	14000 J		11000000 J	52 J	5600 J	330 U
DIBENZOFURAN	360 U	1000 J		2000000 J	380 U	7400 U	330 U
DIETHYL PHTHALATE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
DIMETHYL PHTHALATE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
FLUORANTHENE	200 J	120000 J		130000000 J	440	55000	100 J
FLUORENE	360 U	1500 J		2600000 J	380 U	460 J	330 U
HEXACHLOROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
HEXACHLOROBUTADIENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
HEXACHLOROCYCLOPENTADIENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
HEXACHLOROETHANE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
INDENO(1,2,3-CD)PYRENE	72 J	38000 J		30000000 J	150 J	15000	24 J
ISOPHORONE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
N-NITROSO-DI-N-PROPYLAMINE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
N-NITROSODIPHENYLAMINE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
NAPHTHALENE	360 U	3200 J		2200000 J	380 U	490 J	330 U
NITROBENZENE	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
PENTACHLOROPHENOL	880 U	46000 UJ		57000000 UJ	920 U	18000 U	800 U
PHENANTHRENE	85 J	52000 J		60000000 J	160 J	16000	33 J
PHENOL	360 U	19000 UJ		23000000 UJ	380 U	7400 U	330 U
PYRENE	190 J	94000 J		74000000 J	340 J	27000	68 J
Pesticides/PCBs (ug/kg)							
4,4'-DDD	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
4,4'-DDE	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
4,4'-DDT	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ALDRIN	2 U	190 UJ	1900 UJ		0.25 R	19 UJ	19 UJ
ALPHA-BHC	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
ALPHA-CHLORDANE	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
AROCLOR-1016	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ
AROCLOR-1221	80 U	7600 UJ	76000 UJ		77 U	740 UJ	770 UJ
AROCLOR-1232	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ
AROCLOR-1242	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ
AROCLOR-1248	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ
AROCLOR-1254	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS010 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS012 (Con)	CF15SS012 (Con)
SAMPLE NUMBER	CF15SB10 [07/12/95]-D	CF15SS011 [07/12/95]	CF15SS011DL [07/12/95]	CF15SS011RE [07/12/95]	CF15SB11 [07/12/95]	CF15SS012 [07/13/95]	CF15SB12 [07/13/95]
DEPTH	1-3	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/13/1995	7/13/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260	40 U	3800 UJ	38000 UJ		38 U	370 UJ	390 UJ
BETA-BHC	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
DELTA-BHC	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
DIELDRIN	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ENDOSULFAN I	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
ENDOSULFAN II	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ENDOSULFAN SULFATE	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ENDRIN	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ENDRIN ALDEHYDE	4 U	380 UJ	3800 UJ		3.8 U	37 UJ	39 UJ
ENDRIN KETONE	4 U	380 UJ	3800 UJ		2.7 R	37 UJ	39 UJ
GAMMA-BHC (LINDANE)	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
GAMMA-CHLORDANE	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
HEPTACHLOR	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
HEPTACHLOR EPOXIDE	2 U	190 UJ	1900 UJ		1.9 U	19 UJ	19 UJ
METHOXYCHLOR	20 U	1900 UJ	19000 UJ		19 U	190 UJ	190 UJ
TOXAPHENE	200 U	19000 UJ	190000 UJ		190 U	1900 UJ	1900 UJ
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	250 U	2500 U			250 U	250 U	250 U
2-AMINO-4,6-DINITROTOLUENE	250 U	2500 U			250 U	250 U	250 U
2-NITROTOLUENE	500 U	5000 U			500 U	500 U	500 U
3-NITROTOLUENE	500 U	5000 U			500 U	500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	250 U	2500 U			250 U	250 U	250 U
4-NITROTOLUENE	500 U	5000 U			500 U	500 U	500 U
HMX	500 U	5000 U			500 U	500 U	500 U
RDX	500 U	5000 U			500 U	500 U	500 U
TETRYL	500 U	5000 U			500 U	500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	22	120			18	110 J	14 J
Inorganics (mg/kg)							
ALUMINUM	2360	1200			2060	1000	468
ANTIMONY	2.4	3.3			0.93 J	5.5 U	4.4 U
ARSENIC	0.95 U	2.1			0.92 U	1.5	0.93 U
BARIUM	4.5	97.7			17.4	38.1	10.5
BERYLLIUM	0.24 U	0.23 U			0.23 U	0.22 U	0.23 U
CADMIUM	0.24 U	0.84			0.23 U	0.3	0.23 U
CALCIUM	1040 J	102000 J			2510 J	1240 J	1240 J
CHROMIUM	2 U	4.2 U			2.8 U	1.6	0.85 U
COBALT	0.24 U	0.23 U			0.23 U	0.22 UJ	0.23 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS010 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS011 (Con)	CF15SS012 (Con)	CF15SS012 (Con)
SAMPLE NUMBER	CF15SB10 [07/12/95]-D	CF15SS011 [07/12/95]	CF15SS011DL [07/12/95]	CF15SS011RE [07/12/95]	CF15SB11 [07/12/95]	CF15SS012 [07/13/95]	CF15SB12 [07/13/95]
DEPTH	1-3	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/12/1995	7/13/1995	7/13/1995
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER	0.71 U	1.1			0.69 U	1.4	0.69 U
IRON	205	764			298	231	153
LEAD	223		145		3.5	141 J	10.6 J
MAGNESIUM	43.2 U	631			46 U	40.7 U	35 U
MANGANESE	0.82	13.5			1.2	4.6	1.1 U
MERCURY	0.12 U	0.11 U			0.11 U	0.15	0.11 U
NICKEL	0.79	0.9			0.98	0.69 J	0.69 UJ
POTASSIUM	21.9 U	20.8 U			21.3 U	21.7	22.7
SELENIUM	0.95 U	0.9 U			0.92 U	0.89 U	0.93 U
SILVER	0.24 U	0.23 U			0.23 U	0.22 U	0.23 U
SODIUM	251 J	165 U			177 U	440 U	300 U
THALLIUM	1.2 U	1.1 U			1.2 U	1.1 U	1.2 U
VANADIUM	1.3	3.4			2.2	1	0.55 J
ZINC	2.5 U	24.7 U			6.9 U	8.6 U	1.5 U
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.15 U	0.16 U			0.15 U	0.17 U	0.15 U
TOTAL ORGANIC CARBON	5800						

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013(Con)	CF15SS013(Con)	CF15SS014 (Con)	CF15SS015 (Con)	CF15SS016 (Con)	CF15SS016 (Con)	CF15SS017 (Con)
SAMPLE NUMBER	CF15SS013 [07/13/95]	CF15SB13 [07/13/95]	CF15SS014 [07/26/95]	CF15SS015 [07/31/95]	CF15SS016 [07/20/95]	CF15SS016 [07/26/95]	CF15SS017 [07/13/95]
DEPTH	0-1	1-3	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/13/1995	7/13/1995	7/26/1995	7/31/1995	7/20/1995	7/26/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U	6 U	7 U	9 U	7 U		6 U
1,1,2,2-TETRACHLOROETHANE	6 U	6 U	7 U	9 U	7 U		6 U
1,1,2-TRICHLOROETHANE	6 U	6 U	7 U	9 U	7 U		6 U
1,1-DICHLOROETHANE	6 U	6 U	7 U	9 U	7 U		6 U
1,1-DICHLOROETHENE	6 U	6 U	7 U	9 U	7 U		6 U
1,2-DICHLOROETHANE	6 U	6 U	7 U	9 U	7 U		6 U
1,2-DICHLOROPROPANE	6 U	6 U	7 U	9 U	7 U		6 U
2-BUTANONE	11 U	12 U	14 U	18 U	14 U		11 U
2-HEXANONE	11 U	12 U	14 U	18 U	14 U		11 U
4-METHYL-2-PENTANONE	11 U	12 U	14 U	18 U	14 U		11 U
ACETONE	11 U	12 U	14 U	18 U	14 U		11 U
BENZENE	6 U	6 U	7 U	9 U	7 U		6 U
BROMODICHLOROMETHANE	6 U	6 U	7 U	9 U	7 U		6 U
BROMOFORM	6 U	6 U	7 U	9 U	7 U		6 U
BROMOMETHANE	11 U	12 U	14 U	18 U	14 U		11 U
CARBON DISULFIDE	6 U	6 U	7 U	9 U	7 U		6 U
CARBON TETRACHLORIDE	6 U	6 U	7 U	9 U	7 U		6 U
CHLOROBENZENE	6 U	6 U	7 U	9 U	7 U		6 U
CHLORODIBROMOMETHANE	6 U	6 U	7 U	9 U	7 U		6 U
CHLOROETHANE	11 U	12 U	14 U	18 U	14 U		11 U
CHLOROFORM	6 U	6 U	7 U	9 U	7 U		6 U
CHLOROMETHANE	11 U	12 U	14 U	18 U	14 U		11 U
CIS-1,3-DICHLOROPROPENE	6 U	6 U	7 U	9 U	7 U		6 U
ETHYLBENZENE	6 U	6 U	7 U	9 U	7 U		6 U
METHYLENE CHLORIDE	6 U	6 U	7 U	9 U	7 U		6 U
STYRENE	6 U	6 U	7 U	9 U	7 U		6 U
TETRACHLOROETHENE	6 U	6 U	7 U	9 U	7 U		6 U
TOLUENE	6 U	6 U	7 U	9 U	7 U		6 U
TOTAL 1,2-DICHLOROETHENE	6 U	6 U	7 U	9 U	7 U		6 U
TOTAL XYLENES	6 U	6 U	7 U	9 U	7 U		6 U
TRANS-1,3-DICHLOROPROPENE	6 U	6 U	7 U	9 U	7 U		6 U
TRICHLOROETHENE	6 U	6 U	7 U	9 U	7 U		6 U
VINYL CHLORIDE	11 U	12 U	14 U	18 U	14 U		11 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
1,2-DICHLOROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
1,3,5-TRINITROBENZENE	2500 U	250 U	250 UJ	250 U		250 UJ	250 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013(Con)	CF15SS013(Con)	CF15SS014 (Con)	CF15SS015 (Con)	CF15SS016 (Con)	CF15SS016 (Con)	CF15SS017 (Con)
SAMPLE NUMBER	CF15SS013 [07/13/95]	CF15SB13 [07/13/95]	CF15SS014 [07/26/95]	CF15SS015 [07/31/95]	CF15SS016 [07/20/95]	CF15SS016 [07/26/95]	CF15SS017 [07/13/95]
DEPTH	0-1	1-3	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/13/1995	7/13/1995	7/26/1995	7/31/1995	7/20/1995	7/26/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
1,3-DINITROBENZENE	2500 U	250 U	250 U	250 U		250 U	250 U
1,4-DICHLOROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
2,2'-OXYBIS(1-CHLOROPROPANE)	1800 U	390 U	480 U	590 U		460 U	370 U
2,4,5-TRICHLOROPHENOL	4500 U	950 U	1200 U	1400 U		1100 U	890 U
2,4,6-TRICHLOROPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
2,4-DICHLOROPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
2,4-DIMETHYLPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
2,4-DINITROPHENOL	4500 U	950 U	1200 U	1400 U		1100 U	890 U
2,4-DINITROTOLUENE	1800 U	390 U	480 U	590 U		460 U	370 U
2,6-DINITROTOLUENE	1800 U	390 U	480 U	590 U		460 U	370 U
2-CHLORONAPHTHALENE	1800 U	390 U	480 U	590 U		460 U	370 U
2-CHLOROPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
2-METHYLNAPHTHALENE	1800 U	390 U	480 U	590 U		460 U	370 U
2-METHYLPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
2-NITROANILINE	4500 U	950 U	1200 U	1400 U		1100 U	890 U
2-NITROPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
3,3'-DICHLOROBENZIDINE	1800 U	390 U	480 U	590 U		460 U	370 U
3-NITROANILINE	4500 U	950 U	1200 U	1400 U		1100 U	890 U
4,6-DINITRO-2-METHYLPHENOL	4500 U	950 U	1200 U	1400 U		1100 U	890 U
4-BROMOPHENYL PHENYL ETHER	1800 U	390 U	480 U	590 U		460 U	370 U
4-CHLORO-3-METHYLPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
4-CHLOROANILINE	1800 U	390 U	480 U	590 U		460 U	370 U
4-CHLOROPHENYL PHENYL ETHER	1800 U	390 U	480 U	590 U		460 U	370 U
4-METHYLPHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
4-NITROANILINE	4500 U	950 U	1200 U	1400 U		1100 U	890 U
4-NITROPHENOL	4500 U	950 U	1200 U	1400 U		1100 U	890 U
ACENAPHTHENE	360 J	390 U	480 U	590 U		460 U	370 U
ACENAPHTHYLENE	1800 U	390 U	480 U	590 U		460 U	370 U
ANTHRACENE	640 J	390 U	480 U	590 U		460 U	370 U
BENZO(A)ANTHRACENE	7900	120 J	480 U	590 U		76 J	370 U
BENZO(A)PYRENE	8400	130 J	79 J	590 U		68 J	370 U
BENZO(B)FLUORANTHENE	11000	170 J	93 J	41 J		91 J	370 U
BENZO(G,H,I)PERYLENE	3500	82 J	56 J	590 U		460 U	370 U
BENZO(K)FLUORANTHENE	5200	80 J	40 J	590 U		42 J	370 U
BIS(2-CHLOROETHOXY)METHANE	1800 U	390 U	480 U	590 U		460 U	370 U
BIS(2-CHLOROETHYL)ETHER	1800 U	390 U	480 U	590 U		460 U	370 U
BIS(2-ETHYLHEXYL)PHTHALATE	1800 U	390 U	80 J	590 U		460 U	370 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013(Con)	CF15SS013(Con)	CF15SS014 (Con)	CF15SS015 (Con)	CF15SS016 (Con)	CF15SS016 (Con)	CF15SS017 (Con)
SAMPLE NUMBER	CF15SS013 [07/13/95]	CF15SB13 [07/13/95]	CF15SS014 [07/26/95]	CF15SS015 [07/31/95]	CF15SS016 [07/20/95]	CF15SS016 [07/26/95]	CF15SS017 [07/13/95]
DEPTH	0-1	1-3	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/13/1995	7/13/1995	7/26/1995	7/31/1995	7/20/1995	7/26/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	1800 U	390 U	480 U	590 U		460 U	370 U
CARBAZOLE	650 J	390 U	480 U	590 U		460 U	370 U
CHRYSENE	8900	140 J	72 J	590 U		88 J	370 U
DI-N-BUTYL PHTHALATE	1800 U	390 U	3600	190 J		1200	370 U
DI-N-OCTYL PHTHALATE	1800 U	390 U	480 U	590 U		460 U	370 U
DIBENZO(A,H)ANTHRACENE	1400 J	28 J	480 U	590 U		460 U	370 U
DIBENZOFURAN	120 J	390 U	480 U	590 U		460 U	370 U
DIETHYL PHTHALATE	1800 U	390 U	480 U	590 U		460 U	370 U
DIMETHYL PHTHALATE	1800 U	390 U	480 U	590 U		460 U	370 U
FLUORANTHENE	12000	230 J	120 J	39 J		97 J	370 U
FLUORENE	140 J	390 U	480 U	590 U		460 U	370 U
HEXACHLOROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
HEXACHLOROBUTADIENE	1800 U	390 U	480 U	590 U		460 U	370 U
HEXACHLOROCYCLOPENTADIENE	1800 U	390 U	480 U	590 U		460 U	370 U
HEXACHLOROETHANE	1800 U	390 U	480 U	590 U		460 U	370 U
INDENO(1,2,3-CD)PYRENE	3900	74 J	44 J	590 U		35 J	370 U
ISOPHORONE	1800 U	390 U	480 U	590 U		460 U	370 U
N-NITROSO-DI-N-PROPYLAMINE	1800 U	390 U	480 U	590 U		460 U	370 U
N-NITROSODIPHENYLAMINE	1800 U	390 U	480 U	590 U		460 U	370 U
NAPHTHALENE	350 J	390 U	480 U	590 U		460 U	370 U
NITROBENZENE	1800 U	390 U	480 U	590 U		460 U	370 U
PENTACHLOROPHENOL	4500 U	950 U	1200 U	1400 U		1100 U	890 U
PHENANTHRENE	3200	83 J	60 J	590 U		29 J	370 U
PHENOL	1800 U	390 U	480 U	590 U		460 U	370 U
PYRENE	7600	160 J	100 J	590 U		82 J	370 U
Pesticides/PCBs (ug/kg)							
4,4'-DDD	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	3.7 U
4,4'-DDE	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	3.7 U
4,4'-DDT	38 UJ	40 UJ	0.69 J	3.5 R		4.7 U	3.7 U
ALDRIN	19 UJ	20 UJ	0.27 R	1 R		0.44 R	1.8 U
ALPHA-BHC	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
ALPHA-CHLORDANE	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
AROCLOR-1016	380 UJ	400 UJ	48 U	59 U		47 U	37 U
AROCLOR-1221	750 UJ	790 UJ	96 U	120 U		94 U	74 U
AROCLOR-1232	380 UJ	400 UJ	48 U	59 U		47 U	37 U
AROCLOR-1242	380 UJ	400 UJ	48 U	59 U		47 U	37 U
AROCLOR-1248	380 UJ	400 UJ	48 U	59 U		47 U	37 U
AROCLOR-1254	380 UJ	400 UJ	48 U	59 U		47 U	37 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013(Con)	CF15SS013(Con)	CF15SS014 (Con)	CF15SS015 (Con)	CF15SS016 (Con)	CF15SS016 (Con)	CF15SS017 (Con)
SAMPLE NUMBER	CF15SS013 [07/13/95]	CF15SB13 [07/13/95]	CF15SS014 [07/26/95]	CF15SS015 [07/31/95]	CF15SS016 [07/20/95]	CF15SS016 [07/26/95]	CF15SS017 [07/13/95]
DEPTH	0-1	1-3	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/13/1995	7/13/1995	7/26/1995	7/31/1995	7/20/1995	7/26/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260	380 UJ	400 UJ	48 U	59 U		47 U	37 U
BETA-BHC	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
DELTA-BHC	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
DIELDRIN	38 UJ	40 UJ	4.8 U	5.9 UJ		4.7 U	3.7 U
ENDOSULFAN I	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
ENDOSULFAN II	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	0.74 J
ENDOSULFAN SULFATE	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	3.7 U
ENDRIN	38 UJ	40 UJ	4.8 U	5.9 UJ		4.7 U	3.7 U
ENDRIN ALDEHYDE	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	3.7 U
ENDRIN KETONE	38 UJ	40 UJ	4.8 U	5.9 U		4.7 U	3.7 U
GAMMA-BHC (LINDANE)	19 UJ	20 UJ	2.4 U	3 UJ		2.4 U	1.8 U
GAMMA-CHLORDANE	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
HEPTACHLOR	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
HEPTACHLOR EPOXIDE	19 UJ	20 UJ	2.4 U	3 U		2.4 U	1.8 U
METHOXYCHLOR	190 UJ	200 UJ	49	30 U		24 U	18 U
TOXAPHENE	1900 UJ	2000 UJ	240 U	300 U		240 U	180 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	2500 U	250 U	250 UJ	250 U		250 UJ	250 U
2-AMINO-4,6-DINITROTOLUENE	2500 U	250 U	250 U	250 U		250 U	250 U
2-NITROTOLUENE	5000 U	500 U	500 UJ	500 U		500 UJ	500 U
3-NITROTOLUENE	5000 U	500 U	500 U	500 U		500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	2500 U	250 U	250 U	250 U		250 U	250 U
4-NITROTOLUENE	5000 U	500 U	500 U	500 U		500 U	500 U
HMX	5000 U	500 U	500 U	500 U		500 U	500 U
RDX	5000 U	500 U	500 UJ	500 U		500 UJ	500 U
TETRYL	5000 U	500 U	500 U	500 U		500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	170 J	60 J	14 U	160 J		32	30 J
Inorganics (mg/kg)							
ALUMINUM	414	1950	498 J	5570 J		232 J	498
ANTIMONY	1.4 U	0.8 U	0.58 U	301		0.56 U	0.44 U
ARSENIC	0.95	0.96 U	1.2 UJ	96.5		1.1 UJ	0.89 U
BARIUM	10.7	2.4	1.1	4.8		4.9	1.4
BERYLLIUM	0.23 U	0.24 U	0.29 U	0.36 U		0.28 U	0.22 U
CADMIUM	0.4	0.24 U	0.29 U	0.36 U		0.28 U	0.22 U
CALCIUM	4270 J	865 J	153	199		434	137 U
CHROMIUM	26.9	2	2.1 U	6.2 U		0.79 U	0.92 U
COBALT	0.35 J	0.24 UJ	0.29 UJ	0.36 UJ		0.28 UJ	0.22 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013(Con)	CF15SS013(Con)	CF15SS014 (Con)	CF15SS015 (Con)	CF15SS016 (Con)	CF15SS016 (Con)	CF15SS017 (Con)
SAMPLE NUMBER	CF15SS013 [07/13/95]	CF15SB13 [07/13/95]	CF15SS014 [07/26/95]	CF15SS015 [07/31/95]	CF15SS016 [07/20/95]	CF15SS016 [07/26/95]	CF15SS017 [07/13/95]
DEPTH	0-1	1-3	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/13/1995	7/13/1995	7/26/1995	7/31/1995	7/20/1995	7/26/1995	7/13/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER	2.7	0.72 U	3.8 U	4.4 U		2.2 U	0.67 U
IRON	829	161	84.2 J	665		163 J	121
LEAD	251 J	3.8 J	22.7	7510		47.4	2.9 J
MAGNESIUM	83.8	47.2 U	20.3 U	67.5		20.2 U	19.7 U
MANGANESE	20.2	1.9 U	0.6	2		1.1	0.84 U
MERCURY	0.11 U	0.13 U	0.14 U	0.18 U		0.14 U	0.11 U
NICKEL	0.91 J	0.91 J	0.87 U	2.2		0.84 U	0.67 UJ
POTASSIUM	20.7 U	27.6	26.6 U	39.3		25.8 U	20.5 U
SELENIUM	0.9 U	0.96 U	1.2 UJ	1.4 UJ		1.1 UJ	0.89 U
SILVER	0.23 U	0.24 U	0.29 U	0.36 U		0.28 U	0.22 U
SODIUM	322 U	279 U	198 UJ	358 J		218 UJ	247 U
THALLIUM	1.1 U	1.2 U	1.4 U	1.8 UJ		1.4 U	1.1 U
VANADIUM	0.89	1.1	0.8	4.1		0.41	0.82
ZINC	21 U	1.6 U	4.9 U	14.5 U		3.3 U	1 U
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.19 U	0.16 U	0.22 U	0.25 U		0.24 U	0.15 U
TOTAL ORGANIC CARBON				46000			

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS017 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS019 (Con)	CF15SS019 (Con)
SAMPLE NUMBER	CF15SB17 [07/13/95]	CF15SS018 [07/27/95]	CF15SS018DL [07/27/95]	CF15SB18 [07/27/95]	CF15SB18DL [07/27/95]	CF15SS019 [07/10/95]	CF15SB19 [07/10/95]
DEPTH	1-3	0-1	0-1	1-3	1-3	0-1	1-3
SAMPLE DATE	7/13/1995	7/27/1995	7/27/1995	7/27/1995	7/27/1995	7/10/1995	7/10/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U	6 U		6 U		6 U	6 U
1,1,2,2-TETRACHLOROETHANE	6 U	6 U		6 U		6 U	6 U
1,1,2-TRICHLOROETHANE	6 U	6 U		6 U		6 U	6 U
1,1-DICHLOROETHANE	6 U	6 U		6 U		6 U	6 U
1,1-DICHLOROETHENE	6 U	6 U		6 U		6 U	6 U
1,2-DICHLOROETHANE	6 U	6 U		6 U		6 U	6 U
1,2-DICHLOROPROPANE	6 U	6 U		6 U		6 U	6 U
2-BUTANONE	12 U	13 U		12 U		11 U	12 U
2-HEXANONE	12 U	13 U		12 U		11 U	12 U
4-METHYL-2-PENTANONE	12 U	13 U		12 U		11 U	12 U
ACETONE	12 U	13 U		12 U		11 U	12 U
BENZENE	6 U	6 U		6 U		6 U	6 U
BROMODICHLOROMETHANE	6 U	6 U		6 U		6 U	6 U
BROMOFORM	6 U	6 U		6 U		6 U	6 U
BROMOMETHANE	12 U	13 U		12 U		11 U	12 U
CARBON DISULFIDE	6 U	6 U		6 U		6 U	6 U
CARBON TETRACHLORIDE	6 U	6 U		6 U		6 U	6 U
CHLOROBENZENE	6 U	6 U		6 U		6 U	6 U
CHLORODIBROMOMETHANE	6 U	6 U		6 U		6 U	6 U
CHLOROETHANE	12 U	13 U		12 U		11 U	12 U
CHLOROFORM	6 U	6 U		6 U		6 U	6 U
CHLOROMETHANE	12 U	13 U		12 U		11 U	12 U
CIS-1,3-DICHLOROPROPENE	6 U	6 U		6 U		6 U	6 U
ETHYLBENZENE	6 U	6 U		6 U		6 U	6 U
METHYLENE CHLORIDE	6 U	6 U		6 U		6 U	6 U
STYRENE	6 U	6 U		6 U		6 U	6 U
TETRACHLOROETHENE	6 U	6 U		6 U		6 U	6 U
TOLUENE	6 U	6 U		6 U		6 U	6 U
TOTAL 1,2-DICHLOROETHENE	6 U	6 U		6 U		6 U	6 U
TOTAL XYLENES	6 U	6 U		6 U		6 U	6 U
TRANS-1,3-DICHLOROPROPENE	6 U	6 U		6 U		6 U	6 U
TRICHLOROETHENE	6 U	6 U		6 U		6 U	6 U
VINYL CHLORIDE	12 U	13 U		12 U		11 U	12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
1,2-DICHLOROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
1,3,5-TRINITROBENZENE	250 U	250 UJ		250 UJ		250 U	250 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS017 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS019 (Con)	CF15SS019 (Con)
SAMPLE NUMBER	CF15SB17 [07/13/95]	CF15SS018 [07/27/95]	CF15SS018DL [07/27/95]	CF15SB18 [07/27/95]	CF15SB18DL [07/27/95]	CF15SS019 [07/10/95]	CF15SB19 [07/10/95]
DEPTH	1-3	0-1	0-1	1-3	1-3	0-1	1-3
SAMPLE DATE	7/13/1995	7/27/1995	7/27/1995	7/27/1995	7/27/1995	7/10/1995	7/10/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
1,3-DINITROBENZENE	250 U	250 U		250 U		250 U	250 U
1,4-DICHLOROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,4,5-TRICHLOROPHENOL	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
2,4,6-TRICHLOROPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,4-DICHLOROPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,4-DIMETHYLPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,4-DINITROPHENOL	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
2,4-DINITROTOLUENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2,6-DINITROTOLUENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2-CHLORONAPHTHALENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2-CHLOROPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2-METHYLNAPHTHALENE	400 U	22 J	840 U	390 U	790 U	370 U	400 U
2-METHYLPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
2-NITROANILINE	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
2-NITROPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
3,3'-DICHLOROBENZIDINE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
3-NITROANILINE	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
4,6-DINITRO-2-METHYLPHENOL	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
4-BROMOPHENYL PHENYL ETHER	400 U	420 U	840 U	390 U	790 U	370 U	400 U
4-CHLORO-3-METHYLPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
4-CHLOROANILINE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
4-CHLOROPHENYL PHENYL ETHER	400 U	420 U	840 U	390 U	790 U	370 U	400 U
4-METHYLPHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
4-NITROANILINE	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
4-NITROPHENOL	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
ACENAPHTHENE	400 U	110 J	84 J	390 U	790 U	370 U	400 U
ACENAPHTHYLENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
ANTHRACENE	400 U	250 J	200 J	390 U	790 U	370 U	400 U
BENZO(A)ANTHRACENE	400 U	2300	1800	390 U	790 U	120 J	400 U
BENZO(A)PYRENE	400 U	2500	2000	390 U	790 U	150 J	400 U
BENZO(B)FLUORANTHENE	400 U	4200 J	3100	390 U	790 U	210 J	400 U
BENZO(G,H,I)PERYLENE	400 U	450	460 J	390 U	790 U	67 J	400 U
BENZO(K)FLUORANTHENE	400 U	1500	1100	390 U	790 U	92 J	400 U
BIS(2-CHLOROETHOXY)METHANE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
BIS(2-CHLOROETHYL)ETHER	400 U	420 U	840 U	390 U	790 U	370 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	400 U	97 J	57 J	390 U	790 U	370 U	400 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS017 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS019 (Con)	CF15SS019 (Con)
SAMPLE NUMBER	CF15SB17 [07/13/95]	CF15SS018 [07/27/95]	CF15SS018DL [07/27/95]	CF15SB18 [07/27/95]	CF15SB18DL [07/27/95]	CF15SS019 [07/10/95]	CF15SB19 [07/10/95]
DEPTH	1-3	0-1	0-1	1-3	1-3	0-1	1-3
SAMPLE DATE	7/13/1995	7/27/1995	7/27/1995	7/27/1995	7/27/1995	7/10/1995	7/10/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	400 U	160 J	82 J	56 J	790 U	370 U	400 U
CARBAZOLE	400 U	260 J	180 J	390 U	790 U	370 U	400 U
CHRYSENE	400 U	2600	2300	390 U	790 U	170 J	400 U
DI-N-BUTYL PHTHALATE	400 U	4500 J	3600	5600 J	3700	760	260 J
DI-N-OCTYL PHTHALATE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
DIBENZO(A,H)ANTHRACENE	400 U	350 J	320 J	390 U	790 U	22 J	400 U
DIBENZOFURAN	400 U	35 J	840 U	390 U	790 U	370 U	400 U
DIETHYL PHTHALATE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
DIMETHYL PHTHALATE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
FLUORANTHENE	400 U	3600 J	3200	390 U	790 U	230 J	400 U
FLUORENE	400 U	43 J	840 U	390 U	790 U	370 U	400 U
HEXACHLOROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
HEXACHLOROBUTADIENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
HEXACHLOROCYCLOPENTADIENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
HEXACHLOROETHANE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
INDENO(1,2,3-CD)PYRENE	400 U	950	970	390 U	790 U	69 J	400 U
ISOPHORONE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
N-NITROSODIPHENYLAMINE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
NAPHTHALENE	400 U	80 J	73 J	390 U	790 U	370 U	400 U
NITROBENZENE	400 U	420 U	840 U	390 U	790 U	370 U	400 U
PENTACHLOROPHENOL	980 U	1000 U	2000 U	950 U	1900 U	900 U	960 U
PHENANTHRENE	400 U	1100	1000	390 U	790 U	62 J	400 U
PHENOL	400 U	420 U	840 U	390 U	790 U	370 U	400 U
PYRENE	400 U	2700	2300	41 J	790 U	140 J	400 U
Pesticides/PCBs (ug/kg)							
4,4'-DDD	4.1 U	21 UJ		4 U		3.7 U	4 U
4,4'-DDE	4.1 U	21 UJ		4 U		3.7 U	4 U
4,4'-DDT	4.1 U	21 J		4 U		3.7 U	4 U
ALDRIN	2 U	10 UJ		0.35 R		1.9 UJ	0.53 R
ALPHA-BHC	2 U	10 UJ		2 U		1.9 U	2 U
ALPHA-CHLORDANE	2 U	10 UJ		2 U		1.9 U	2 U
AROCLOR-1016	41 U	210 UJ		40 U		37 U	40 U
AROCLOR-1221	81 U	420 UJ		79 U		75 U	80 U
AROCLOR-1232	41 U	210 UJ		40 U		37 U	40 U
AROCLOR-1242	41 U	210 UJ		40 U		37 U	40 U
AROCLOR-1248	41 U	210 UJ		40 U		37 U	40 U
AROCLOR-1254	41 U	210 UJ		40 U		37 U	40 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS017 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS019 (Con)	CF15SS019 (Con)
SAMPLE NUMBER	CF15SB17 [07/13/95]	CF15SS018 [07/27/95]	CF15SS018DL [07/27/95]	CF15SB18 [07/27/95]	CF15SB18DL [07/27/95]	CF15SS019 [07/10/95]	CF15SB19 [07/10/95]
DEPTH	1-3	0-1	0-1	1-3	1-3	0-1	1-3
SAMPLE DATE	7/13/1995	7/27/1995	7/27/1995	7/27/1995	7/27/1995	7/10/1995	7/10/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260	41 U	210 UJ		40 U		37 U	40 U
BETA-BHC	2 U	10 UJ		2 U		1.9 U	2 U
DELTA-BHC	2 U	10 UJ		2 U		1.9 U	2 U
DIELDRIN	4.1 U	21 UJ		4 U		3.7 U	4 U
ENDOSULFAN I	2 U	10 UJ		2 U		1.9 U	2 U
ENDOSULFAN II	4.1 U	21 UJ		4 U		3.7 U	4 U
ENDOSULFAN SULFATE	4.1 U	21 UJ		4 U		3.7 U	4 U
ENDRIN	4.1 U	21 UJ		4 U		3.7 U	4 U
ENDRIN ALDEHYDE	4.1 U	21 UJ		4 U		3.7 U	4 U
ENDRIN KETONE	4.1 U	21 UJ		4 U		3.7 U	4 U
GAMMA-BHC (LINDANE)	2 U	10 UJ		2 U		1.9 U	2 U
GAMMA-CHLORDANE	2 U	10 UJ		2 U		1.9 U	2 U
HEPTACHLOR	2 U	10 UJ		2 U		1.9 UJ	2 UJ
HEPTACHLOR EPOXIDE	2 U	10 UJ		2 U		1.9 U	2 U
METHOXYCHLOR	20 U	100 UJ		20 U		19 U	4 U
TOXAPHENE	200 U	1000 UJ		200 U		190 U	200 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	250 U	250 UJ		250 UJ		250 U	250 U
2-AMINO-4,6-DINITROTOLUENE	250 U	250 U		250 U		250 U	250 U
2-NITROTOLUENE	500 U	500 UJ		500 UJ		500 U	500 U
3-NITROTOLUENE	500 U	500 U		500 U		500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	250 U	250 U		250 U		250 U	250 U
4-NITROTOLUENE	500 U	500 U		500 U		500 U	500 U
HMX	500 U	500 U		500 U		500 U	500 U
RDX	500 U	500 UJ		500 UJ		500 U	500 U
TETRYL	500 U	500 U		500 U		500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	12 UJ	110		12 U		38 J	57 J
Inorganics (mg/kg)							
ALUMINUM	430	316 J		2140		1380	1410
ANTIMONY	0.61 U	0.51 U		0.48 U		4.4 U	4.8 U
ARSENIC	0.97 U	1.1 J		0.95 UJ		0.88 UJ	0.96 UJ
BARIUM	0.95 U	2.4		1.7		3.1	1.3
BERYLLIUM	0.24 U	0.25 U		0.24 U		0.22 U	0.24 U
CADMIUM	0.24 U	0.25 U		0.24 U		0.22 U	0.24 U
CALCIUM	109 U	2170		773		159 J	62.7 J
CHROMIUM	1.1 U	1 U		2.7		2 U	2.2 U
COBALT	0.24 UJ	0.25 UJ		0.24 UJ		1.3 U	1.4 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS017 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS018 (Con)	CF15SS019 (Con)	CF15SS019 (Con)
SAMPLE NUMBER	CF15SB17 [07/13/95]	CF15SS018 [07/27/95]	CF15SS018DL [07/27/95]	CF15SB18 [07/27/95]	CF15SB18DL [07/27/95]	CF15SS019 [07/10/95]	CF15SB19 [07/10/95]
DEPTH	1-3	0-1	0-1	1-3	1-3	0-1	1-3
SAMPLE DATE	7/13/1995	7/27/1995	7/27/1995	7/27/1995	7/27/1995	7/10/1995	7/10/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER	0.73 U	3.5 U		1.9 U		0.66 U	0.72 U
IRON	66.6	100 J		170 J		285 J	191 J
LEAD	1.9 J	14.1 J		1.1 J		10.4 J	1.5 J
MAGNESIUM	15.9 U	34 U		35.5 U		32.7 U	24.6 U
MANGANESE	0.83 U	5.6		0.89		0.96 U	0.74 U
MERCURY	0.12 U	0.13 U		0.12 U		0.11 U	0.12 U
NICKEL	0.82 J	0.9 J		1.1		2.7 U	2.9 U
POTASSIUM	22.3 U	23.3 U		21.9 U		21.8 U	20.9 U
SELENIUM	0.97 U	1 UJ		0.95 UJ		0.88 U	0.96 U
SILVER	0.24 U	0.25 U		0.24 U		0.88 U	0.96 U
SODIUM	185 U	184 UJ		204 UJ		262 J	156 J
THALLIUM	1.2 U	1.3 U		1.2 U		1.1 U	1.2 U
VANADIUM	0.69	0.78		1.8		1 J	1.2 J
ZINC	0.94 U	2.8 U		2.5 U		1.6 UJ	0.96 UJ
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.18 U	0.24 U		0.23 U		0.42 UJ	0.2 UJ
TOTAL ORGANIC CARBON		9200		4900		8400	5700

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS021 (Con)	CF15SS021 (Con)
SAMPLE NUMBER	CF15SS020 [07/31/95]	CF15SS020 [07/31/95]-D	CF15SS020RE [07/31/95]	CF15SS020RE [07/31/95]-D	CF15SS021 [07/10/95]	CF15SS021DL [07/10/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/31/1995	7/31/1995	7/31/1995	7/31/1995	7/10/1995	7/10/1995
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE	6 U	6 U			6 U	
1,1,2,2-TETRACHLOROETHANE	6 U	6 U			6 U	
1,1,2-TRICHLOROETHANE	6 U	6 U			6 U	
1,1-DICHLOROETHANE	6 U	6 U			6 U	
1,1-DICHLOROETHENE	6 U	6 U			6 U	
1,2-DICHLOROETHANE	6 U	6 U			6 U	
1,2-DICHLOROPROPANE	6 U	6 U			6 U	
2-BUTANONE	13 U	12 U			11 U	
2-HEXANONE	13 U	12 U			11 U	
4-METHYL-2-PENTANONE	13 U	12 U			11 U	
ACETONE	13 U	12 U			11 U	
BENZENE	6 U	6 U			6 U	
BROMODICHLOROMETHANE	6 U	6 U			6 U	
BROMOFORM	6 U	6 U			6 U	
BROMOMETHANE	13 U	12 U			11 U	
CARBON DISULFIDE	6 U	6 U			6 U	
CARBON TETRACHLORIDE	6 U	6 U			6 U	
CHLOROBENZENE	6 U	6 U			6 U	
CHLORODIBROMOMETHANE	6 U	6 U			6 U	
CHLOROETHANE	13 U	12 U			11 U	
CHLOROFORM	6 U	6 U			6 U	
CHLOROMETHANE	13 U	12 U			11 U	
CIS-1,3-DICHLOROPROPENE	6 U	6 U			6 U	
ETHYLBENZENE	6 U	6 U			6 U	
METHYLENE CHLORIDE	6 U	6 U			6 U	
STYRENE	6 U	6 U			6 U	
TETRACHLOROETHENE	6 U	6 U			6 U	
TOLUENE	6 U	6 U			6 U	
TOTAL 1,2-DICHLOROETHENE	6 U	6 U			6 U	
TOTAL XYLENES	6 U	6 U			6 U	
TRANS-1,3-DICHLOROPROPENE	6 U	6 U			6 U	
TRICHLOROETHENE	6 U	6 U			6 U	
VINYL CHLORIDE	13 U	12 U			11 U	
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
1,2-DICHLOROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
1,3,5-TRINITROBENZENE	2500 U	2500 U			250 U	

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS021 (Con)	CF15SS021 (Con)
SAMPLE NUMBER	CF15SS020 [07/31/95]	CF15SS020 [07/31/95]-D	CF15SS020RE [07/31/95]	CF15SS020RE [07/31/95]-D	CF15SS021 [07/10/95]	CF15SS021DL [07/10/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/31/1995	7/31/1995	7/31/1995	7/31/1995	7/10/1995	7/10/1995
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
1,3-DICHLOROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
1,3-DINITROBENZENE	2500 U	2500 U			250 U	
1,4-DICHLOROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,2'-OXYBIS(1-CHLOROPROPANE)	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,4,5-TRICHLOROPHENOL	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
2,4,6-TRICHLOROPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,4-DICHLOROPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,4-DIMETHYLPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,4-DINITROPHENOL	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
2,4-DINITROTOLUENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2,6-DINITROTOLUENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2-CHLORONAPHTHALENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2-CHLOROPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2-METHYLNAPHTHALENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2-METHYLPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
2-NITROANILINE	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
2-NITROPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
3,3'-DICHLOROBENZIDINE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
3-NITROANILINE	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
4,6-DINITRO-2-METHYLPHENOL	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
4-BROMOPHENYL PHENYL ETHER	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
4-CHLORO-3-METHYLPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
4-CHLOROANILINE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
4-CHLOROPHENYL PHENYL ETHER	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
4-METHYLPHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
4-NITROANILINE	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
4-NITROPHENOL	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
ACENAPHTHENE	7200 J	2800 J	1400 J	12000 UJ	370 U	740 U
ACENAPHTHYLENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
ANTHRACENE	14000 J	7800 J	3700 J	870 J	370 U	740 U
BENZO(A)ANTHRACENE	110000 J	60000	37000 J	8600 J	370 U	740 U
BENZO(A)PYRENE	100000 J	60000	40000 J	10000 J	370 U	740 U
BENZO(B)FLUORANTHENE	140000 J	80000	58000 J	15000 J	370 U	740 U
BENZO(G,H,I)PERYLENE	56000 J	29000 J	18000 J	5600 J	370 U	740 U
BENZO(K)FLUORANTHENE	57000 J	33000	25000 J	5400 J	370 U	740 U
BIS(2-CHLOROETHOXY)METHANE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
BIS(2-CHLOROETHYL)ETHER	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
BIS(2-ETHYLHEXYL)PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS021 (Con)	CF15SS021 (Con)
SAMPLE NUMBER	CF15SS020 [07/31/95]	CF15SS020 [07/31/95]-D	CF15SS020RE [07/31/95]	CF15SS020RE [07/31/95]-D	CF15SS021 [07/10/95]	CF15SS021DL [07/10/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/31/1995	7/31/1995	7/31/1995	7/31/1995	7/10/1995	7/10/1995
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
CARBAZOLE	13000 J	7700 J	3800 J	740 J	370 U	740 U
CHRYSENE	130000	68000 J	43000 J	10000 J	370 U	740 U
DI-N-BUTYL PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	3000 J	3300
DI-N-OCTYL PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
DIBENZO(A,H)ANTHRACENE	17000 J	9000 J	5800 J	12000 UJ	370 U	740 U
DIBENZOFURAN	2200 J	20000 U	13000 UJ	12000 UJ	370 U	740 U
DIETHYL PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
DIMETHYL PHTHALATE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
FLUORANTHENE	200000 J	110000	62000 J	14000 J	370 U	740 U
FLUORENE	2700 J	1000 J	13000 UJ	12000 UJ	370 U	740 U
HEXACHLOROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
HEXACHLOROBUTADIENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
HEXACHLOROCYCLOPENTADIENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
HEXACHLOROETHANE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
INDENO(1,2,3-CD)PYRENE	52000 J	27000 J	17000 J	4900 J	370 U	740 U
ISOPHORONE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
N-NITROSO-DI-N-PROPYLAMINE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
N-NITROSODIPHENYLAMINE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
NAPHTHALENE	6500 J	2300 J	1300 J	12000 UJ	370 U	740 U
NITROBENZENE	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
PENTACHLOROPHENOL	100000 UJ	50000 U	32000 UJ	31000 UJ	900 U	1800 U
PHENANTHRENE	72000 J	39000	19000 J	4300 J	370 U	740 U
PHENOL	42000 UJ	20000 U	13000 UJ	12000 UJ	370 U	740 U
PYRENE	170000 J	86000 J	46000 J	13000 J	370 U	740 U
Pesticides/PCBs (ug/kg)						
4,4'-DDD	210 UJ	210 UJ			0.053 R	
4,4'-DDE	210 UJ	210 UJ			3.7 U	
4,4'-DDT	210 UJ	210 UJ			3.7 U	
ALDRIN	110 UJ	100 UJ			0.47 R	
ALPHA-BHC	110 UJ	100 UJ			1.9 U	
ALPHA-CHLORDANE	110 UJ	100 UJ			1.9 U	
AROCLOR-1016	2100 UJ	2100 UJ			37 U	
AROCLOR-1221	4200 UJ	4200 UJ			75 U	
AROCLOR-1232	2100 UJ	2100 UJ			37 U	
AROCLOR-1242	2100 UJ	2100 UJ			37 U	
AROCLOR-1248	2100 UJ	2100 UJ			37 U	
AROCLOR-1254	2100 UJ	2100 UJ			37 U	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER DEPTH SAMPLE DATE SAMPLE CODE	CF15SS020 (Con) CF15SS020 [07/31/95] 0-1 7/31/1995 ORIG	CF15SS020 (Con) CF15SS020 [07/31/95]-D 0-1 7/31/1995 DUP	CF15SS020 (Con) CF15SS020RE [07/31/95] 0-1 7/31/1995 ORIG	CF15SS020 (Con) CF15SS020RE [07/31/95]-D 0-1 7/31/1995 DUP	CF15SS021 (Con) CF15SS021 [07/10/95] 0-1 7/10/1995 NORMAL	CF15SS021 (Con) CF15SS021DL [07/10/95] 0-1 7/10/1995 NORMAL
AROCLOR-1260	2100 UJ	2100 UJ			37 U	
BETA-BHC	110 UJ	100 UJ			1.9 U	
DELTA-BHC	110 UJ	100 UJ			1.9 U	
DIELDRIN	210 UJ	210 UJ			3.7 U	
ENDOSULFAN I	110 UJ	100 UJ			1.9 U	
ENDOSULFAN II	210 UJ	210 UJ			0.67 R	
ENDOSULFAN SULFATE	210 UJ	210 UJ			3.7 U	
ENDRIN	210 UJ	210 UJ			3.7 U	
ENDRIN ALDEHYDE	210 UJ	210 UJ			2.7 J	
ENDRIN KETONE	210 UJ	210 UJ			3.7 U	
GAMMA-BHC (LINDANE)	110 UJ	100 UJ			1.9 U	
GAMMA-CHLORDANE	19 R	16 R			1.9 U	
HEPTACHLOR	110 UJ	100 UJ			1.9 UJ	
HEPTACHLOR EPOXIDE	110 UJ	100 UJ			1.9 U	
METHOXYCHLOR	1100 UJ	1000 UJ			19 U	
TOXAPHENE	11000 UJ	10000 UJ			190 U	
Explosives (ug/kg)						
2,4,6-TRINITROTOLUENE	2500 U	2500 U			250 U	
2-AMINO-4,6-DINITROTOLUENE	2500 U	2500 U			250 U	
2-NITROTOLUENE	5000 U	5000 U			500 U	
3-NITROTOLUENE	5000 U	5000 U			500 U	
4-AMINO-2,6-DINITROTOLUENE	2500 U	2500 U			250 U	
4-NITROTOLUENE	5000 U	5000 U			500 U	
HMX	5000 U	5000 U			500 U	
RDX	5000 U	5000 U			500 U	
TETRYL	5000 U	5000 U			500 U	
Petroleum Hydrocarbons (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	130 J	58 J			30 J	
Inorganics (mg/kg)						
ALUMINUM	844 J	796 J			88	
ANTIMONY	4.1 U	4.2 U			5.5 U	
ARSENIC	1.5 J	1.9 U			0.9 UJ	
BARIUM	6.9	7.2			1.4	
BERYLLIUM	0.26 U	0.25 U			0.23 U	
CADMIUM	0.26 U	0.25 U			0.23 U	
CALCIUM	889	807			88.6 J	
CHROMIUM	1.4 U	1.4 U			2 U	
COBALT	0.26 UJ	0.25 UJ			1.4 U	

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS020 (Con)	CF15SS021 (Con)	CF15SS021 (Con)
SAMPLE NUMBER	CF15SS020 [07/31/95]	CF15SS020 [07/31/95]-D	CF15SS020RE [07/31/95]	CF15SS020RE [07/31/95]-D	CF15SS021 [07/10/95]	CF15SS021DL [07/10/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/31/1995	7/31/1995	7/31/1995	7/31/1995	7/10/1995	7/10/1995
SAMPLE CODE	ORIG	DUP	ORIG	DUP	NORMAL	NORMAL
COPPER	0.84 U	1 U			0.68 U	
IRON	198	330			76.2 J	
LEAD	278	296			1090 J	
MAGNESIUM	35.2 UJ	34.6 UJ			12.3 U	
MANGANESE	3.3	4.2			0.53 U	
MERCURY	0.8 J	0.2 J			0.11 U	
NICKEL	0.77 U	0.75 U			2.7 U	
POTASSIUM	23.5 U	23 U			15.4 U	
SELENIUM	1 UJ	1 UJ			0.9 U	
SILVER	0.26 U	0.25 U			0.9 U	
SODIUM	148 J	118 J			161 J	
THALLIUM	1.3 UJ	1.2 UJ			1.1 U	
VANADIUM	1.2	1.6			0.68 U	
ZINC	7.2 U	8 U			0.9 UJ	
Miscellaneous Parameters (mg/kg)						
CYANIDE	0.17 U	0.19 U			0.11 UJ	
TOTAL ORGANIC CARBON	10000	8400				

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS021 (Con)	CF15SS022 (Con)	CF15SS022 (Con)	CF15SS023 (Con)	CF15SS023 (Con)	CF15SS024 (Con)	CF15SS025(Con)
SAMPLE NUMBER	CF15SB21 [07/10/95]	CF15SS022 [07/06/95]	CF15SS022DL [07/06/95]	CF15SS023 [07/06/95]	CF15SS023DL [07/06/95]	CF15SS024 [07/06/95]	CF15SS025 [07/11/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/10/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U	7 U		8 U		8 U	6 U
1,1,2,2-TETRACHLOROETHANE	6 U	7 U		8 U		8 U	6 U
1,1,2-TRICHLOROETHANE	6 U	7 U		8 U		8 U	6 U
1,1-DICHLOROETHANE	6 U	7 U		8 U		8 U	6 U
1,1-DICHLOROETHENE	6 U	7 U		8 U		8 U	6 U
1,2-DICHLOROETHANE	6 U	7 U		8 U		8 U	6 U
1,2-DICHLOROPROPANE	6 U	7 U		8 U		8 U	6 U
2-BUTANONE	13 U	14 U		17 U		17 U	12 U
2-HEXANONE	13 U	14 U		17 U		17 U	12 U
4-METHYL-2-PENTANONE	13 U	14 U		17 U		17 U	12 U
ACETONE	13 U	14 U		17 U		17 U	12 U
BENZENE	6 U	7 U		8 U		8 U	6 U
BROMODICHLOROMETHANE	6 U	7 U		8 U		8 U	6 U
BROMOFORM	6 U	7 U		8 U		8 U	6 U
BROMOMETHANE	13 U	14 U		17 U		17 U	12 U
CARBON DISULFIDE	6 U	7 U		8 U		8 U	6 U
CARBON TETRACHLORIDE	6 U	7 U		8 U		8 U	6 U
CHLOROBENZENE	6 U	7 U		8 U		8 U	6 U
CHLORODIBROMOMETHANE	6 U	7 U		8 U		8 U	6 U
CHLOROETHANE	13 U	14 U		17 U		17 U	12 U
CHLOROFORM	6 U	7 U		8 U		8 U	6 U
CHLOROMETHANE	13 U	14 U		17 U		17 U	12 U
CIS-1,3-DICHLOROPROPENE	6 U	7 U		8 U		8 U	6 U
ETHYLBENZENE	6 U	7 U		8 U		8 U	6 U
METHYLENE CHLORIDE	6 U	7 U		8 U		8 U	6 U
STYRENE	6 U	7 U		8 U		8 U	6 U
TETRACHLOROETHENE	6 U	7 U		8 U		8 U	6 U
TOLUENE	6 U	7 U		8 U		8 U	6 U
TOTAL 1,2-DICHLOROETHENE	6 U	7 U		8 U		8 U	6 U
TOTAL XYLENES	6 U	7 U		8 U		8 U	6 U
TRANS-1,3-DICHLOROPROPENE	6 U	7 U		8 U		8 U	6 U
TRICHLOROETHENE	6 U	7 U		8 U		8 U	6 U
VINYL CHLORIDE	13 U	14 U		17 U		17 U	12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
1,2-DICHLOROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
1,3,5-TRINITROBENZENE	250 U	2500 U		250 U		250 U	250 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS021 (Con)	CF15SS022 (Con)	CF15SS022 (Con)	CF15SS023 (Con)	CF15SS023 (Con)	CF15SS024 (Con)	CF15SS025(Con)
SAMPLE NUMBER	CF15SB21 [07/10/95]	CF15SS022 [07/06/95]	CF15SS022DL [07/06/95]	CF15SS023 [07/06/95]	CF15SS023DL [07/06/95]	CF15SS024 [07/06/95]	CF15SS025 [07/11/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/10/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
1,3-DINITROBENZENE	250 U	2500 U		250 U		250 U	250 U
1,4-DICHLOROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,4,5-TRICHLOROPHENOL	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
2,4,6-TRICHLOROPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,4-DICHLOROPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,4-DIMETHYLPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,4-DINITROPHENOL	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
2,4-DINITROTOLUENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2,6-DINITROTOLUENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2-CHLORONAPHTHALENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2-CHLOROPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2-METHYLNAPHTHALENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2-METHYLPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
2-NITROANILINE	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
2-NITROPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
3,3'-DICHLOROBENZIDINE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
3-NITROANILINE	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
4-BROMOPHENYL PHENYL ETHER	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
4-CHLORO-3-METHYLPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
4-CHLOROANILINE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
4-CHLOROPHENYL PHENYL ETHER	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
4-METHYLPHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
4-NITROANILINE	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
4-NITROPHENOL	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
ACENAPHTHENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
ACENAPHTHYLENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
ANTHRACENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
BENZO(A)ANTHRACENE	420 U	55 J	71 J	550 U	1100 U	300 J	400 U
BENZO(A)PYRENE	420 U	80 J	90 J	550 U	1100 U	390 J	400 U
BENZO(B)FLUORANTHENE	420 U	110 J	110 J	550 U	1100 U	570	55 J
BENZO(G,H,I)PERYLENE	420 U	36 J	56 J	550 U	1100 U	150 J	400 U
BENZO(K)FLUORANTHENE	420 U	56 J	56 J	550 U	1100 U	67 J	400 U
BIS(2-CHLOROETHOXY)METHANE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
BIS(2-CHLOROETHYL)ETHER	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS021 (Con)	CF15SS022 (Con)	CF15SS022 (Con)	CF15SS023 (Con)	CF15SS023 (Con)	CF15SS024 (Con)	CF15SS025(Con)
SAMPLE NUMBER	CF15SB21 [07/10/95]	CF15SS022 [07/06/95]	CF15SS022DL [07/06/95]	CF15SS023 [07/06/95]	CF15SS023DL [07/06/95]	CF15SS024 [07/06/95]	CF15SS025 [07/11/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/10/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	420 U	280 J	260 J	220 J	160 J	560 U	400 U
CARBAZOLE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
CHRYSENE	420 U	77 J	86 J	550 U	1100 U	400 J	400 U
DI-N-BUTYL PHTHALATE	3300	4100 J	4900	4500 J	3900	3600	3300
DI-N-OCTYL PHTHALATE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
DIBENZO(A,H)ANTHRACENE	420 U	460 U	910 U	550 U	1100 U	55 J	400 U
DIBENZOFURAN	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
DIETHYL PHTHALATE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
DIMETHYL PHTHALATE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
FLUORANTHENE	420 U	94 J	94 J	550 U	1100 U	470 J	49 J
FLUORENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
HEXACHLOROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
HEXACHLOROBUTADIENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
HEXACHLOROCYCLOPENTADIENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
HEXACHLOROETHANE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
INDENO(1,2,3-CD)PYRENE	420 U	34 J	48 J	550 U	1100 U	180 J	400 U
ISOPHORONE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
N-NITROSODIPHENYLAMINE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
NAPHTHALENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
NITROBENZENE	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
PENTACHLOROPHENOL	1000 U	1100 U	2200 U	1300 U	2600 U	1400 U	960 U
PHENANTHRENE	420 U	460 U	910 U	550 U	1100 U	100 J	36 J
PHENOL	420 U	460 U	910 U	550 U	1100 U	560 U	400 U
PYRENE	420 U	59 J	61 J	550 U	1100 U	310 J	38 J
Pesticides/PCBs (ug/kg)							
4,4'-DDD	4.2 U	4.6 U		5.6 U		5.6 U	4 U
4,4'-DDE	4.2 U	4.6 U		1.3 J		0.73 J	0.16 J
4,4'-DDT	0 R	4.6 U		5.6 U		5.6 U	4 U
ALDRIN	2.1 R	1.6 R		2.8 UJ		1.9 R	2 U
ALPHA-BHC	2.1 U	2.3 U		2.8 U		2.8 U	2 U
ALPHA-CHLORDANE	2.1 U	2.3 U		2.8 U		2.8 U	2 U
AROCLOR-1016	42 U	46 U		56 U		56 U	40 U
AROCLOR-1221	84 U	93 U		110 U		110 U	80 U
AROCLOR-1232	42 U	46 U		56 U		56 U	40 U
AROCLOR-1242	42 U	46 U		56 U		56 U	40 U
AROCLOR-1248	42 U	46 U		56 U		56 U	40 U
AROCLOR-1254	42 U	46 U		56 U		56 U	40 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS021 (Con)	CF15SS022 (Con)	CF15SS022 (Con)	CF15SS023 (Con)	CF15SS023 (Con)	CF15SS024 (Con)	CF15SS025(Con)
SAMPLE NUMBER	CF15SB21 [07/10/95]	CF15SS022 [07/06/95]	CF15SS022DL [07/06/95]	CF15SS023 [07/06/95]	CF15SS023DL [07/06/95]	CF15SS024 [07/06/95]	CF15SS025 [07/11/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/10/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260	42 U	46 U		56 U		56 U	40 U
BETA-BHC	2.1 U	2.3 U		2.8 U		2.8 U	2 U
DELTA-BHC	2.1 U	2.3 U		2.8 U		2.8 U	2 U
DIELDRIN	4.2 U	4.6 U		5.6 U		5.6 U	4 U
ENDOSULFAN I	2.1 U	2.3 U		2.8 U		2.8 U	2 U
ENDOSULFAN II	4.2 U	4.6 U		5.6 U		5.6 U	4 U
ENDOSULFAN SULFATE	4.2 U	4.6 U		5.6 U		5.6 U	4 U
ENDRIN	4.2 U	4.6 U		0.9 U		5.6 U	4 U
ENDRIN ALDEHYDE	4.2 U	4.6 U		5.6 U		5.6 U	4 U
ENDRIN KETONE	4.2 U	4.6 U		5.6 U		5.6 U	4 U
GAMMA-BHC (LINDANE)	2.1 U	2.3 U		2.8 U		2.8 U	2 U
GAMMA-CHLORDANE	2.1 U	2.3 U		2.8 U		2.8 U	2 U
HEPTACHLOR	2.1 U	2.3 UJ		2.8 UJ		2.8 UJ	2 U
HEPTACHLOR EPOXIDE	2.1 U	2.3 U		2.8 U		2.8 U	2 U
METHOXYCHLOR	21 U	4.6 U		5.6 U		28 U	20 U
TOXAPHENE	210 U	230 U		280 U		280 U	200 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	250 U	2500 U		250 U		250 U	250 U
2-AMINO-4,6-DINITROTOLUENE	250 U	2500 U		250 U		250 U	250 U
2-NITROTOLUENE	500 U	5000 U		500 U		500 U	500 U
3-NITROTOLUENE	500 U	5000 U		500 U		500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	250 U	2500 U		250 U		250 U	250 U
4-NITROTOLUENE	500 U	5000 U		1170		500 U	500 U
HMX	500 U	5000 U		500 U		500 U	500 U
RDX	500 U	5000 U		500 U		500 U	500 U
TETRYL	500 U	5000 U		500 U		500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	13 U	54 J		66 J		27 J	15
Inorganics (mg/kg)							
ALUMINUM	1430	713		558		7140	118
ANTIMONY	0.51 U	5.5 U		6.6 U		6.9 U	0.9 J
ARSENIC	1 U	1.1 UJ		1.3 UJ		2.9 J	0.94 U
BARIUM	1.3	6.8		3.5		47.8	1.1
BERYLLIUM	0.25 U	0.28 U		0.33 U		0.34 U	0.24 U
CADMIUM	0.25 U	0.28 U		0.33 U		0.34 U	0.24 U
CALCIUM	133 U	224 J		111 J		967	109 U
CHROMIUM	1.8 U	2.5 U		3 U		4.3	0.38 U
COBALT	0.35	1.7 U		2 U		2.1 U	0.24 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS021 (Con)	CF15SS022 (Con)	CF15SS022 (Con)	CF15SS023 (Con)	CF15SS023 (Con)	CF15SS024 (Con)	CF15SS025(Con)
SAMPLE NUMBER	CF15SB21 [07/10/95]	CF15SS022 [07/06/95]	CF15SS022DL [07/06/95]	CF15SS023 [07/06/95]	CF15SS023DL [07/06/95]	CF15SS024 [07/06/95]	CF15SS025 [07/11/95]
DEPTH	1-3	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/10/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER	0.76 U	0.83 U		1 U		2.4 U	0.71 U
IRON	128	207 J		274 J		1340 J	55.3 U
LEAD	15.7	40.7 J		6.2 J		602 J	80.8
MAGNESIUM	29.1 U	38.2 U		60.6		123	10.2 U
MANGANESE	1	1.1 U		1.1 U		4.2 U	1.5
MERCURY	0.13 U	0.14 U		0.17 U		0.18 U	0.11 U
NICKEL	0.79	3.3 U		4 U		4.1 U	0.71 U
POTASSIUM	23.2 U	34 U		46.2 U		76.8 U	21.7 U
SELENIUM	1 U	1.1 U		1.3 U		1.7 J	0.94 U
SILVER	0.25 U	1.1 U		1.3 U		1.4 U	0.24 U
SODIUM	191	281 J		261 J		390 J	134 U
THALLIUM	1.3 U	1.4 U		1.7 U		1.7 U	1.2 U
VANADIUM	1.2	0.83 U		2		5.2	0.24 U
ZINC	4.7 U	1.1 UJ		4.8 UJ		2.9 UJ	0.92 U
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.16 U	0.14 UJ		0.42 UJ		0.31 UJ	0.15 U
TOTAL ORGANIC CARBON		15000					

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS025(Con)	CF15SS025(Con)	CF15SS025(Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS027(Con)	CF15SS027(Con)
SAMPLE NUMBER	CF15SS025DL [07/11/95]	CF15SB25 [07/11/95]	CF15SB25DL [07/11/95]	CF15SS026 [07/31/95]	CF15SS026D [07/31/95]	CF15SS027 [07/20/95]	CF15SS027 [07/26/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/11/1995	7/11/1995	7/31/1995	7/31/1995	7/20/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE		6 U		7 U	7 U	6 U	
1,1,2,2-TETRACHLOROETHANE		6 U		7 U	7 U	6 U	
1,1,2-TRICHLOROETHANE		6 U		7 U	7 U	6 U	
1,1-DICHLOROETHANE		6 U		7 U	7 U	6 U	
1,1-DICHLOROETHENE		6 U		7 U	7 U	6 U	
1,2-DICHLOROETHANE		6 U		7 U	7 U	6 U	
1,2-DICHLOROPROPANE		6 U		7 U	7 U	6 U	
2-BUTANONE		12 U		13 U	14 U	12 U	
2-HEXANONE		12 U		13 U	14 U	12 U	
4-METHYL-2-PENTANONE		12 U		13 U	14 U	12 U	
ACETONE		12 U		13 U	14 U	12 U	
BENZENE		6 U		7 U	7 U	6 U	
BROMODICHLOROMETHANE		6 U		7 U	7 U	6 U	
BROMOFORM		6 U		7 U	7 U	6 U	
BROMOMETHANE		12 U		13 U	14 U	12 U	
CARBON DISULFIDE		6 U		7 U	7 U	6 U	
CARBON TETRACHLORIDE		6 U		7 U	7 U	6 U	
CHLOROBENZENE		6 U		7 U	7 U	6 U	
CHLORODIBROMOMETHANE		6 U		7 U	7 U	6 U	
CHLOROETHANE		12 U		13 U	14 U	12 U	
CHLOROFORM		6 U		7 U	7 U	6 U	
CHLOROMETHANE		12 U		13 U	14 U	12 U	
CIS-1,3-DICHLOROPROPENE		6 U		7 U	7 U	6 U	
ETHYLBENZENE		6 U		7 U	7 U	6 U	
METHYLENE CHLORIDE		6 U		7 U	7 U	6 U	
STYRENE		6 U		7 U	7 U	6 U	
TETRACHLOROETHENE		6 U		7 U	7 U	6 U	
TOLUENE		6 U		7 U	7 U	6 U	
TOTAL 1,2-DICHLOROETHENE		6 U		7 U	7 U	6 U	
TOTAL XYLENES		6 U		7 U	7 U	6 U	
TRANS-1,3-DICHLOROPROPENE		6 U		7 U	7 U	6 U	
TRICHLOROETHENE		6 U		7 U	7 U	6 U	
VINYL CHLORIDE		12 U		13 U	14 U	12 U	
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
1,2-DICHLOROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
1,3,5-TRINITROBENZENE		250 U		250 U	250 U		250 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS025(Con)	CF15SS025(Con)	CF15SS025(Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS027(Con)	CF15SS027(Con)
SAMPLE NUMBER	CF15SS025DL [07/11/95]	CF15SB25 [07/11/95]	CF15SB25DL [07/11/95]	CF15SS026 [07/31/95]	CF15SS026D [07/31/95]	CF15SS027 [07/20/95]	CF15SS027 [07/26/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/11/1995	7/11/1995	7/31/1995	7/31/1995	7/20/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
1,3-DICHLOROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
1,3-DINITROBENZENE		250 U		250 U	250 U		250 U
1,4-DICHLOROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
2,2'-OXYBIS(1-CHLOROPROPANE)	790 U	400 U	800 U	440 U	450 U		410 U
2,4,5-TRICHLOROPHENOL	1900 U	960 U	1900 U	1100 U	1100 U		990 U
2,4,6-TRICHLOROPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
2,4-DICHLOROPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
2,4-DIMETHYLPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
2,4-DINITROPHENOL	1900 U	960 U	1900 U	1100 U	1100 U		990 U
2,4-DINITROTOLUENE	790 U	400 U	800 U	440 U	450 U		410 U
2,6-DINITROTOLUENE	790 U	400 U	800 U	440 U	450 U		410 U
2-CHLORONAPHTHALENE	790 U	400 U	800 U	440 U	450 U		410 U
2-CHLOROPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
2-METHYLNAPHTHALENE	790 U	400 U	800 U	440 U	450 U		410 U
2-METHYLPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
2-NITROANILINE	1900 U	960 U	1900 U	1100 U	1100 U		990 U
2-NITROPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
3,3'-DICHLOROBENZIDINE	790 U	400 U	800 U	440 U	450 U		410 U
3-NITROANILINE	1900 U	960 U	1900 U	1100 U	1100 U		990 U
4,6-DINITRO-2-METHYLPHENOL	1900 U	960 U	1900 U	1100 U	1100 U		990 U
4-BROMOPHENYL PHENYL ETHER	790 U	400 U	800 U	440 U	450 U		410 U
4-CHLORO-3-METHYLPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
4-CHLOROANILINE	790 U	400 U	800 U	440 U	450 U		410 U
4-CHLOROPHENYL PHENYL ETHER	790 U	400 U	800 U	440 U	450 U		410 U
4-METHYLPHENOL	790 U	400 U	800 U	440 U	450 U		410 U
4-NITROANILINE	1900 U	960 U	1900 U	1100 U	1100 U		990 U
4-NITROPHENOL	1900 U	960 U	1900 U	1100 U	1100 U		990 U
ACENAPHTHENE	790 U	400 U	800 U	440 U	450 U		47 J
ACENAPHTHYLENE	790 U	400 U	800 U	440 U	450 U		410 U
ANTHRACENE	790 U	400 U	800 U	440 U	450 U		120 J
BENZO(A)ANTHRACENE	790 U	35 J	800 U	440 U	450 U		1300
BENZO(A)PYRENE	790 U	40 J	800 U	53 J	450 U		1300
BENZO(B)FLUORANTHENE	790 U	49 J	800 U	59 J	450 U		2000
BENZO(G,H,I)PERYLENE	790 U	400 U	800 U	440 U	450 U		610
BENZO(K)FLUORANTHENE	790 U	400 U	800 U	440 U	450 U		910
BIS(2-CHLOROETHOXY)METHANE	790 U	400 U	800 U	440 U	450 U		410 U
BIS(2-CHLOROETHYL)ETHER	790 U	400 U	800 U	440 U	450 U		410 U
BIS(2-ETHYLHEXYL)PHTHALATE	790 U	53 J	800 U	440 U	34 J		110 J

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS025(Con)	CF15SS025(Con)	CF15SS025(Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS027(Con)	CF15SS027(Con)
SAMPLE NUMBER	CF15SS025DL [07/11/95]	CF15SB25 [07/11/95]	CF15SB25DL [07/11/95]	CF15SS026 [07/31/95]	CF15SS026D [07/31/95]	CF15SS027 [07/20/95]	CF15SS027 [07/26/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/11/1995	7/11/1995	7/31/1995	7/31/1995	7/20/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	790 U	400 U	800 U	440 U	450 U		410 U
CARBAZOLE	790 U	400 U	800 U	440 U	450 U		140 J
CHRYSENE	790 U	41 J	800 U	440 U	450 U		1500
DI-N-BUTYL PHTHALATE	3600	3900 J	3400	1900	3500		1400
DI-N-OCTYL PHTHALATE	790 U	400 U	800 U	440 U	450 U		410 U
DIBENZO(A,H)ANTHRACENE	790 U	400 U	800 U	440 U	450 U		200 J
DIBENZOFURAN	790 U	400 U	800 U	440 U	450 U		410 U
DIETHYL PHTHALATE	790 U	400 U	800 U	440 U	450 U		410 U
DIMETHYL PHTHALATE	790 U	400 U	800 U	440 U	450 U		410 U
FLUORANTHENE	790 U	55 J	800 U	86 J	70 J		2000
FLUORENE	790 U	400 U	800 U	440 U	450 U		410 U
HEXACHLOROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
HEXACHLOROBUTADIENE	790 U	400 U	800 U	440 U	450 U		410 U
HEXACHLOROCYCLOPENTADIENE	790 U	400 U	800 U	440 U	450 U		410 U
HEXACHLOROETHANE	790 U	400 U	800 U	440 U	450 U		410 U
INDENO(1,2,3-CD)PYRENE	790 U	400 U	800 U	440 U	450 U		540
ISOPHORONE	790 U	400 U	800 U	440 U	450 U		410 U
N-NITROSO-DI-N-PROPYLAMINE	790 U	400 U	800 U	440 U	450 U		410 U
N-NITROSODIPHENYLAMINE	790 U	400 U	800 U	440 U	450 U		410 U
NAPHTHALENE	790 U	400 U	800 U	440 U	450 U		28 J
NITROBENZENE	790 U	400 U	800 U	440 U	450 U		410 U
PENTACHLOROPHENOL	1900 U	960 U	1900 U	1100 U	1100 U		990 U
PHENANTHRENE	790 U	400 U	800 U	58 J	45 J		610
PHENOL	790 U	400 U	800 U	440 U	450 U		410 U
PYRENE	790 U	50 J	800 U	60 J	51 J		1700
Pesticides/PCBs (ug/kg)							
4,4'-DDD		4 U		4.5 U	4.5 U		4.1 U
4,4'-DDE		4 U		4.5 U	4.5 U		4.1 U
4,4'-DDT		4 U		4.5 U	4.5 U		4.1 U
ALDRIN		2 U		0.37 R	0.65 R		0.47 R
ALPHA-BHC		2 U		2.2 U	2.3 U		2.1 U
ALPHA-CHLORDANE		2 U		2.2 U	2.3 U		2.1 U
AROCLOR-1016		40 U		45 U	45 U		41 U
AROCLOR-1221		80 U		90 U	90 U		82 U
AROCLOR-1232		40 U		45 U	45 U		41 U
AROCLOR-1242		40 U		45 U	45 U		41 U
AROCLOR-1248		40 U		45 U	45 U		41 U
AROCLOR-1254		40 U		45 U	45 U		41 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS025(Con)	CF15SS025(Con)	CF15SS025(Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS027(Con)	CF15SS027(Con)
SAMPLE NUMBER	CF15SS025DL [07/11/95]	CF15SB25 [07/11/95]	CF15SB25DL [07/11/95]	CF15SS026 [07/31/95]	CF15SS026D [07/31/95]	CF15SS027 [07/20/95]	CF15SS027 [07/26/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/11/1995	7/11/1995	7/31/1995	7/31/1995	7/20/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
AROCLOR-1260		40 U		45 U	45 U		41 U
BETA-BHC		2 U		2.2 U	2.3 U		2.1 U
DELTA-BHC		2 U		2.2 U	2.3 U		2.1 U
DIELDRIN		4 U		4.5 UJ	4.5 UJ		4.1 U
ENDOSULFAN I		2 U		2.2 U	2.3 U		2.1 U
ENDOSULFAN II		4 U		4.5 U	1.9 J		4.1 U
ENDOSULFAN SULFATE		4 U		4.5 U	4.5 U		4.1 U
ENDRIN		4 U		4.5 UJ	4.5 UJ		4.1 U
ENDRIN ALDEHYDE		4 U		4.5 U	4.5 U		4.1 U
ENDRIN KETONE		4 U		4.5 U	3 U		4.1 U
GAMMA-BHC (LINDANE)		2 U		2.2 UJ	2.3 UJ		2.1 U
GAMMA-CHLORDANE		2 U		2.2 U	2.3 U		2.1 U
HEPTACHLOR		2 U		2.2 U	2.3 U		2.1 U
HEPTACHLOR EPOXIDE		2 U		2.2 U	2.3 U		2.1 U
METHOXYCHLOR		20 U		22 U	23 U		21 U
TOXAPHENE		200 U		220 U	230 U		210 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE		250 U		250 U	250 U		250 UJ
2-AMINO-4,6-DINITROTOLUENE		250 U		250 U	250 U		250 U
2-NITROTOLUENE		500 U		500 U	500 U		500 UJ
3-NITROTOLUENE		500 U		500 U	500 U		500 U
4-AMINO-2,6-DINITROTOLUENE		250 U		250 U	250 U		250 U
4-NITROTOLUENE		500 U		500 U	500 U		500 U
HMX		500 U		500 U	500 U		500 U
RDX		500 U		500 U	500 U		500 UJ
TETRYL		500 U		500 U	500 U		500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS		12 U		13 U	14 U		12 U
Inorganics (mg/kg)							
ALUMINUM		224		1410 J	1600 J		150 J
ANTIMONY		0.47 U		25.7	29.6		6.5
ARSENIC		0.94 U		25.2	18.4		3.1 J
BARIUM		0.75		1.1	1.2		4.8
BERYLLIUM		0.24 U		0.27 U	0.27 U		0.25 U
CADMIUM		0.24 U		0.27 U	0.27 U		0.25 U
CALCIUM		140 U		131	123 U		232
CHROMIUM		2.7 U		1.7 U	1.9 U		0.77 U
COBALT		0.24 U		0.27 UJ	0.27 UJ		0.25 UJ

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS025(Con)	CF15SS025(Con)	CF15SS025(Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS027(Con)	CF15SS027(Con)
SAMPLE NUMBER	CF15SS025DL [07/11/95]	CF15SB25 [07/11/95]	CF15SB25DL [07/11/95]	CF15SS026 [07/31/95]	CF15SS026D [07/31/95]	CF15SS027 [07/20/95]	CF15SS027 [07/26/95]
DEPTH	0-1	1-3	1-3	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/11/1995	7/11/1995	7/31/1995	7/31/1995	7/20/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
COPPER		0.71 U		2.3 U	2.1 U		4 U
IRON		114		417	432		89.8 J
LEAD		19.1		3490	3160		1200
MAGNESIUM		14.3 U		27 UJ	36.9 UJ		16.2 U
MANGANESE		1.8		1.2	1.4		1.2
MERCURY		0.12 U		0.13 U	0.14 U		0.12 U
NICKEL		0.71 U		0.81 U	0.81 U		0.74 U
POTASSIUM		21.7 U		24.7 U	24.9 U		22.7 U
SELENIUM		0.94 U		1.1 UJ	1.1 UJ		0.99 UJ
SILVER		0.24 U		0.27 U	0.27 U		0.25 U
SODIUM		164 U		214 J	195 J		155 UJ
THALLIUM		1.2 U		1.3 UJ	1.4 UJ		1.2 U
VANADIUM		0.49		1.5	1.6		0.38 J
ZINC		5.1 U		2 U	2.7 U		3.6 U
Miscellaneous Parameters (mg/kg)							
CYANIDE		0.18 U		0.2 U	0.2 U		0.22 U
TOTAL ORGANIC CARBON				20000	20000		

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS029 (Con)	CF15SS030(Con)	CF15SS031 (Con)	CF15SS032 (Con)
SAMPLE NUMBER	CF15SS028 [07/12/95]	CF15SS028DL [07/12/95]	CF15SS028RE [07/12/95]	CF15SS029 [07/11/95]	CF15SS030 [07/18/95]	CF15SS031 [07/06/95]	CF15SS032 [07/11/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/11/1995	7/18/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE	6 U			6 U	7 U	6 U	6 U
1,1,2,2-TETRACHLOROETHANE	6 U			6 U	7 U	6 U	6 U
1,1,2-TRICHLOROETHANE	6 U			6 U	7 U	6 U	6 U
1,1-DICHLOROETHANE	6 U			6 U	7 U	6 U	6 U
1,1-DICHLOROETHENE	6 U			6 U	7 U	6 U	6 U
1,2-DICHLOROETHANE	6 U			6 U	7 U	6 U	6 U
1,2-DICHLOROPROPANE	6 U			6 U	7 U	6 U	6 U
2-BUTANONE	11 U			12 U	13 U	12 U	12 U
2-HEXANONE	11 U			12 U	13 U	12 U	12 U
4-METHYL-2-PENTANONE	11 U			12 U	13 U	12 U	12 U
ACETONE	11 U			12 U	13 U	12 U	12 U
BENZENE	6 U			6 U	7 U	6 U	6 U
BROMODICHLOROMETHANE	6 U			6 U	7 U	6 U	6 U
BROMOFORM	6 U			6 U	7 U	6 U	6 U
BROMOMETHANE	11 U			12 U	13 U	12 U	12 U
CARBON DISULFIDE	6 U			6 U	7 U	6 U	6 U
CARBON TETRACHLORIDE	6 U			6 U	7 U	6 U	6 U
CHLOROBENZENE	6 U			6 U	7 U	6 U	6 U
CHLORODIBROMOMETHANE	6 U			6 U	7 U	6 U	6 U
CHLOROETHANE	11 U			12 U	13 U	12 U	12 U
CHLOROFORM	6 U			6 U	7 U	6 U	6 U
CHLOROMETHANE	11 U			12 U	13 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	6 U			6 U	7 U	6 U	6 U
ETHYLBENZENE	6 U			6 U	7 U	6 U	6 U
METHYLENE CHLORIDE	6 U			6 U	7 U	6 U	6 U
STYRENE	6 U			6 U	7 U	6 U	6 U
TETRACHLOROETHENE	6 U			6 U	7 U	6 U	6 U
TOLUENE	6 U			6 U	7 U	6 U	6 U
TOTAL 1,2-DICHLOROETHENE	6 U			6 U	7 U	6 U	6 U
TOTAL XYLENES	6 U			6 U	7 U	2 J	6 U
TRANS-1,3-DICHLOROPROPENE	6 U			6 U	7 U	6 U	6 U
TRICHLOROETHENE	6 U			6 U	7 U	6 U	6 U
VINYL CHLORIDE	11 U			12 U	13 U	12 U	12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
1,2-DICHLOROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
1,3,5-TRINITROBENZENE	250 U			250 U	250 U	250 U	250 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS029 (Con)	CF15SS030(Con)	CF15SS031 (Con)	CF15SS032 (Con)
SAMPLE NUMBER	CF15SS028 [07/12/95]	CF15SS028DL [07/12/95]	CF15SS028RE [07/12/95]	CF15SS029 [07/11/95]	CF15SS030 [07/18/95]	CF15SS031 [07/06/95]	CF15SS032 [07/11/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/11/1995	7/18/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
1,3-DINITROBENZENE	250 U			250 U	250 U	250 U	250 U
1,4-DICHLOROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
2,2'-OXYBIS(1-CHLOROPROPANE)	370 U		370 U	380 U	440 U	420 U	380 U
2,4,5-TRICHLOROPHENOL	890 U		890 U	930 U	1100 U	1000 U	920 U
2,4,6-TRICHLOROPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
2,4-DICHLOROPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
2,4-DIMETHYLPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
2,4-DINITROPHENOL	890 U		890 U	930 U	1100 U	1000 U	920 U
2,4-DINITROTOLUENE	370 U		370 U	380 U	440 U	420 U	380 U
2,6-DINITROTOLUENE	370 U		370 U	380 U	440 U	420 U	380 U
2-CHLORONAPHTHALENE	370 U		370 U	380 U	440 U	420 U	380 U
2-CHLOROPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
2-METHYLNAPHTHALENE	370 U		370 U	380 U	440 U	420 U	380 U
2-METHYLPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
2-NITROANILINE	890 U		890 U	930 U	1100 U	1000 U	920 U
2-NITROPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
3,3'-DICHLOROBENZIDINE	370 UJ		370 U	380 U	440 U	420 U	380 U
3-NITROANILINE	890 U		890 U	930 U	1100 U	1000 U	920 U
4,6-DINITRO-2-METHYLPHENOL	890 U		890 U	930 U	1100 U	1000 U	920 U
4-BROMOPHENYL PHENYL ETHER	370 U		370 U	380 U	440 U	420 U	380 U
4-CHLORO-3-METHYLPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
4-CHLOROANILINE	370 U		370 U	380 U	440 U	420 U	380 U
4-CHLOROPHENYL PHENYL ETHER	370 U		370 U	380 U	440 U	420 U	380 U
4-METHYLPHENOL	370 U		370 U	380 U	440 U	420 U	380 U
4-NITROANILINE	890 U		890 U	930 U	1100 U	1000 U	920 U
4-NITROPHENOL	890 U		890 U	930 U	1100 U	1000 U	920 U
ACENAPHTHENE	31 J		32 J	380 U	440 U	420 U	380 U
ACENAPHTHYLENE	370 U		370 U	380 U	440 U	420 U	380 U
ANTHRACENE	73 J		67 J	20 J	440 U	420 U	380 U
BENZO(A)ANTHRACENE	760 J		720	260 J	440 U	420 U	380 U
BENZO(A)PYRENE	810 J		830 J	270 J	440 U	420 U	380 U
BENZO(B)FLUORANTHENE	1200 J		1300 J	360 J	440 U	420 U	380 U
BENZO(G,H,I)PERYLENE	250 J		280 J	160 J	440 U	420 U	380 U
BENZO(K)FLUORANTHENE	370 J		380 J	140 J	440 U	420 U	380 U
BIS(2-CHLOROETHOXY)METHANE	370 U		370 U	380 U	440 U	420 U	380 U
BIS(2-CHLOROETHYL)ETHER	370 U		370 U	380 U	440 U	420 U	380 U
BIS(2-ETHYLHEXYL)PHTHALATE	370 UJ		370 U	510	440 U	520	27 J

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS029 (Con)	CF15SS030(Con)	CF15SS031 (Con)	CF15SS032 (Con)
SAMPLE NUMBER	CF15SS028 [07/12/95]	CF15SS028DL [07/12/95]	CF15SS028RE [07/12/95]	CF15SS029 [07/11/95]	CF15SS030 [07/18/95]	CF15SS031 [07/06/95]	CF15SS032 [07/11/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/11/1995	7/18/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	370 UJ		370 U	280 J	440 U	330 J	380 U
CARBAZOLE	84 J		69 J	21 J	440 U	420 U	380 U
CHRYSENE	790 J		830	310 J	440 U	420 U	380 U
DI-N-BUTYL PHTHALATE	61 J		65 J	2600	3200	2200	3100 J
DI-N-OCTYL PHTHALATE	370 UJ		370 UJ	380 U	440 U	420 U	380 U
DIBENZO(A,H)ANTHRACENE	130 J		150 J	52 J	440 U	420 U	380 U
DIBENZOFURAN	370 U		370 U	380 U	440 U	420 U	380 U
DIETHYL PHTHALATE	370 U		370 U	380 U	440 U	420 U	380 U
DIMETHYL PHTHALATE	370 U		370 U	380 U	440 U	420 U	380 U
FLUORANTHENE	1000		1100	320 J	440 U	420 U	380 U
FLUORENE	370 U		370 U	380 U	440 U	420 U	380 U
HEXACHLOROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
HEXACHLOROBUTADIENE	370 U		370 U	380 U	440 U	420 U	380 U
HEXACHLOROCYCLOPENTADIENE	370 U		370 U	380 U	440 U	420 U	380 U
HEXACHLOROETHANE	370 U		370 U	380 U	440 U	420 U	380 U
INDENO(1,2,3-CD)PYRENE	350 J		420 J	150 J	440 U	420 U	380 U
ISOPHORONE	370 U		370 U	380 U	440 U	420 U	380 U
N-NITROSO-DI-N-PROPYLAMINE	370 U		370 U	380 U	440 U	420 U	380 U
N-NITROSODIPHENYLAMINE	370 U		370 U	380 U	440 U	420 U	380 U
NAPHTHALENE	24 J		25 J	380 U	440 U	420 U	380 U
NITROBENZENE	370 U		370 U	380 U	440 U	420 U	380 U
PENTACHLOROPHENOL	890 U		890 U	930 U	1100 U	1000 U	920 U
PHENANTHRENE	360 J		360 J	110 J	440 U	420 U	380 U
PHENOL	370 U		370 U	380 U	440 U	420 U	380 U
PYRENE	750 J		860	320 J	440 U	420 U	380 U
Pesticides/PCBs (ug/kg)							
4,4'-DDD	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
4,4'-DDE	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
4,4'-DDT	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
ALDRIN	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 UJ	1.9 U
ALPHA-BHC	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
ALPHA-CHLORDANE	180 UJ	1800 UJ		1.9 U	0.3 U	2.1 U	1.9 U
AROCLOR-1016	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U
AROCLOR-1221	7400 UJ	74000 UJ		78 U	88 U	84 U	77 U
AROCLOR-1232	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U
AROCLOR-1242	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U
AROCLOR-1248	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U
AROCLOR-1254	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS029 (Con)	CF15SS030(Con)	CF15SS031 (Con)	CF15SS032 (Con)
SAMPLE NUMBER	CF15SS028 [07/12/95]	CF15SS028DL [07/12/95]	CF15SS028RE [07/12/95]	CF15SS029 [07/11/95]	CF15SS030 [07/18/95]	CF15SS031 [07/06/95]	CF15SS032 [07/11/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/11/1995	7/18/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260	3700 UJ	37000 UJ		39 U	44 U	42 U	38 U
BETA-BHC	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
DELTA-BHC	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
DIELDRIN	370 UJ	3700 UJ		0.37 J	4.4 U	4.2 U	3.8 U
ENDOSULFAN I	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
ENDOSULFAN II	370 UJ	3700 UJ		3.9 U	4.4 U	0.14 R	3.8 U
ENDOSULFAN SULFATE	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
ENDRIN	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
ENDRIN ALDEHYDE	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
ENDRIN KETONE	370 UJ	3700 UJ		3.9 U	4.4 U	4.2 U	3.8 U
GAMMA-BHC (LINDANE)	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
GAMMA-CHLORDANE	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
HEPTACHLOR	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 UJ	1.9 U
HEPTACHLOR EPOXIDE	180 UJ	1800 UJ		1.9 U	2.2 U	2.1 U	1.9 U
METHOXYCHLOR	1800 UJ	18000 UJ		19 U	22 U	21 U	19 U
TOXAPHENE	18000 UJ	180000 UJ		190 U	220 U	210 U	190 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	250 U			250 U	250 U	250 U	250 U
2-AMINO-4,6-DINITROTOLUENE	250 U			250 U	250 U	250 U	250 U
2-NITROTOLUENE	500 U			500 U	500 U	500 U	500 U
3-NITROTOLUENE	500 U			500 U	500 U	500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	250 U			250 U	250 U	250 U	250 U
4-NITROTOLUENE	500 U			500 U	500 U	4340	500 U
HMX	500 U			500 U	500 U	500 U	500 U
RDX	500 U			500 U	500 U	500 U	500 U
TETRYL	500 U			500 U	500 U	500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	38			28	26	13 UJ	34
Inorganics (mg/kg)							
ALUMINUM	321			534	2220	969	49.7 U
ANTIMONY	0.46 J			0.74	3.1 U	5 U	2.3
ARSENIC	0.89 U			0.92 U	1.7	1 UJ	0.92 U
BARIUM	6.9			1.6	2.9	1.2	0.88
BERYLLIUM	0.22 U			0.23 U	0.27 U	0.25 U	0.23 U
CADMIUM	0.22 U			0.23 U	0.27 U	0.25 U	0.23 U
CALCIUM	754 J			127 U	160 U	38.3 J	128 U
CHROMIUM	1 U			0.83 U	2.8	2.3 U	0.41 U
COBALT	0.22 U			0.23 U	0.28 J	1.5 U	0.23 U

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS028 (Con)	CF15SS029 (Con)	CF15SS030(Con)	CF15SS031 (Con)	CF15SS032 (Con)
SAMPLE NUMBER	CF15SS028 [07/12/95]	CF15SS028DL [07/12/95]	CF15SS028RE [07/12/95]	CF15SS029 [07/11/95]	CF15SS030 [07/18/95]	CF15SS031 [07/06/95]	CF15SS032 [07/11/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/12/1995	7/12/1995	7/12/1995	7/11/1995	7/18/1995	7/6/1995	7/11/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER	0.67 U			0.69 U	0.8 U	0.76 U	0.69 U
IRON	116			74.5	418	258 J	43.6 U
LEAD	27.3	27.3		21.2	520 J	2.5 J	814
MAGNESIUM	35.9 U			17.6 U	63.8	29.1 U	13.4 U
MANGANESE	2			0.64	2.2 U	0.68 U	0.52
MERCURY	0.11 U			0.12 U	0.13 U	0.13 U	0.12 U
NICKEL	0.67 U			0.69 U	1.2 J	3 U	0.69 U
POTASSIUM	20.5 U			21.1 U	40.2	31.5 U	21.2 U
SELENIUM	0.89 U			0.92 U	1.1 U	1 U	0.92 U
SILVER	0.22 U			0.23 U	0.27 U	1 U	0.23 U
SODIUM	122 U			262 J	252 U	168 J	201 U
THALLIUM	1.1 U			1.1 U	1.3 U	1.3 U	1.2 U
VANADIUM	0.61			0.62	2.8	0.76 U	0.28 J
ZINC	4.7 U			2.6 U	1.7 U	1 UJ	1.9 U
Miscellaneous Parameters (mg/kg)							
CYANIDE	0.16 U			0.15 U	0.27	0.39 UJ	0.16 U
TOTAL ORGANIC CARBON							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS032 (Con)	CF15SS033 (Con)	CF15SS034 (Con)	CF15SS035 (Con)	CF15SS036 (Con)	CF15SS037 (Con)	CF15SS038 (Con)
SAMPLE NUMBER	CF15SS032DL [07/11/95]	CF15SS033 [07/19/95]	CF15SS034 [07/18/95]	CF15SS035	CF15SS036 [07/19/95]	CF15SS037 [07/26/95]	CF15SS038 [07/26/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/19/1995	7/18/1995	7/19/1995	7/19/1995	7/26/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
1,2-DICHLOROPROPANE							
2-BUTANONE							
2-HEXANONE							
4-METHYL-2-PENTANONE							
ACETONE							
BENZENE							
BROMODICHLOROMETHANE							
BROMOFORM							
BROMOMETHANE							
CARBON DISULFIDE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLORODIBROMOMETHANE							
CHLOROETHANE							
CHLOROFORM							
CHLOROMETHANE							
CIS-1,3-DICHLOROPROPENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
STYRENE							
TETRACHLOROETHENE							
TOLUENE							
TOTAL 1,2-DICHLOROETHENE							
TOTAL XYLENES							
TRANS-1,3-DICHLOROPROPENE							
TRICHLOROETHENE							
VINYL CHLORIDE							
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE	760 U						
1,2-DICHLOROBENZENE	760 U						
1,3,5-TRINITROBENZENE							

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS032 (Con)	CF15SS033 (Con)	CF15SS034 (Con)	CF15SS035 (Con)	CF15SS036 (Con)	CF15SS037 (Con)	CF15SS038 (Con)
SAMPLE NUMBER	CF15SS032DL [07/11/95]	CF15SS033 [07/19/95]	CF15SS034 [07/18/95]	CF15SS035	CF15SS036 [07/19/95]	CF15SS037 [07/26/95]	CF15SS038 [07/26/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/19/1995	7/18/1995	7/19/1995	7/19/1995	7/26/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE	760 U						
1,3-DINITROBENZENE							
1,4-DICHLOROBENZENE	760 U						
2,2'-OXYBIS(1-CHLOROPROPANE)	760 U						
2,4,5-TRICHLOROPHENOL	1800 U						
2,4,6-TRICHLOROPHENOL	760 U						
2,4-DICHLOROPHENOL	760 U						
2,4-DIMETHYLPHENOL	760 U						
2,4-DINITROPHENOL	1800 U						
2,4-DINITROTOLUENE	760 U						
2,6-DINITROTOLUENE	760 U						
2-CHLORONAPHTHALENE	760 U						
2-CHLOROPHENOL	760 U						
2-METHYLNAPHTHALENE	760 U						
2-METHYLPHENOL	760 U						
2-NITROANILINE	1800 U						
2-NITROPHENOL	760 U						
3,3'-DICHLOROBENZIDINE	760 U						
3-NITROANILINE	1800 U						
4,6-DINITRO-2-METHYLPHENOL	1800 U						
4-BROMOPHENYL PHENYL ETHER	760 U						
4-CHLORO-3-METHYLPHENOL	760 U						
4-CHLOROANILINE	760 U						
4-CHLOROPHENYL PHENYL ETHER	760 U						
4-METHYLPHENOL	760 U						
4-NITROANILINE	1800 U						
4-NITROPHENOL	1800 U						
ACENAPHTHENE	760 U						
ACENAPHTHYLENE	760 U						
ANTHRACENE	760 U						
BENZO(A)ANTHRACENE	760 U						
BENZO(A)PYRENE	760 U						
BENZO(B)FLUORANTHENE	760 U						
BENZO(G,H,I)PERYLENE	760 U						
BENZO(K)FLUORANTHENE	760 U						
BIS(2-CHLOROETHOXY)METHANE	760 U						
BIS(2-CHLOROETHYL)ETHER	760 U						
BIS(2-ETHYLHEXYL)PHTHALATE	760 U						

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS032 (Con)	CF15SS033 (Con)	CF15SS034 (Con)	CF15SS035 (Con)	CF15SS036 (Con)	CF15SS037 (Con)	CF15SS038 (Con)
SAMPLE NUMBER	CF15SS032DL [07/11/95]	CF15SS033 [07/19/95]	CF15SS034 [07/18/95]	CF15SS035	CF15SS036 [07/19/95]	CF15SS037 [07/26/95]	CF15SS038 [07/26/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/19/1995	7/18/1995	7/19/1995	7/19/1995	7/26/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	760 U						
CARBAZOLE	760 U						
CHRYSENE	760 U						
DI-N-BUTYL PHTHALATE	2900						
DI-N-OCTYL PHTHALATE	760 U						
DIBENZO(A,H)ANTHRACENE	760 U						
DIBENZOFURAN	760 U						
DIETHYL PHTHALATE	760 U						
DIMETHYL PHTHALATE	760 U						
FLUORANTHENE	760 U						
FLUORENE	760 U						
HEXACHLOROBENZENE	760 U						
HEXACHLOROBUTADIENE	760 U						
HEXACHLOROCYCLOPENTADIENE	760 U						
HEXACHLOROETHANE	760 U						
INDENO(1,2,3-CD)PYRENE	760 U						
ISOPHORONE	760 U						
N-NITROSO-DI-N-PROPYLAMINE	760 U						
N-NITROSODIPHENYLAMINE	760 U						
NAPHTHALENE	760 U						
NITROBENZENE	760 U						
PENTACHLOROPHENOL	1800 U						
PHENANTHRENE	760 U						
PHENOL	760 U						
PYRENE	760 U						
Pesticides/PCBs (ug/kg)							
4,4'-DDD							
4,4'-DDE							
4,4'-DDT							
ALDRIN							
ALPHA-BHC							
ALPHA-CHLORDANE							
AROCLOR-1016							
AROCLOR-1221							
AROCLOR-1232							
AROCLOR-1242							
AROCLOR-1248							
AROCLOR-1254							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS032 (Con)	CF15SS033 (Con)	CF15SS034 (Con)	CF15SS035 (Con)	CF15SS036 (Con)	CF15SS037 (Con)	CF15SS038 (Con)
SAMPLE NUMBER	CF15SS032DL [07/11/95]	CF15SS033 [07/19/95]	CF15SS034 [07/18/95]	CF15SS035	CF15SS036 [07/19/95]	CF15SS037 [07/26/95]	CF15SS038 [07/26/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/19/1995	7/18/1995	7/19/1995	7/19/1995	7/26/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260							
BETA-BHC							
DELTA-BHC							
DIELDRIN							
ENDOSULFAN I							
ENDOSULFAN II							
ENDOSULFAN SULFATE							
ENDRIN							
ENDRIN ALDEHYDE							
ENDRIN KETONE							
GAMMA-BHC (LINDANE)							
GAMMA-CHLORDANE							
HEPTACHLOR							
HEPTACHLOR EPOXIDE							
METHOXYCHLOR							
TOXAPHENE							
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE							
2-AMINO-4,6-DINITROTOLUENE							
2-NITROTOLUENE							
3-NITROTOLUENE							
4-AMINO-2,6-DINITROTOLUENE							
4-NITROTOLUENE							
HMX							
RDX							
TETRYL							
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS							
Inorganics (mg/kg)							
ALUMINUM							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CALCIUM							
CHROMIUM							
COBALT							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS032 (Con)	CF15SS033 (Con)	CF15SS034 (Con)	CF15SS035 (Con)	CF15SS036 (Con)	CF15SS037 (Con)	CF15SS038 (Con)
SAMPLE NUMBER	CF15SS032DL [07/11/95]	CF15SS033 [07/19/95]	CF15SS034 [07/18/95]	CF15SS035	CF15SS036 [07/19/95]	CF15SS037 [07/26/95]	CF15SS038 [07/26/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/11/1995	7/19/1995	7/18/1995	7/19/1995	7/19/1995	7/26/1995	7/26/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER							
IRON							
LEAD		42.4 J	325 J	3580	93 J	1580	29.8
MAGNESIUM							
MANGANESE							
MERCURY							
NICKEL							
POTASSIUM							
SELENIUM							
SILVER							
SODIUM							
THALLIUM							
VANADIUM							
ZINC							
Miscellaneous Parameters (mg/kg)							
CYANIDE							
TOTAL ORGANIC CARBON							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS039 (Con)	CF15SS039 (Con)	CF15SS040 (Con)	CF15SS041 (Con)	CF15SS042 (Con)	CF15SS043 (Con)	CF15SS043 (Con)
SAMPLE NUMBER	CF15SS039 [07/11/95]	CF15SS039DL [07/11/95]	CF15SS040 [07/10/95]	CF15SS041 [07/18/95]	CF15SS042 [07/26/95]	CF15SS043 [08/01/95]	CF15SB43 [07/12/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/11/1995	7/10/1995	7/18/1995	7/26/1995	8/1/1995	7/12/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DICHLOROETHANE							
1,2-DICHLOROPROPANE							
2-BUTANONE							
2-HEXANONE							
4-METHYL-2-PENTANONE							
ACETONE							
BENZENE							
BROMODICHLOROMETHANE							
BROMOFORM							
BROMOMETHANE							
CARBON DISULFIDE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLORODIBROMOMETHANE							
CHLOROETHANE							
CHLOROFORM							
CHLOROMETHANE							
CIS-1,3-DICHLOROPROPENE							
ETHYLBENZENE							
METHYLENE CHLORIDE							
STYRENE							
TETRACHLOROETHENE							
TOLUENE							
TOTAL 1,2-DICHLOROETHENE							
TOTAL XYLENES							
TRANS-1,3-DICHLOROPROPENE							
TRICHLOROETHENE							
VINYL CHLORIDE							
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE			420 U				
1,2-DICHLOROBENZENE			420 U				
1,3,5-TRINITROBENZENE					2500 U	250 U	250 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS039 (Con)	CF15SS039 (Con)	CF15SS040 (Con)	CF15SS041 (Con)	CF15SS042 (Con)	CF15SS043 (Con)	CF15SS043 (Con)
SAMPLE NUMBER	CF15SS039 [07/11/95]	CF15SS039DL [07/11/95]	CF15SS040 [07/10/95]	CF15SS041 [07/18/95]	CF15SS042 [07/26/95]	CF15SS043 [08/01/95]	CF15SB43 [07/12/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/11/1995	7/10/1995	7/18/1995	7/26/1995	8/1/1995	7/12/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE			420 U				
1,3-DINITROBENZENE					2500 U	250 U	250 U
1,4-DICHLOROBENZENE			420 U				
2,2'-OXYBIS(1-CHLOROPROPANE)			420 U				
2,4,5-TRICHLOROPHENOL			1000 U				
2,4,6-TRICHLOROPHENOL			420 U				
2,4-DICHLOROPHENOL			420 U				
2,4-DIMETHYLPHENOL			420 U				
2,4-DINITROPHENOL			1000 U				
2,4-DINITROTOLUENE			420 U		2000 U	200 U	200 U
2,6-DINITROTOLUENE			420 U		2000 U	200 U	200 U
2-CHLORONAPHTHALENE			420 U				
2-CHLOROPHENOL			420 U				
2-METHYLNAPHTHALENE	53 J	1500 U	420 U	1000 U			
2-METHYLPHENOL			420 U				
2-NITROANILINE			1000 U				
2-NITROPHENOL			420 U				
3,3'-DICHLOROBENZIDINE			420 U				
3-NITROANILINE			1000 U				
4,6-DINITRO-2-METHYLPHENOL			1000 U				
4-BROMOPHENYL PHENYL ETHER			420 U				
4-CHLORO-3-METHYLPHENOL			420 U				
4-CHLOROANILINE			420 U				
4-CHLOROPHENYL PHENYL ETHER			420 U				
4-METHYLPHENOL			420 U				
4-NITROANILINE			1000 U				
4-NITROPHENOL			1000 U				
ACENAPHTHENE	250 J	170 J	420 U	86 J			
ACENAPHTHYLENE	380 U	1500 U	420 U	1000 U			
ANTHRACENE	540	360 J	420 U	190 J			
BENZO(A)ANTHRACENE	5100 J	3600	52 J	3000 J			
BENZO(A)PYRENE	5400 J	4300	54 J	3300 J			
BENZO(B)FLUORANTHENE	8600 J	5800	72 J	4600 J			
BENZO(G,H,I)PERYLENE	2300	2700	420 U	1200			
BENZO(K)FLUORANTHENE	3300 J	2100	31 J	2300 J			
BIS(2-CHLOROETHOXY)METHANE			420 U				
BIS(2-CHLOROETHYL)ETHER			420 U				
BIS(2-ETHYLHEXYL)PHTHALATE			420 U				

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS039 (Con)	CF15SS039 (Con)	CF15SS040 (Con)	CF15SS041 (Con)	CF15SS042 (Con)	CF15SS043 (Con)	CF15SS043 (Con)
SAMPLE NUMBER	CF15SS039 [07/11/95]	CF15SS039DL [07/11/95]	CF15SS040 [07/10/95]	CF15SS041 [07/18/95]	CF15SS042 [07/26/95]	CF15SS043 [08/01/95]	CF15SB43 [07/12/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/11/1995	7/10/1995	7/18/1995	7/26/1995	8/1/1995	7/12/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE			420 U				
CARBAZOLE			420 U				
CHRYSENE	5500 J	4400	54 J	3400 J			
DI-N-BUTYL PHTHALATE			750				
DI-N-OCTYL PHTHALATE			420 U				
DIBENZO(A,H)ANTHRACENE	380 U	860 J	420 U	520 J			
DIBENZOFURAN			420 U				
DIETHYL PHTHALATE			420 U				
DIMETHYL PHTHALATE			420 U				
FLUORANTHENE	8100 J	5400	73 J	3200 J			
FLUORENE	100 J	1500 U	420 U	1000 U			
HEXACHLOROBENZENE			420 U				
HEXACHLOROBUTADIENE			420 U				
HEXACHLOROCYCLOPENTADIENE			420 U				
HEXACHLOROETHANE			420 U				
INDENO(1,2,3-CD)PYRENE	2200	2400	26 J	1200			
ISOPHORONE			420 U				
N-NITROSO-DI-N-PROPYLAMINE			420 U				
N-NITROSODIPHENYLAMINE			420 U				
NAPHTHALENE	200 J	130 J	420 U	86 J			
NITROBENZENE			420 U		3000 U	300 U	3 U
PENTACHLOROPHENOL			1000 U				
PHENANTHRENE	2400	1800	420 U	780 J			
PHENOL			420 U				
PYRENE	6300 J	4500	50 J	2300 J			
Pesticides/PCBs (ug/kg)							
4,4'-DDD							
4,4'-DDE							
4,4'-DDT							
ALDRIN							
ALPHA-BHC							
ALPHA-CHLORDANE							
AROCLOR-1016							
AROCLOR-1221							
AROCLOR-1232							
AROCLOR-1242							
AROCLOR-1248							
AROCLOR-1254							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS039 (Con)	CF15SS039 (Con)	CF15SS040 (Con)	CF15SS041 (Con)	CF15SS042 (Con)	CF15SS043 (Con)	CF15SS043 (Con)
SAMPLE NUMBER	CF15SS039 [07/11/95]	CF15SS039DL [07/11/95]	CF15SS040 [07/10/95]	CF15SS041 [07/18/95]	CF15SS042 [07/26/95]	CF15SS043 [08/01/95]	CF15SB43 [07/12/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/11/1995	7/10/1995	7/18/1995	7/26/1995	8/1/1995	7/12/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260							
BETA-BHC							
DELTA-BHC							
DIELDRIN							
ENDOSULFAN I							
ENDOSULFAN II							
ENDOSULFAN SULFATE							
ENDRIN							
ENDRIN ALDEHYDE							
ENDRIN KETONE							
GAMMA-BHC (LINDANE)							
GAMMA-CHLORDANE							
HEPTACHLOR							
HEPTACHLOR EPOXIDE							
METHOXYCHLOR							
TOXAPHENE							
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE					2500 U	250 U	250 U
2-AMINO-4,6-DINITROTOLUENE					2500 U	250 U	250 U
2-NITROTOLUENE					5000 U	500 U	500 U
3-NITROTOLUENE					5000 U	500 U	500 U
4-AMINO-2,6-DINITROTOLUENE					2500 U	250 U	250 U
4-NITROTOLUENE					5000 U	500 U	500 U
HMX					5000 U	500 U	500 U
RDX					5000 U	500 U	500 U
TETRYL					5000 U	500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS							
Inorganics (mg/kg)							
ALUMINUM							
ANTIMONY							
ARSENIC							
BARIUM							
BERYLLIUM							
CADMIUM							
CALCIUM							
CHROMIUM							
COBALT							

APPENDIX C-1.2

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS039 (Con)	CF15SS039 (Con)	CF15SS040 (Con)	CF15SS041 (Con)	CF15SS042 (Con)	CF15SS043 (Con)	CF15SS043 (Con)
SAMPLE NUMBER	CF15SS039 [07/11/95]	CF15SS039DL [07/11/95]	CF15SS040 [07/10/95]	CF15SS041 [07/18/95]	CF15SS042 [07/26/95]	CF15SS043 [08/01/95]	CF15SB43 [07/12/95]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	1-3
SAMPLE DATE	7/11/1995	7/11/1995	7/10/1995	7/18/1995	7/26/1995	8/1/1995	7/12/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER							
IRON							
LEAD							
MAGNESIUM							
MANGANESE							
MERCURY							
NICKEL							
POTASSIUM							
SELENIUM							
SILVER							
SODIUM							
THALLIUM							
VANADIUM							
ZINC							
Miscellaneous Parameters (mg/kg)							
CYANIDE							
TOTAL ORGANIC CARBON							

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS044 (Con)	CF15SS044 (Con)	CF15SS045	CF15SS045	CF15SS045 (Con)	CF15SS046 (Con)	CF15SS047 (Con)
SAMPLE NUMBER	CF15SS044 [08/01/95]	CF15SB44 [07/10/95]	CF15SS045 [08/01/95]	CF15SS045RE [08/01/95]	CF15SB45 [07/11/95]	CF15SS046 [07/31/95]	CF15SS047 [07/31/95]
DEPTH	0-1	1-3	0-1	0-1	1-3	0-1	0-1
SAMPLE DATE	8/1/1995	7/10/1995	8/1/1995	8/1/1995	7/11/1995	7/31/1995	7/31/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)							
1,1,1-TRICHLOROETHANE						8 U	6 U
1,1,2,2-TETRACHLOROETHANE						8 U	6 U
1,1,2-TRICHLOROETHANE						8 U	6 U
1,1-DICHLOROETHANE						8 U	6 U
1,1-DICHLOROETHENE						8 U	6 U
1,2-DICHLOROETHANE						8 U	6 U
1,2-DICHLOROPROPANE						8 U	6 U
2-BUTANONE						16 U	12 U
2-HEXANONE						16 U	12 U
4-METHYL-2-PENTANONE						16 U	12 U
ACETONE						16 U	12 U
BENZENE						8 U	6 U
BROMODICHLOROMETHANE						8 U	6 U
BROMOFORM						8 U	6 U
BROMOMETHANE						16 U	12 U
CARBON DISULFIDE						8 U	6 U
CARBON TETRACHLORIDE						8 U	6 U
CHLOROBENZENE						8 U	6 U
CHLORODIBROMOMETHANE						8 U	6 U
CHLOROETHANE						16 U	12 U
CHLOROFORM						8 U	6 U
CHLOROMETHANE						16 U	12 U
CIS-1,3-DICHLOROPROPENE						8 U	6 U
ETHYLBENZENE						8 U	6 U
METHYLENE CHLORIDE						8 U	6 U
STYRENE						8 U	6 U
TETRACHLOROETHENE						8 U	6 U
TOLUENE						8 U	6 U
TOTAL 1,2-DICHLOROETHENE						8 U	6 U
TOTAL XYLENES						8 U	6 U
TRANS-1,3-DICHLOROPROPENE						8 U	6 U
TRICHLOROETHENE						8 U	6 U
VINYL CHLORIDE						16 U	12 U
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE						550 U	410 U
1,2-DICHLOROBENZENE						550 U	410 U
1,3,5-TRINITROBENZENE	2500 U	2500 U				250 U	250 U

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS044 (Con)	CF15SS044 (Con)	CF15SS045	CF15SS045	CF15SS045 (Con)	CF15SS046 (Con)	CF15SS047 (Con)
SAMPLE NUMBER	CF15SS044 [08/01/95]	CF15SB44 [07/10/95]	CF15SS045 [08/01/95]	CF15SS045RE [08/01/95]	CF15SB45 [07/11/95]	CF15SS046 [07/31/95]	CF15SS047 [07/31/95]
DEPTH	0-1	1-3	0-1	0-1	1-3	0-1	0-1
SAMPLE DATE	8/1/1995	7/10/1995	8/1/1995	8/1/1995	7/11/1995	7/31/1995	7/31/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,3-DICHLOROBENZENE						550 U	410 U
1,3-DINITROBENZENE	2500 U	2500 U				250 U	250 U
1,4-DICHLOROBENZENE						550 U	410 U
2,2'-OXYBIS(1-CHLOROPROPANE)						550 U	410 U
2,4,5-TRICHLOROPHENOL						1300 U	1000 U
2,4,6-TRICHLOROPHENOL						550 U	410 U
2,4-DICHLOROPHENOL						550 U	410 U
2,4-DIMETHYLPHENOL						550 U	410 U
2,4-DINITROPHENOL						1300 U	1000 U
2,4-DINITROTOLUENE	2000 U	2000 U				550 U	410 U
2,6-DINITROTOLUENE	2000 U	2000 U				550 U	410 U
2-CHLORONAPHTHALENE						550 U	410 U
2-CHLOROPHENOL						550 U	410 U
2-METHYLNAPHTHALENE			110000 UJ	260000 UJ	400 U	550 U	410 U
2-METHYLPHENOL						550 U	410 U
2-NITROANILINE						1300 U	1000 U
2-NITROPHENOL						550 U	410 U
3,3'-DICHLOROBENZIDINE						550 U	410 U
3-NITROANILINE						1300 U	1000 U
4,6-DINITRO-2-METHYLPHENOL						1300 U	1000 U
4-BROMOPHENYL PHENYL ETHER						550 U	410 U
4-CHLORO-3-METHYLPHENOL						550 U	410 U
4-CHLOROANILINE						550 U	410 U
4-CHLOROPHENYL PHENYL ETHER						550 U	410 U
4-METHYLPHENOL						550 U	410 U
4-NITROANILINE						1300 U	1000 U
4-NITROPHENOL						1300 U	1000 U
ACENAPHTHENE			17000 J	39000 J	400 U	550 U	410 U
ACENAPHTHYLENE			110000 UJ	260000 UJ	400 U	550 U	410 U
ANTHRACENE			50000 J	76000 J	400 U	550 U	30 J
BENZO(A)ANTHRACENE			340000 J	650000 J	30 J	71 J	320 J
BENZO(A)PYRENE			340000 J	740000 J	35 J	63 J	360 J
BENZO(B)FLUORANTHENE			510000 J	1100000 J	45 J	94 J	520
BENZO(G,H,I)PERYLENE			180000 J	400000 J	34 J	550 U	210 J
BENZO(K)FLUORANTHENE			160000 J	330000 J	400 U	41 J	190 J
BIS(2-CHLOROETHOXY)METHANE						550 U	410 U
BIS(2-CHLOROETHYL)ETHER						550 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE						550 U	410 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS044 (Con)	CF15SS044 (Con)	CF15SS045	CF15SS045	CF15SS045 (Con)	CF15SS046 (Con)	CF15SS047 (Con)
SAMPLE NUMBER	CF15SS044 [08/01/95]	CF15SB44 [07/10/95]	CF15SS045 [08/01/95]	CF15SS045RE [08/01/95]	CF15SB45 [07/11/95]	CF15SS046 [07/31/95]	CF15SS047 [07/31/95]
DEPTH	0-1	1-3	0-1	0-1	1-3	0-1	0-1
SAMPLE DATE	8/1/1995	7/10/1995	8/1/1995	8/1/1995	7/11/1995	7/31/1995	7/31/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE						550 U	410 U
CARBAZOLE						550 U	36 J
CHRYSENE			400000 J	760000 J	40 J	79 J	370 J
DI-N-BUTYL PHTHALATE						550 U	660
DI-N-OCTYL PHTHALATE						550 U	410 U
DIBENZO(A,H)ANTHRACENE			54000 J	120000 J	400 U	550 U	64 J
DIBENZOFURAN						550 U	410 U
DIETHYL PHTHALATE						550 U	410 U
DIMETHYL PHTHALATE						550 U	410 U
FLUORANTHENE			660000 J	1100000 J	39 J	98 J	560
FLUORENE			7300 J	15000 J	400 U	550 U	410 U
HEXACHLOROBENZENE						550 U	410 U
HEXACHLOROBUTADIENE						550 U	410 U
HEXACHLOROCYCLOPENTADIENE						550 U	410 U
HEXACHLOROETHANE						550 U	410 U
INDENO(1,2,3-CD)PYRENE			160000 J	360000 J	400 U	550 U	190 J
ISOPHORONE						550 U	410 U
N-NITROSO-DI-N-PROPYLAMINE						550 U	410 U
N-NITROSODIPHENYLAMINE						550 U	410 U
NAPHTHALENE			17000 J	38000 J	400 U	550 U	410 U
NITROBENZENE	3000 U	25 U				550 U	410 U
PENTACHLOROPHENOL						1300 U	1000 U
PHENANTHRENE			250000 J	380000 J	400 U	33 J	160 J
PHENOL						550 U	410 U
PYRENE			500000 J	900000 J	42 J	77 J	420 J
Pesticides/PCBs (ug/kg)							
4,4'-DDD						5.5 U	4.2 U
4,4'-DDE						5.5 U	4.2 U
4,4'-DDT						6.5	4.2 U
ALDRIN						2.8 U	0.36 R
ALPHA-BHC						2.8 U	2.1 U
ALPHA-CHLORDANE						2.8 U	2.1 U
AROCLOR-1016						55 U	42 U
AROCLOR-1221						110 U	83 U
AROCLOR-1232						55 U	42 U
AROCLOR-1242						55 U	42 U
AROCLOR-1248						55 U	42 U
AROCLOR-1254						55 U	42 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS044 (Con)	CF15SS044 (Con)	CF15SS045	CF15SS045	CF15SS045 (Con)	CF15SS046 (Con)	CF15SS047 (Con)
SAMPLE NUMBER	CF15SS044 [08/01/95]	CF15SB44 [07/10/95]	CF15SS045 [08/01/95]	CF15SS045RE [08/01/95]	CF15SB45 [07/11/95]	CF15SS046 [07/31/95]	CF15SS047 [07/31/95]
DEPTH	0-1	1-3	0-1	0-1	1-3	0-1	0-1
SAMPLE DATE	8/1/1995	7/10/1995	8/1/1995	8/1/1995	7/11/1995	7/31/1995	7/31/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
AROCLOR-1260						55 U	42 U
BETA-BHC						2.8 U	2.1 U
DELTA-BHC						2.8 U	2.1 U
DIELDRIN						5.5 UJ	4.2 UJ
ENDOSULFAN I						2.8 U	2.1 U
ENDOSULFAN II						5.5 U	4.2 U
ENDOSULFAN SULFATE						5.5 U	4.2 U
ENDRIN						5.5 UJ	4.2 UJ
ENDRIN ALDEHYDE						5.5 U	4.2 U
ENDRIN KETONE						5.5 U	2.7 R
GAMMA-BHC (LINDANE)						2.8 UJ	2.1 UJ
GAMMA-CHLORDANE						2.8 U	2.1 U
HEPTACHLOR						2.8 U	2.1 U
HEPTACHLOR EPOXIDE						2.8 U	2.1 U
METHOXYCHLOR						28 U	21 U
TOXAPHENE						280 U	210 U
Explosives (ug/kg)							
2,4,6-TRINITROTOLUENE	2500 U	2500 U				250 U	250 U
2-AMINO-4,6-DINITROTOLUENE	2500 U	2500 U				250 U	250 U
2-NITROTOLUENE	5000 U	5000 U				500 U	500 U
3-NITROTOLUENE	5000 U	5000 U				500 U	500 U
4-AMINO-2,6-DINITROTOLUENE	2500 U	2500 U				250 U	250 U
4-NITROTOLUENE	5000 U	5000 U				500 U	500 U
HMX	5000 U	5000 U				500 U	500 U
RDX	5000 U	5000 U				500 U	500 U
TETRYL	5000 U	5000 U				500 U	500 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS						30 J	33 J
Inorganics (mg/kg)							
ALUMINUM						3540 J	367 J
ANTIMONY						151	0.64 U
ARSENIC						47.4	1 UJ
BARIUM						4.3	1.3
BERYLLIUM						0.33 U	0.25 U
CADMIUM						0.33 U	0.25 U
CALCIUM						196	160
CHROMIUM						3 U	0.86 U
COBALT						0.33 UJ	0.25 UJ

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS044 (Con)	CF15SS044 (Con)	CF15SS045	CF15SS045	CF15SS045 (Con)	CF15SS046 (Con)	CF15SS047 (Con)
SAMPLE NUMBER	CF15SS044 [08/01/95]	CF15SB44 [07/10/95]	CF15SS045 [08/01/95]	CF15SS045RE [08/01/95]	CF15SB45 [07/11/95]	CF15SS046 [07/31/95]	CF15SS047 [07/31/95]
DEPTH	0-1	1-3	0-1	0-1	1-3	0-1	0-1
SAMPLE DATE	8/1/1995	7/10/1995	8/1/1995	8/1/1995	7/11/1995	7/31/1995	7/31/1995
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
COPPER						4 U	0.75 U
IRON						436	129
LEAD			20			4430	13.9
MAGNESIUM						47 UJ	21.2 UJ
MANGANESE						1.7	0.45
MERCURY						0.17 U	0.12 U
NICKEL						1.8	0.75 U
POTASSIUM						32.3	23 U
SELENIUM						1.3 UJ	1 UJ
SILVER						0.33 U	0.25 U
SODIUM						322 J	137 J
THALLIUM						1.7 UJ	1.2 UJ
VANADIUM						2.8	0.83
ZINC						5.6 U	2.9 U
Miscellaneous Parameters (mg/kg)							
CYANIDE						0.25 U	0.18 U
TOTAL ORGANIC CARBON						46000	7500

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CF15SS048 [08/01/95]	CF15SS048 [08/03/95]
DEPTH	0-1	0-1
SAMPLE DATE	8/1/1995	8/3/1995
SAMPLE CODE	NORMAL	NORMAL
Volatile Organics (ug/kg)		
1,1,1-TRICHLOROETHANE	6 U	
1,1,2,2-TETRACHLOROETHANE	6 U	
1,1,2-TRICHLOROETHANE	6 U	
1,1-DICHLOROETHANE	6 U	
1,1-DICHLOROETHENE	6 U	
1,2-DICHLOROETHANE	6 U	
1,2-DICHLOROPROPANE	6 U	
2-BUTANONE	11 U	
2-HEXANONE	11 U	
4-METHYL-2-PENTANONE	11 U	
ACETONE	11 U	
BENZENE	6 U	
BROMODICHLOROMETHANE	6 U	
BROMOFORM	6 U	
BROMOMETHANE	11 U	
CARBON DISULFIDE	6 U	
CARBON TETRACHLORIDE	6 U	
CHLOROBENZENE	6 U	
CHLORODIBROMOMETHANE	6 U	
CHLOROETHANE	11 U	
CHLOROFORM	6 U	
CHLOROMETHANE	11 U	
CIS-1,3-DICHLOROPROPENE	6 U	
ETHYLBENZENE	6 U	
METHYLENE CHLORIDE	6 U	
STYRENE	6 U	
TETRACHLOROETHENE	6 U	
TOLUENE	6 U	
TOTAL 1,2-DICHLOROETHENE	6 U	
TOTAL XYLENES	6 U	
TRANS-1,3-DICHLOROPROPENE	6 U	
TRICHLOROETHENE	6 U	
VINYL CHLORIDE	11 U	
Semivolatile Organics (ug/kg)		
1,2,4-TRICHLOROBENZENE	380 U	
1,2-DICHLOROBENZENE	380 U	
1,3,5-TRINITROBENZENE		250 U

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CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CF15SS048 [08/01/95]	CF15SS048 [08/03/95]
DEPTH	0-1	0-1
SAMPLE DATE	8/1/1995	8/3/1995
SAMPLE CODE	NORMAL	NORMAL
1,3-DICHLOROBENZENE	380 U	
1,3-DINITROBENZENE		250 U
1,4-DICHLOROBENZENE	380 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	380 U	
2,4,5-TRICHLOROPHENOL	910 U	
2,4,6-TRICHLOROPHENOL	380 U	
2,4-DICHLOROPHENOL	380 U	
2,4-DIMETHYLPHENOL	380 U	
2,4-DINITROPHENOL	910 U	
2,4-DINITROTOLUENE	380 U	200 U
2,6-DINITROTOLUENE	380 U	200 U
2-CHLORONAPHTHALENE	380 U	
2-CHLOROPHENOL	380 U	
2-METHYLNAPHTHALENE	380 U	
2-METHYLPHENOL	380 U	
2-NITROANILINE	910 U	
2-NITROPHENOL	380 U	
3,3'-DICHLOROBENZIDINE	380 U	
3-NITROANILINE	910 U	
4,6-DINITRO-2-METHYLPHENOL	910 U	
4-BROMOPHENYL PHENYL ETHER	380 U	
4-CHLORO-3-METHYLPHENOL	380 U	
4-CHLOROANILINE	380 U	
4-CHLOROPHENYL PHENYL ETHER	380 U	
4-METHYLPHENOL	380 U	
4-NITROANILINE	910 U	
4-NITROPHENOL	910 U	
ACENAPHTHENE	380 U	
ACENAPHTHYLENE	380 U	
ANTHRACENE	380 U	
BENZO(A)ANTHRACENE	380 U	
BENZO(A)PYRENE	59 J	
BENZO(B)FLUORANTHENE	72 J	
BENZO(G,H,I)PERYLENE	28 J	
BENZO(K)FLUORANTHENE	380 U	
BIS(2-CHLOROETHOXY)METHANE	380 U	
BIS(2-CHLOROETHYL)ETHER	380 U	
BIS(2-ETHYLHEXYL)PHTHALATE	21 J	

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CF15SS048 [08/01/95]	CF15SS048 [08/03/95]
DEPTH	0-1	0-1
SAMPLE DATE	8/1/1995	8/3/1995
SAMPLE CODE	NORMAL	NORMAL
BUTYL BENZYL PHTHALATE	380 U	
CARBAZOLE	380 U	
CHRYSENE	58 J	
DI-N-BUTYL PHTHALATE	120 J	
DI-N-OCTYL PHTHALATE	380 U	
DIBENZO(A,H)ANTHRACENE	380 U	
DIBENZOFURAN	380 U	
DIETHYL PHTHALATE	380 U	
DIMETHYL PHTHALATE	380 U	
FLUORANTHENE	100 J	
FLUORENE	380 U	
HEXACHLOROBENZENE	380 U	
HEXACHLOROBUTADIENE	380 U	
HEXACHLOROCYCLOPENTADIENE	380 U	
HEXACHLOROETHANE	380 U	
INDENO(1,2,3-CD)PYRENE	25 J	
ISOPHORONE	380 U	
N-NITROSO-DI-N-PROPYLAMINE	380 U	
N-NITROSODIPHENYLAMINE	380 U	
NAPHTHALENE	380 U	
NITROBENZENE	380 U	300 U
PENTACHLOROPHENOL	910 U	
PHENANTHRENE	45 J	
PHENOL	380 U	
PYRENE	84 J	
Pesticides/PCBs (ug/kg)		
4,4'-DDD	3.8 U	
4,4'-DDE	3.8 U	
4,4'-DDT	3.8 U	
ALDRIN	1.9 U	
ALPHA-BHC	1.9 U	
ALPHA-CHLORDANE	1.9 U	
AROCLOR-1016	38 U	
AROCLOR-1221	76 U	
AROCLOR-1232	38 U	
AROCLOR-1242	38 U	
AROCLOR-1248	38 U	
AROCLOR-1254	38 U	

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CF15SS048 [08/01/95]	CF15SS048 [08/03/95]
DEPTH	0-1	0-1
SAMPLE DATE	8/1/1995	8/3/1995
SAMPLE CODE	NORMAL	NORMAL
AROCLOR-1260	38 U	
BETA-BHC	1.9 U	
DELTA-BHC	1.9 U	
DIELDRIN	3.8 UJ	
ENDOSULFAN I	1.9 U	
ENDOSULFAN II	3.8 U	
ENDOSULFAN SULFATE	3.8 U	
ENDRIN	3.8 UJ	
ENDRIN ALDEHYDE	3.8 U	
ENDRIN KETONE	3.8 U	
GAMMA-BHC (LINDANE)	1.9 UJ	
GAMMA-CHLORDANE	1.9 U	
HEPTACHLOR	1.9 U	
HEPTACHLOR EPOXIDE	1.9 U	
METHOXYCHLOR	19 U	
TOXAPHENE	190 U	
Explosives (ug/kg)		
2,4,6-TRINITROTOLUENE		250 U
2-AMINO-4,6-DINITROTOLUENE		250 U
2-NITROTOLUENE		500 U
3-NITROTOLUENE		500 U
4-AMINO-2,6-DINITROTOLUENE		250 U
4-NITROTOLUENE		500 U
HMX		500 U
RDX		500 U
TETRYL		500 U
Petroleum Hydrocarbons (mg/kg)		
TOTAL PETROLEUM HYDROCARBONS		11 U
Inorganics (mg/kg)		
ALUMINUM	333 J	
ANTIMONY	0.45 U	
ARSENIC	0.91 UJ	
BARIUM	1.1	
BERYLLIUM	0.23 U	
CADMIUM	0.23 U	
CALCIUM	111	
CHROMIUM	0.85 U	
COBALT	0.23 UJ	

CONFIRMATORY SOIL ANALYTIC RESULTS (JULY - AUGUST 1995)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CF15SS048 [08/01/95]	CF15SS048 [08/03/95]
DEPTH	0-1	0-1
SAMPLE DATE	8/1/1995	8/3/1995
SAMPLE CODE	NORMAL	NORMAL
COPPER	1.3 U	
IRON	89.4	
LEAD	0.97 J	
MAGNESIUM	11.9 UJ	
MANGANESE	0.86	
MERCURY	0.11 U	
NICKEL	0.68 U	
POTASSIUM	20.9 U	
SELENIUM	0.91 UJ	
SILVER	0.23 U	
SODIUM	502 J	
THALLIUM	1.1 UJ	
VANADIUM	0.66	
ZINC	3.1 U	
Miscellaneous Parameters (mg/kg)		
CYANIDE	0.16 U	
TOTAL ORGANIC CARBON		2700

E-1.3: SOIL ANALYTICAL RESULTS
(MAY 1997 - DECEMBER 1997)

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS015	CF15SS015	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS026 (Con)	CF15SS034
SAMPLE NUMBER	CF15SS015A [12/23/97]	CF15SS015B [12/23/97]	CF15SS026A [12/23/97]	CF15SS026B [12/23/97]	CF15SS026C [12/23/97]	CF15SS34A [12/23/97]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	12/23/1997	12/23/1997	12/23/1997	12/23/1997	12/23/1997	12/23/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE						
1,4-DICHLOROBENZENE						
1-METHYLNAPHTHALENE						380 U
2,4-DINITROTOLUENE						
2-CHLOROPHENOL						
2-METHYLNAPHTHALENE						380 U
4-CHLORO-3-METHYLPHENOL						
4-NITROPHENOL						
ACENAPHTHENE						380 U
ACENAPHTHYLENE						380 U
ANTHRACENE						380 U
BENZO(A)ANTHRACENE						380 U
BENZO(A)PYRENE						380 U
BENZO(B)FLUORANTHENE						380 U
BENZO(G,H,I)PERYLENE						380 U
BENZO(K)FLUORANTHENE						380 U
CHRYSENE						380 U
DIBENZO(A,H)ANTHRACENE						380 U
FLUORANTHENE						380 U
FLUORENE						380 U
INDENO(1,2,3-CD)PYRENE						380 U
N-NITROSO-DI-N-PROPYLAMINE						
NAPHTHALENE						380 U
PENTACHLOROPHENOL						
PHENANTHRENE						380 U
PHENOL						
PYRENE						380 U
Inorganics (mg/kg)						
ANTIMONY	46.9	19.7	16.7	48.4	1.2 J	
ARSENIC	17.2	14.8	13.3	9.1	0.95 U	
LEAD						

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS034	CF15SS046	CF15SS046	CF15SS049 (Con)	CF15SS049 (Con)	CF15SS050 (Con)	CF15SS050 (Con)
SAMPLE NUMBER	CF15SS34B [12/23/97]	CF15SS046A [12/23/97]	CF15SS046B [12/23/97]	CF15SS049 [05/06/97]	CF15SB49 [05/06/97]	CF15SS050 [05/06/97]	CF15SB50 [05/06/97]
DEPTH	0-1	0-1	0-1	0-1	1-3	0-1	1-3
SAMPLE DATE	12/23/1997	12/23/1997	12/23/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE					390 U		
1,4-DICHLOROBENZENE					390 U		
1-METHYLNAPHTHALENE	400 U						
2,4-DINITROTOLUENE					390 U		
2-CHLOROPHENOL					390 U		
2-METHYLNAPHTHALENE	400 U			410 U	390 U	580 U	390 U
4-CHLORO-3-METHYLPHENOL					390 U		
4-NITROPHENOL					940 U		
ACENAPHTHENE	400 U			410 U	390 U	580 U	390 U
ACENAPHTHYLENE	400 U			410 U	390 U	580 U	390 U
ANTHRACENE	400 U			410 U	390 U	580 U	390 U
BENZO(A)ANTHRACENE	400 U			410 U	360 J	330 J	170 J
BENZO(A)PYRENE	400 U			410 U	340 J	390 J	200 J
BENZO(B)FLUORANTHENE	400 U			410 U	490	450 J	300 J
BENZO(G,H,I)PERYLENE	400 U			410 U	130 J	110 J	100 J
BENZO(K)FLUORANTHENE	400 U			410 U	210 J	260 J	120 J
CHRYSENE	400 U			410 U	410	360 J	210 J
DIBENZO(A,H)ANTHRACENE	400 U			410 U	65 J	580 U	44 J
FLUORANTHENE	400 U			410 U	580	520 J	260 J
FLUORENE	400 U			410 U	390 U	580 U	390 U
INDENO(1,2,3-CD)PYRENE	400 U			410 U	200 J	190 J	130 J
N-NITROSO-DI-N-PROPYLAMINE					390 U		
NAPHTHALENE	400 U			410 U	390 U	580 U	390 U
PENTACHLOROPHENOL					940 U		
PHENANTHRENE	400 U			410 U	230 J	220 J	92 J
PHENOL					390 U		
PYRENE	400 U			410 U	600	440 J	290 J
Inorganics (mg/kg)							
ANTIMONY		1.2 J	221				
ARSENIC		1.1 J	34.5				
LEAD							

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS051 (Con)	CF15SS051 (Con)	CF15SS052 (Con)	CF15SS052 (Con)	CF15SS053 (Con)	CF15SS053 (Con)	CF15SS054 (Con)
SAMPLE NUMBER	CF15SS051 [05/06/97]	CF15SB51 [05/06/97]	CF15SS052 [05/06/97]	CF15SB52 [05/06/97]	CF15SS053 [05/06/97]	CF15SB53 [05/06/97]	CF15SS054 [05/06/97]
DEPTH	0-1	1-3	0-1	1-3	0-1	1-3	0-1
SAMPLE DATE	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE							
1,4-DICHLOROBENZENE							
1-METHYLNAPHTHALENE							
2,4-DINITROTOLUENE							
2-CHLOROPHENOL							
2-METHYLNAPHTHALENE		410 U		51 J		400 U	
4-CHLORO-3-METHYLPHENOL							
4-NITROPHENOL							
ACENAPHTHENE		410 U		410 U		400 U	
ACENAPHTHYLENE		410 U		410 U		400 U	
ANTHRACENE		410 U		410 U		400 U	
BENZO(A)ANTHRACENE		42 J		59 J		110 J	
BENZO(A)PYRENE		49 J		57 J		130 J	
BENZO(B)FLUORANTHENE		77 J		84 J		190 J	
BENZO(G,H,I)PERYLENE		410 U		410 U		52 J	
BENZO(K)FLUORANTHENE		410 U		410 U		78 J	
CHRYSENE		59 J		69 J		140 J	
DIBENZO(A,H)ANTHRACENE		410 U		410 U		400 U	
FLUORANTHENE		62 J		81 J		130 J	
FLUORENE		410 U		410 U		400 U	
INDENO(1,2,3-CD)PYRENE		410 U		410 U		69 J	
N-NITROSO-DI-N-PROPYLAMINE							
NAPHTHALENE		64 J		200 J		400 U	
PENTACHLOROPHENOL							
PHENANTHRENE		410 U		64 J		400 U	
PHENOL							
PYRENE		75 J		91 J		160 J	
Inorganics (mg/kg)							
ANTIMONY	14.2 J		1.9 J		15.9		16.1 J
ARSENIC	16.5		2.6 J		21.9		5.2
LEAD							

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS054 (Con)	CF15SS055 (Con)	CF15SS055 (Con)	CF15SS056 (Con)	CF15SS056 (Con)	CF15SS057 (Con)	CF15SS058 (Con)
SAMPLE NUMBER	CF15SB54 [05/06/97]	CF15SS055 [05/06/97]	CF15SB55 [05/06/97]	CF15SS056 [05/06/97]	CF15SB56 [05/06/97]	CF15SS057 [05/06/97]	CF15SS058 [05/06/97]
DEPTH	1-3	0-1	1-3	0-1	1-3	0-1	0-1
SAMPLE DATE	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE							
1,4-DICHLOROBENZENE							
1-METHYLNAPHTHALENE							
2,4-DINITROTOLUENE							
2-CHLOROPHENOL							
2-METHYLNAPHTHALENE	390 U		400 U		400 U		
4-CHLORO-3-METHYLPHENOL							
4-NITROPHENOL							
ACENAPHTHENE	390 U		400 U		400 U		
ACENAPHTHYLENE	390 U		400 U		400 U		
ANTHRACENE	390 U		400 U		400 U		
BENZO(A)ANTHRACENE	230 J		400 U		380 J		
BENZO(A)PYRENE	240 J		400 U		420		
BENZO(B)FLUORANTHENE	340 J		400 U		620		
BENZO(G,H,I)PERYLENE	78 J		400 U		160 J		
BENZO(K)FLUORANTHENE	160 J		400 U		220 J		
CHRYSENE	270 J		400 U		450		
DIBENZO(A,H)ANTHRACENE	390 U		400 U		74 J		
FLUORANTHENE	300 J		400 U		500		
FLUORENE	390 U		400 U		400 U		
INDENO(1,2,3-CD)PYRENE	140 J		400 U		250 J		
N-NITROSO-DI-N-PROPYLAMINE							
NAPHTHALENE	390 U		400 U		400 U		
PENTACHLOROPHENOL							
PHENANTHRENE	97 J		400 U		150 J		
PHENOL							
PYRENE	330 J		400 U		540		
Inorganics (mg/kg)							
ANTIMONY		2440		110		375	27.9
ARSENIC		451		30.2		58.2	17.1
LEAD							

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS059 (Con)	CF15SS060 (Con)	CF15SS061 (Con)	CF15SS062 (Con)	CF15SS063 (Con)	CF15SS064 (Con)	CF15SS065 (Con)
SAMPLE NUMBER	CF15SS059 [05/06/97]	CF15SS060 [05/06/97]	CF15SS061 [05/06/97]	CF15SS062 [05/06/97]	CF15SS063 [05/06/97]	CF15SS064 [05/06/97]	CF15SS065 [05/07/97]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/6/1997	5/7/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE							
1,4-DICHLOROBENZENE							
1-METHYLNAPHTHALENE							
2,4-DINITROTOLUENE							
2-CHLOROPHENOL							
2-METHYLNAPHTHALENE							
4-CHLORO-3-METHYLPHENOL							
4-NITROPHENOL							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
N-NITROSO-DI-N-PROPYLAMINE							
NAPHTHALENE							
PENTACHLOROPHENOL							
PHENANTHRENE							
PHENOL							
PYRENE							
Inorganics (mg/kg)							
ANTIMONY	69						
ARSENIC	30.2						
LEAD		550	807	1980	1110	21.5	274 J

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS066 (Con)	CF15SS067 (Con)	CF15SS068 (Con)	CF15SS069 (Con)	CF15SS070 (Con)	CF15SS071 (Con)	CF15SS072 (Con)
SAMPLE NUMBER	CF15SS066 [05/07/97]	CF15SS067 [05/07/97]	CF15SS068 [05/07/97]	CF15SS069 [05/06/97]	CF15SS070 [05/06/97]	CF15SS071 [05/06/97]	CF15SS072 [05/07/97]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	5/7/1997	5/7/1997	5/7/1997	5/6/1997	5/6/1997	5/6/1997	5/7/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1,2,4-TRICHLOROBENZENE							
1,4-DICHLOROBENZENE							
1-METHYLNAPHTHALENE							
2,4-DINITROTOLUENE							
2-CHLOROPHENOL							
2-METHYLNAPHTHALENE							
4-CHLORO-3-METHYLPHENOL							
4-NITROPHENOL							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
N-NITROSO-DI-N-PROPYLAMINE							
NAPHTHALENE							
PENTACHLOROPHENOL							
PHENANTHRENE							
PHENOL							
PYRENE							
Inorganics (mg/kg)							
ANTIMONY							
ARSENIC							
LEAD	2830 J	139 J	144 J	4	37	840	60.2 J

APPENDIX C-1.3

SOIL ANALYTIC RESULTS (MAY AND DECEMBER 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS073 (Con)
SAMPLE NUMBER	CF15SS073 [05/07/97]
DEPTH	0-1
SAMPLE DATE	5/7/1997
SAMPLE CODE	NORMAL
Semivolatile Organics (ug/kg)	
1,2,4-TRICHLOROBENZENE	
1,4-DICHLOROBENZENE	
1-METHYLNAPHTHALENE	
2,4-DINITROTOLUENE	
2-CHLOROPHENOL	
2-METHYLNAPHTHALENE	
4-CHLORO-3-METHYLPHENOL	
4-NITROPHENOL	
ACENAPHTHENE	
ACENAPHTHYLENE	
ANTHRACENE	
BENZO(A)ANTHRACENE	
BENZO(A)PYRENE	
BENZO(B)FLUORANTHENE	
BENZO(G,H,I)PERYLENE	
BENZO(K)FLUORANTHENE	
CHRYSENE	
DIBENZO(A,H)ANTHRACENE	
FLUORANTHENE	
FLUORENE	
INDENO(1,2,3-CD)PYRENE	
N-NITROSO-DI-N-PROPYLAMINE	
NAPHTHALENE	
PENTACHLOROPHENOL	
PHENANTHRENE	
PHENOL	
PYRENE	
Inorganics (mg/kg)	
ANTIMONY	
ARSENIC	
LEAD	427 J

E-1.4: SUPPLEMENTAL SOIL ANALYTICAL RESULTS
(APRIL 1997 - JUNE 1999)

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-500	CEF-015-SS-501	CEF-015-SS-502	CEF-015-SS-503	CEF-015-SS-504	CEF-015-SS-505	CEF-015-SS-506	CEF-015-SS-507	CEF-015-SS-508
SAMPLE NUMBER	CEF-15-SS-500	CEF-15-SS-501	CEF-15-SS-502	CEF-15-SS-503	CEF-15-SS-504	CEF-15-SS-505	CEF-15-SS-506	CEF-15-SS-507	CEF-15-SS-508
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	132	106	62	257	164	708	1870	673	1130

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-508	CEF-015-SS-509	CEF-015-SS-510	CEF-015-SS-511	CEF-015-SS-512	CEF-015-SS-513	CEF-015-SS-514	CEF-015-SS-515	CEF-015-SS-516
SAMPLE NUMBER	CEF-15-SS-508-D	CEF-15-SS-509	CEF-15-SS-510	CEF-15-SS-511	CEF-15-SS-512	CEF-15-SS-513	CEF-15-SS-514	CEF-15-SS-515	CEF-15-SS-516
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	719	3740	632	4680	1640	1210	2490	2290	1990

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-517	CEF-015-SS-518	CEF-015-SS-519	CEF-015-SS-520	CEF-015-SS-520	CEF-015-SS-521	CEF-015-SS-522	CEF-015-SS-523	CEF-015-SS-524
SAMPLE NUMBER	CEF-15-SS-517	CEF-15-SS-518	CEF-15-SS-519	CEF-15-SS-520	CEF-15-SS-520-D	CEF-15-SS-521	CEF-15-SS-522	CEF-15-SS-523	CEF-15-SS-524
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	4520	4600	13000	148	114	2420	1110	746	2980

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-525	CEF-015-SS-526	CEF-015-SS-526	CEF-015-SS-527	CEF-015-SS-528	CEF-015-SS-529	CEF-015-SS-530	CEF-015-SS-531	CEF-015-SS-531
SAMPLE NUMBER	CEF-15-SS-525	CEF-15-SS-526	CEF-15-SS-526-D	CEF-15-SS-527	CEF-15-SS-528	CEF-15-SS-529	CEF-15-SS-530	CEF-15-SS-531	CEF-15-SS-531-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/12/1999
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	746	698	982	439	115	1230	5660	4790 J	11800 J

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-532	CEF-015-SS-533	CEF-015-SS-534	CEF-015-SS-535	CEF-015-SS-536	CEF-015-SS-537	CEF-015-SS-538	CEF-015-SS-538	CEF-015-SS-539
SAMPLE NUMBER	CEF-15-SS-532	CEF-15-SS-533	CEF-15-SS-534	CEF-15-SS-535	CEF-15-SS-536	CEF-15-SS-537	CEF-15-SS-538	CEF-15-SS-538-D	CEF-15-SS-539
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/12/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	2290	41400	970	285	88.3	57.3	25 U	15.5 U	378

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-540	CEF-015-SS-541	CEF-015-SS-542	CEF-015-SS-543	CEF-015-SS-544	CEF-015-SS-544	CEF-015-SS-545	CEF-015-SS-546	CEF-015-SS-547
SAMPLE NUMBER	CEF-15-SS-540	CEF-15-SS-541	CEF-15-SS-542	CEF-15-SS-543	CEF-15-SS-544	CEF-15-SS-544-D	CEF-15-SS-545	CEF-15-SS-546	CEF-15-SS-547
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE									
2-METHYLNAPHTHALENE									
ACENAPHTHENE									
ACENAPHTHYLENE									
ANTHRACENE									
BENZO(A)ANTHRACENE									
BENZO(A)PYRENE									
BENZO(B)FLUORANTHENE									
BENZO(G,H,I)PERYLENE									
BENZO(K)FLUORANTHENE									
CHRYSENE									
DIBENZO(A,H)ANTHRACENE									
FLUORANTHENE									
FLUORENE									
INDENO(1,2,3-CD)PYRENE									
NAPHTHALENE									
PHENANTHRENE									
PYRENE									
Inorganics (mg/kg)									
LEAD	7.5 U	19.1 U	65.9	5.8 U	119	36.4 U	199	152	35.7 U

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-548	CEF-015-SS-549	CEF-015-SS-550	CEF-015-SS-551	CEF-015-SS-552	CEF-015-SS-553	CEF-015-SS-554	CEF-015-SS-555	CEF-015-SS-556
SAMPLE NUMBER	CEF-15-SS-548	CEF-15-SS-549	CEF-15-SS-550	CEF-15-SS-551	CEF-15-SS-552	CEF-15-SS-553	CEF-15-SS-554	CEF-15-SS-555	CEF-15-SS-556
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE								47 U	52 U
2-METHYLNAPHTHALENE								47 U	52 U
ACENAPHTHENE								47 U	52 U
ACENAPHTHYLENE								391	52 U
ANTHRACENE								47 U	52 U
BENZO(A)ANTHRACENE								7 U	7.8 U
BENZO(A)PYRENE								7 U	17.9
BENZO(B)FLUORANTHENE								7 U	7.8 U
BENZO(G,H,I)PERYLENE								7 U	7.8 U
BENZO(K)FLUORANTHENE								7 U	73.8
CHRYSENE								42.3	7.8 U
DIBENZO(A,H)ANTHRACENE								7 U	7.8 U
FLUORANTHENE								147	7.8 U
FLUORENE								47 U	52 U
INDENO(1,2,3-CD)PYRENE								7 U	7.8 U
NAPHTHALENE								47 U	52 U
PHENANTHRENE								47 U	52 U
PYRENE								7 U	7.8 U
Inorganics (mg/kg)									
LEAD	35.2 U	16.4 U	13.1 U	9.3 U	13.3 U	221	125		

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-557	CEF-015-SS-558	CEF-015-SS-558	CEF-015-SS-559	CEF-015-SS-560	CEF-015-SS-560	CEF-015-SS-561	CEF-015-SS-561	CEF-015-SS-562
SAMPLE NUMBER	CEF-15-SS-557	CEF-15-SS-558	CEF-15-SS-558-D	CEF-15-SS-559	CEF-15-SS-560	CEF-15-SS-560-D	CEF-15-SS-561	CEF-15-SS-561-D	CEF-15-SS-562
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	ORIG	DUP	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	55 U	51 U	52 U	44 U	46 U	46 U	45 U	47 U	36 U
2-METHYLNAPHTHALENE	55 U	51 U	52 U	44 U	46 UJ	2730 J	45 U	47 U	36 U
ACENAPHTHENE	55 U	51 U	52 U	44 U	1390 J	3180 J	217	213	36 U
ACENAPHTHYLENE	55 U	51 U	52 U	53.7	46 U	46 U	45 U	47 U	36 U
ANTHRACENE	55 U	51 U	52 U	44 U	201 J	1060 J	45 U	47 U	36 U
BENZO(A)ANTHRACENE	8.2 U	7.7 U	9.2	6.6 U	1850 J	3900 J	190	195	26.2
BENZO(A)PYRENE	8.2 U	7.7 U	7.8 U	6.6 U	5440	7360	324	354	31.7
BENZO(B)FLUORANTHENE	8.2 U	7.7 U	11.4	6.6 U	4400 J	8140 J	258	323	31.6
BENZO(G,H,I)PERYLENE	8.2 U	7.7 U	7.8 U	6.6 U	3880	4590	178	235	5.4 U
BENZO(K)FLUORANTHENE	28.2	7.7 U	7.8 U	6.6 U	2450	2460	99	160	17.5
CHRYSENE	8.2 U	7.7 U	19	6.6 U	2470 J	4300 J	339 J	7.1 UJ	52.9
DIBENZO(A,H)ANTHRACENE	8.2 U	7.7 U	7.8 U	6.6 U	6.9 U	7 U	6.8 U	7.1 U	5.4 U
FLUORANTHENE	8.2 U	7.7 U	7.8 U	6.6 U	1980	5750	498	549	128
FLUORENE	55 U	51 U	52 U	44 U	820 J	1700 J	45 UJ	94 J	36 U
INDENO(1,2,3-CD)PYRENE	8.2 U	7.7 U	7.8 U	6.6 U	6.9 U	7 U	171	214	5.4 U
NAPHTHALENE	55 U	51 U	52 U	44 U	46 U	46 U	45 U	47 U	36 U
PHENANTHRENE	55 U	51 U	52 U	44 U	46 UJ	2760 J	45 UJ	62.5 J	36 U
PYRENE	8.2 U	7.7 U	7.8 U	6.6 U	1420 J	3790 J	307	339	53
Inorganics (mg/kg)									
LEAD									

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-563	CEF-015-SS-564	CEF-015-SS-565	CEF-015-SS-566	CEF-015-SS-567	CEF-015-SS-568	CEF-015-SS-569	CEF-015-SS-570	CEF-015-SS-571
SAMPLE NUMBER	CEF-15-SS-563	CEF-15-SS-564	CEF-15-SS-565	CEF-15-SS-566	CEF-15-SS-567	CEF-15-SS-568	CEF-15-SS-569	CEF-15-SS-570	CEF-15-SS-571
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/14/1999	4/12/1999	4/12/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	34 U	36 U	35 U	34 U	38 U	39 U	35 U	43 U	41 U
2-METHYLNAPHTHALENE	34 U	36 U	275	34 U	38 U	39 U	295	43 U	41 U
ACENAPHTHENE	34 U	36 U	336	34 U	70.7	39 U	360	43 U	41 U
ACENAPHTHYLENE	34 U	36 U	35 U	65.2	38 U	39 U	35 U	152	137
ANTHRACENE	34 U	36 U	42.9	34 U	38 U	39 U	62.4	43 U	41 U
BENZO(A)ANTHRACENE	5.8	33.4	415	5.2 U	148	27.6	456	47.6	6.1 U
BENZO(A)PYRENE	5.1 U	26.5	523	28.7	173	43.6	631	49.7	6.1 U
BENZO(B)FLUORANTHENE	5.1 U	63.6	470	26.3	169	41.1	580	73.5	6.1 U
BENZO(G,H,I)PERYLENE	5.1 U	5.4 U	302	5.2 U	132	36	349	29.4	6.1 U
BENZO(K)FLUORANTHENE	5.1 U	21.4	156	12.5	49.5	19.4	179	6.5 U	6.1 U
CHRYSENE	14	69	530	5.2 U	217	5.8 U	626	235	6.1 U
DIBENZO(A,H)ANTHRACENE	5.1 U	5.4 U	5.2 U	5.2 U	5.7 U	5.8 U	108	6.5 U	6.1 U
FLUORANTHENE	38.5	143	962	111	511	109	1160	160	6.1 U
FLUORENE	34 U	36 U	35 U	34 U	80.3	39 U	140	43 U	41 U
INDENO(1,2,3-CD)PYRENE	5.1 U	5.4 U	557	5.2 U	189	33.1	457	6.5 U	6.1 U
NAPHTHALENE	34 U	36 U	35 U	34 U	38 U	39 U	35 U	43 U	41 U
PHENANTHRENE	34 U	38.6	382	34 U	659	37.7	372	43 U	41 U
PYRENE	11.8	85	679	34.6	260	76.2	789	109	6.1 U
Inorganics (mg/kg)									
LEAD									

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-572	CEF-015-SS-573	CEF-015-SS-574	CEF-015-SS-575	CEF-015-SS-576	CEF-015-SS-577	CEF-015-SS-578	CEF-015-SS-579	CEF-015-SS-580
SAMPLE NUMBER	CEF-15-SS-572	CEF-15-SS-573	CEF-15-SS-574	CEF-15-SS-575	CEF-15-SS-576	CEF-15-SS-577	CEF-15-SS-578	CEF-15-SS-579	CEF-15-SS-580
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/12/1999	4/12/1999	4/12/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999	4/13/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	39 U	37 U	41 U	36 U	36 U	40 U	43 U	34 U	37 U
2-METHYLNAPHTHALENE	69	37 U	41 U	36 U	36 U	40 U	43 U	34 U	37 U
ACENAPHTHENE	39 U	37 U	41 U	155	36 U	40 U	43 U	34 U	37 U
ACENAPHTHYLENE	52.9	37 U	543	80.9	36 U	40 U	277	34 U	37 U
ANTHRACENE	39 U	37 U	41 U	36 U	36 U	40 U	43 U	34 U	37 U
BENZO(A)ANTHRACENE	5.8 U	5.5 U	6.1 U	175	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
BENZO(A)PYRENE	5.8 U	5.5 U	6.1 U	316	5.3 U	5.9 U	6.4 U	5.2 U	24.3
BENZO(B)FLUORANTHENE	5.8 U	71.5	6.1 U	367	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
BENZO(G,H,I)PERYLENE	5.8 U	5.5 U	6.1 U	210	8	5.9 U	6.4 U	5.2 U	5.5 U
BENZO(K)FLUORANTHENE	5.8 U	62.9	6.1 U	81	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
CHRYSENE	5.8 U	319	6.1 U	255	5.3 U	5.9 U	6.4 U	5.2 U	1670
DIBENZO(A,H)ANTHRACENE	5.8 U	5.5 U	6.1 U	93.9	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
FLUORANTHENE	5.8 U	5.5 U	6.1 U	261	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
FLUORENE	39 U	37 U	41 U	53.7	36 U	40 U	43 U	34 U	37 U
INDENO(1,2,3-CD)PYRENE	5.8 U	5.5 U	6.1 U	272	5.3 U	5.9 U	6.4 U	5.2 U	5.5 U
NAPHTHALENE	39 U	37 U	41 U	36 U	36 U	40 U	43 U	34 U	37 U
PHENANTHRENE	38.5	1660	41 U	89.9	36 U	40 U	43 U	34 U	37 U
PYRENE	5.8 U	5.5 U	6.1 U	255	20.4	5.9 U	6.4 U	5.2 U	5.5 U
Inorganics (mg/kg)									
LEAD									

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-581	CEF-015-SS-582	CEF-015-SS-583	CEF-015-SS-584	CEF-015-SS-600	CEF-015-SS-601	CEF-015-SS-602	CEF-015-SS-603	CEF-015-SS-604
SAMPLE NUMBER	CEF-15-SS-581	CEF-15-SS-582	CEF-15-SS-583	CEF-15-SS-584	CEF-15-SS-600	CEF-15-SS-601	CEF-15-SS-602	CEF-15-SS-603	CEF-15-SS-604
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	4/13/1999	4/13/1999	4/13/1999	4/12/1999	6/24/1999	6/24/1999	6/24/1999	6/25/1999	6/24/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	44 U	51 U	37 U	36 U	38 U	95	170	60	
2-METHYLNAPHTHALENE	44 U	106	37 U	188	83	150	90	56	
ACENAPHTHENE	44 U	51 U	37 U	182	38 U	110	36 U	110	
ACENAPHTHYLENE	212	463	37 U	42.3	78 U	160	110	360	
ANTHRACENE	44 U	51 U	37 U	52.9	5.8 U	5.7 U	5.4 U	6.5 U	
BENZO(A)ANTHRACENE	30.8	7.6 U	5.5 U	190	7.4	5.7 U	9.2	6.5 U	
BENZO(A)PYRENE	40.2	7.6 U	5.5 U	253	9.5	83	5.4 U	6.5 U	
BENZO(B)FLUORANTHENE	32.3	7.6 U	5.5 U	237	13	5.7 U	9.1	6.5 U	
BENZO(G,H,I)PERYLENE	6.6 U	7.6 U	5.5 U	92.3	7.8 U	25	7.3 U	8.7 U	
BENZO(K)FLUORANTHENE	15.7	35.6	5.5 U	87.3	5.8 U	5.7 U	5.4 U	6.5 U	
CHRYSENE	13.8	736	5.5 U	222	5.8 U	5.7 U	5.4 U	6.5 U	
DIBENZO(A,H)ANTHRACENE	6.6 U	7.6 U	5.5 U	5.4 U	9.7 U	9.4 U	9 U	11 U	
FLUORANTHENE	254	7.6 U	5.5 U	701	10	33	8	8.7 U	
FLUORENE	44 U	51 U	37 U	59.4	7.8 U	7.6 U	7.3 U	8.7 U	
INDENO(1,2,3-CD)PYRENE	6.6 U	7.6 U	5.5 U	117	5.8 U	5.7 U	5.4 U	6.5 U	
NAPHTHALENE	44 U	51 U	37 U	36 U	71	200	180	150	
PHENANTHRENE	44 U	51 U	37 U	65.5	7.8 U	5.7 U	5.4 U	7.5 U	
PYRENE	105	137	5.5 U	359	11	51	7.3 U	8.7 U	
Inorganics (mg/kg)									
LEAD								6.8 J	333 J

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-605	CEF-015-SS-606	CEF-015-SS-607	CEF-015-SS-608	CEF-015-SS-608	CEF-015-SS-609	CEF-015-SS-610	CEF-015-SS-611	CEF-015-SS-612
SAMPLE NUMBER	CEF-15-SS-605	CEF-15-SS-606	CEF-15-SS-607	CEF-15-SS-608	CEF-15-SS-608-D	CEF-15-SS-609	CEF-15-SS-610	CEF-15-SS-611	CEF-15-SS-612
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/24/1999	6/24/1999	6/24/1999	6/24/1999	7/9/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE						35 U			36 U
2-METHYLNAPHTHALENE						35 U			59
ACENAPHTHENE						35 U			36 U
ACENAPHTHYLENE						71 U			74 U
ANTHRACENE						5.3 U			5.5 U
BENZO(A)ANTHRACENE						5.3 U			6.1
BENZO(A)PYRENE						5.3 U			8
BENZO(B)FLUORANTHENE						5.3 U			10
BENZO(G,H,I)PERYLENE						7.1 U			7.4
BENZO(K)FLUORANTHENE						5.3 U			5.5 U
CHRYSENE						5.3 U			5.5 U
DIBENZO(A,H)ANTHRACENE						8.7 U			9.1 U
FLUORANTHENE						7.1 U			10
FLUORENE						7.1 U			7.4 U
INDENO(1,2,3-CD)PYRENE						5.3 U			5.5 U
NAPHTHALENE						35 U			110
PHENANTHRENE						5.3 U			5.6
PYRENE						7.1 U			9.2
Inorganics (mg/kg)									
LEAD	5.2 J	2.9 U	349 J	25.4 J	112 J	3.8 J	1350 J	37.2 J	18.1 J

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-613	CEF-015-SS-614	CEF-015-SS-615	CEF-015-SS-616	CEF-015-SS-617	CEF-015-SS-618	CEF-015-SS-618	CEF-015-SS-619	CEF-015-SS-620
SAMPLE NUMBER	CEF-15-SS-613	CEF-15-SS-614	CEF-15-SS-615	CEF-15-SS-616	CEF-15-SS-617	CEF-15-SS-618	CEF-15-SS-618-D	CEF-15-SS-619	CEF-15-SS-620
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	ORIG
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE				150					
2-METHYLNAPHTHALENE				61					
ACENAPHTHENE				67					
ACENAPHTHYLENE				110					
ANTHRACENE				5.3 U					
BENZO(A)ANTHRACENE				11					
BENZO(A)PYRENE				12					
BENZO(B)FLUORANTHENE				12					
BENZO(G,H,I)PERYLENE				7.8					
BENZO(K)FLUORANTHENE				5.3 U					
CHRYSENE				5.3 U					
DIBENZO(A,H)ANTHRACENE				8.8 U					
FLUORANTHENE				22					
FLUORENE				7 U					
INDENO(1,2,3-CD)PYRENE				5.4					
NAPHTHALENE				190					
PHENANTHRENE				6.8					
PYRENE				16					
Inorganics (mg/kg)									
LEAD	1280 J	21.9 J	285 J	52.9 J	9710 J	272	402	109 J	234 J

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-620	CEF-015-SS-621	CEF-015-SS-622	CEF-015-SS-623	CEF-015-SS-624	CEF-015-SS-625	CEF-015-SS-626	CEF-015-SS-627	CEF-015-SS-628
SAMPLE NUMBER	CEF-15-SS-620-D	CEF-15-SS-621	CEF-15-SS-622	CEF-15-SS-623	CEF-15-SS-624	CEF-15-SS-625	CEF-15-SS-626	CEF-15-SS-627	CEF-15-SS-628
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	7/9/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/24/1999	6/25/1999
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE		37 U		35 U	530	150	130	35 U	43 U
2-METHYLNAPHTHALENE		37 U		35 U	37 U	37 U	49	35 U	110
ACENAPHTHENE		37 U		35 U	37 U	37 U	38	35 U	43 U
ACENAPHTHYLENE		74 U		71 U	220	74 U	110	70 U	86 U
ANTHRACENE		5.6 U		5.3 U	5.6 U	5.6 U	5.3 U	5.2 U	6.5 U
BENZO(A)ANTHRACENE		5.6 U		5.3 U	28	5.6 U	16	5.2 U	7.1
BENZO(A)PYRENE		5.6 U		5.3 U	12	6.6	21	5.2 U	9.9
BENZO(B)FLUORANTHENE		5.6 U		5.3 U	7.9	12	29	5.2 U	12
BENZO(G,H,I)PERYLENE		7.4 U		7.1 U	19	7.4 U	9.4	7 U	8.6 U
BENZO(K)FLUORANTHENE		5.6 U		5.3 U	5.6 U	5.6 U	9.9	5.2 U	6.5 U
CHRYSENE		5.6 U		5.3 U	5.6 U	5.6 U	5.3 U	5.2 U	6.5 U
DIBENZO(A,H)ANTHRACENE		9.2 U		8.8 U	9.2 U	9.2 U	8.8 U	8.7 U	11 U
FLUORANTHENE		7.4 U		7.1 U	33	9.7	31	7 U	11
FLUORENE		7.4 U		7.1 U	7.4 U	7.4 U	7.1 U	7 U	8.6 U
INDENO(1,2,3-CD)PYRENE		5.6 U		5.3 U	8.3	5.6 U	11	5.2 U	6.5 U
NAPHTHALENE		37 U		41	850	190	530	51	43 U
PHENANTHRENE		5.6 U		5.3 U	5.6 U	5.6 U	9.1	5.2 U	6.5 U
PYRENE		7.4 U		7.1 U	7.4 U	7.4 U	26	7 U	12
Inorganics (mg/kg)									
LEAD	103 J	90.3 J	47 J						

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-629	CEF-015-SS-630	CEF-015-SS-631	CEF-015-SS-631	CEF-015-SS-632	CEF-015-SS-633	CEF-015-SS-634	CEF-015-SS-635	CEF-015-SS-636
SAMPLE NUMBER	CEF-15-SS-629	CEF-15-SS-630	CEF-15-SS-631	CEF-15-SS-631-D	CEF-15-SS-632	CEF-15-SS-633	CEF-15-SS-634	CEF-15-SS-635	CEF-15-SS-636
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/25/1999	6/25/1999	6/25/1999	6/25/1999	6/25/1999	6/25/1999	6/25/1999	6/25/1999	6/25/1999
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	40 U	36 U	440 J	1400 J	41 U	140	37 U	38 U	36 U
2-METHYLNAPHTHALENE	43	36 U	40 UJ	1100 J	49	180	76	38 U	36 U
ACENAPHTHENE	40 U	36 U	180 J	41 UJ	41 U	43 U	37 U	38 U	36 U
ACENAPHTHYLENE	80 U	73 U	80 U	150	83 U	130	75 U	78 U	74 U
ANTHRACENE	6 U	5.5 U	7.2 J	28 J	6.2 U	6.5 U	5.6 U	5.8 U	5.5 U
BENZO(A)ANTHRACENE	6 U	5.5 U	6 U	7.3	7.2	13	5.6 U	5.8 U	5.5 U
BENZO(A)PYRENE	8.5	5.5 U	6 UJ	14 J	16	18	5.6 U	5.8 U	5.5 U
BENZO(B)FLUORANTHENE	9.1	5.5 U	21 J	78 J	19	84	5.6 U	5.8 U	5.5 U
BENZO(G,H,I)PERYLENE	8 U	7.3 U	8 U	8.4 U	10	12	7.5 U	7.8 U	7.4 U
BENZO(K)FLUORANTHENE	6 U	5.5 U	6 U	6.2 U	6.9	7.8	5.6 U	5.8 U	5.5 U
CHRYSENE	6 U	5.5 U	6 U	6.2 U	6.2 U	6.5 U	5.6 U	5.8 U	5.5 U
DIBENZO(A,H)ANTHRACENE	9.9 U	9.1 U	10 U	10 U	10 U	11 U	9.3 U	9.7 U	9.2 U
FLUORANTHENE	8 U	7.3 U	14 J	43 J	8.9	25	7.5 U	7.8 U	7.4 U
FLUORENE	8 U	7.3 U	8 U	8.4 U	8.3 U	8.8 U	7.5 U	7.8 U	7.4 U
INDENO(1,2,3-CD)PYRENE	6 U	5.5 U	6 U	6.2 U	6.4	6.5 U	5.6 U	5.8 U	5.5 U
NAPHTHALENE	40 U	150	320 J	1700 J	61	140	110	38 U	68
PHENANTHRENE	6 U	5.5 U	6 U	6.2 U	6.2 U	9.1	5.6 U	7.8 U	5.5 U
PYRENE	8.5	7.3 U	8 U	8.4 U	13	25	7.5 U	5.8 U	7.4 U
Inorganics (mg/kg)									
LEAD	5.8 J								

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-637	CEF-015-SS-638	CEF-015-SS-638	CEF-015-SS-639	CEF-015-SS-640	CEF-015-SS-641	CEF-015-SS-642	CEF-015-SS-642	CEF-015-SS-643
SAMPLE NUMBER	CEF-15-SS-637	CEF-15-SS-638	CEF-15-SS-638-D	CEF-15-SS-639	CEF-15-SS-640	CEF-15-SS-641	CEF-15-SS-642	CEF-15-SS-642-D	CEF-15-SS-643
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/25/1999	6/28/1999	6/28/1999	6/28/1999	6/28/1999	6/28/1999	6/28/1999	6/28/1999	6/25/1999
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	36 U	35 U	37 U	36 U	39 U	39 U	37 U	37 U	57
2-METHYLNAPHTHALENE	36 U	35 U	37 U	36 U	52	39 U	37 U	37 U	47
ACENAPHTHENE	36 U	35 U	37 U	36 U	39 U	39 U	37 U	37 U	57
ACENAPHTHYLENE	73 U	71 U	75 U	73 U	79 U	80 U	75 U	76 U	78 U
ANTHRACENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	6.8
BENZO(A)ANTHRACENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	30
BENZO(A)PYRENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	8.9	5.6 U	5.7 U	49
BENZO(B)FLUORANTHENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	19	5.6 U	5.7 U	57
BENZO(G,H,I)PERYLENE	7.3 U	7.1 U	7.5 U	7.3 U	7.9 U	8 U	7.5 U	7.6 U	34
BENZO(K)FLUORANTHENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	26
CHRYSENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	20
DIBENZO(A,H)ANTHRACENE	9.1 U	8.8 U	9.3 U	9 U	9.8 U	9.9 U	9.3 U	9.4 U	9.6 U
FLUORANTHENE	7.3 U	7.1 U	7.5 U	7.3 U	7.9 U	8 U	7.5 U	7.6 U	57
FLUORENE	7.3 U	7.1 U	7.5 U	7.3 U	7.9 U	8 U	7.5 U	7.6 U	7.8 U
INDENO(1,2,3-CD)PYRENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	26
NAPHTHALENE	36 U	35 U	37 U	36 U	45	39 U	54	37 U	86
PHENANTHRENE	5.5 U	5.3 U	5.6 U	5.4 U	5.9 U	6 U	5.6 U	5.7 U	15
PYRENE	7.3 U	7.1 U	7.5 U	7.3 U	7.9 U	8 U	7.5 U	7.6 U	44
Inorganics (mg/kg)									
LEAD									48.5 J

APPENDIX C-1.4

SUPPLEMENTAL SOIL ANALYTIC RESULTS (APRIL AND JUNE 1999)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-644
SAMPLE NUMBER	CEF-15-SS-644
DEPTH	0-1
SAMPLE DATE	6/25/1999
SAMPLE CODE	NORMAL
Semivolatile Organics (ug/kg)	
1-METHYLNAPHTHALENE	160
2-METHYLNAPHTHALENE	150
ACENAPHTHENE	230
ACENAPHTHYLENE	190
ANTHRACENE	20
BENZO(A)ANTHRACENE	64
BENZO(A)PYRENE	99
BENZO(B)FLUORANTHENE	140
BENZO(G,H,I)PERYLENE	64
BENZO(K)FLUORANTHENE	51
CHRYSENE	25
DIBENZO(A,H)ANTHRACENE	13 U
FLUORANTHENE	120
FLUORENE	10 U
INDENO(1,2,3-CD)PYRENE	44
NAPHTHALENE	410
PHENANTHRENE	30
PYRENE	120
Inorganics (mg/kg)	
LEAD	32.9 J

E-1.5: SUPPLEMENTAL SOIL ANALYTICAL RESULTS
(MAY 2003 - AUGUST 2003)

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-519	CEF-015-SS-531	CEF-015-SS-531	CEF-015-SS-533	CEF-015-SS-617	CEF-015-SS-809	CEF-015-SS-810	CEF-015-SS-811
SAMPLE NUMBER	CEF-15-SS-802-02	CEF-15-SS-803-02	CEF-15-SS-803-02-D	CEF-15-SS-804-02	CEF-15-SS-801-02	CEF-15-SS-809-01	CEF-15-SS-810-01	CEF-15-SS-811-01
DEPTH	1-2	1-2	1-2	1-2	1-2	0-1	0-1	0-1
SAMPLE DATE	5/22/2003	5/22/2003	5/23/2003	5/22/2003	5/22/2003	5/23/2003	5/23/2003	5/23/2003
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)								
1-METHYLNAPHTHALENE								
2-METHYLNAPHTHALENE								
ACENAPHTHENE								
ACENAPHTHYLENE								
ANTHRACENE								
BENZO(A)ANTHRACENE								
BENZO(A)PYRENE								
BENZO(B)FLUORANTHENE								
BENZO(G,H,I)PERYLENE								
BENZO(K)FLUORANTHENE								
CHRYSENE								
DIBENZO(A,H)ANTHRACENE								
FLUORANTHENE								
FLUORENE								
INDENO(1,2,3-CD)PYRENE								
NAPHTHALENE								
PHENANTHRENE								
PYRENE								
Petroleum Hydrocarbons (mg/kg)								
TOTAL PETROLEUM HYDROCARBONS								
Inorganics (mg/kg)								
ARSENIC								
LEAD	3.4	2.3	3.4	0.37 U	50.1	4730	3.1	798
Miscellaneous Parameters (%)								
PERCENT SOLIDS	83	90.7	83.2	88.6	82.6	87.8	85.3	85.9

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-812	CEF-015-SS-813	CEF-015-SS-813	CEF-015-SS-814	CEF-015-SS-815	CEF-015-SS-816	CEF-015-SS-817	CEF-015-SS-818
SAMPLE NUMBER	CEF-15-SS-812-01	CEF-15-SS-813-01	CEF-15-SS-813-01-D	CEF-15-SS-814-01	CEF-15-SS-815-01	CEF-15-SS-816-01	CEF-15-SS-817-01	CEF-15-SS-818-01
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)								
1-METHYLNAPHTHALENE								
2-METHYLNAPHTHALENE								
ACENAPHTHENE								
ACENAPHTHYLENE								
ANTHRACENE								
BENZO(A)ANTHRACENE								
BENZO(A)PYRENE								
BENZO(B)FLUORANTHENE								
BENZO(G,H,I)PERYLENE								
BENZO(K)FLUORANTHENE								
CHRYSENE								
DIBENZO(A,H)ANTHRACENE								
FLUORANTHENE								
FLUORENE								
INDENO(1,2,3-CD)PYRENE								
NAPHTHALENE								
PHENANTHRENE								
PYRENE								
Petroleum Hydrocarbons (mg/kg)								
TOTAL PETROLEUM HYDROCARBONS								
Inorganics (mg/kg)								
ARSENIC		1.6 U	3.3 U	0.4 U	0.79 U	1.4 U	1.1 U	1.9 U
LEAD	49							
Miscellaneous Parameters (%)								
PERCENT SOLIDS	89.2	74.2	69.9	66.7	71.4	70.9	64.2	68.6

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-819	CEF-015-SS-820	CEF-015-SS-821	CEF-015-SS-822	CEF-015-SS-823	CEF-015-SS-823	CEF-015-SS-901
SAMPLE NUMBER	CEF-15-SS-819-01	CEF-15-SS-820-01	CEF-15-SS-821-01	CEF-15-SS-822-01	CEF-15-SS-823-01	CEF-15-SS-823-01-D	CEF-15-SS-901-01
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003	5/23/2003	6/25/2003
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG
Semivolatile Organics (ug/kg)							
1-METHYLNAPHTHALENE							
2-METHYLNAPHTHALENE							
ACENAPHTHENE							
ACENAPHTHYLENE							
ANTHRACENE							
BENZO(A)ANTHRACENE							
BENZO(A)PYRENE							
BENZO(B)FLUORANTHENE							
BENZO(G,H,I)PERYLENE							
BENZO(K)FLUORANTHENE							
CHRYSENE							
DIBENZO(A,H)ANTHRACENE							
FLUORANTHENE							
FLUORENE							
INDENO(1,2,3-CD)PYRENE							
NAPHTHALENE							
PHENANTHRENE							
PYRENE							
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS							
Inorganics (mg/kg)							
ARSENIC	3 U	99.5	2.8 U	1.7 U	0.55 U	7.9 J	44.5 J
LEAD							
Miscellaneous Parameters (%)							
PERCENT SOLIDS	69.4	64.5	76.2	69.9	72.8	70.9	57.8

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-901	CEF-015-SS-902	CF15SS007 (Con)	CF15SS008 (Con)	CF15SS009 (Con)	CF15SS009 (Con)	CF15SS009 (Con)
SAMPLE NUMBER	CEF-15-SS-901-01-D	CEF-15-SS-902-01	CEF-15-SS-825-02	CEF-15-SS-826-02	CEF-15-SS-903-02	CEF-15-SS-827-02	CEF-015-SU-904-03
DEPTH	0-1	0-1	1-2	1-2	0-2	1-2	2-3
SAMPLE DATE	6/25/2003	6/25/2003	5/23/2003	5/23/2003	6/25/2003	5/23/2003	7/29/2003
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)							
1-METHYLNAPHTHALENE			97 U	98 U		96 U	
2-METHYLNAPHTHALENE			97 U	98 U		96 U	
ACENAPHTHENE			190 U	200 U		190 U	
ACENAPHTHYLENE			190 U	200 U		190 U	
ANTHRACENE			190 U	200 U		190 U	
BENZO(A)ANTHRACENE			97 U	98 U		96 U	
BENZO(A)PYRENE			65.3 J	78 U		19 U	
BENZO(B)FLUORANTHENE			42.1 J	20 U		19 U	
BENZO(G,H,I)PERYLENE			51.3 J	20 U		19 U	
BENZO(K)FLUORANTHENE			28.1 J	20 U		19 U	
CHRYSENE			97 U	98 U		96 U	
DIBENZO(A,H)ANTHRACENE			19 U	20 U		19 U	
FLUORANTHENE			97 U	98 U		96 U	
FLUORENE			190 U	200 U		190 U	
INDENO(1,2,3-CD)PYRENE			47.1 J	20 U		19 U	
NAPHTHALENE			97 U	98 U		96 U	
PHENANTHRENE			190 U	200 U		190 U	
PYRENE			97 U	98 U		96 U	
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS					2380		7 U
Inorganics (mg/kg)							
ARSENIC	19.8 J	9.1 J			0.51 U		
LEAD							
Miscellaneous Parameters (%)							
PERCENT SOLIDS	60	49.4	85	83.9	80.5	84.2	80.9

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS009 (Con)	CF15SS045	CF15SS067	CF15SS094	CF15SS115	CF15SS127	CF15SS141
SAMPLE NUMBER	CEF-015-SU-904-03-D	CEF-15-SS-830-02	CEF-15-SS-832-02	CEF-15-SS-805-02	CEF-15-SS-833-02	CEF-15-SS-835-02	CEF-15-SS-836-02
DEPTH	2-3	1-2	1-2	1-2	1-2	1-2	1-2
SAMPLE DATE	7/29/2003	5/22/2003	5/23/2003	5/23/2003	5/22/2003	5/22/2003	5/22/2003
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)							
1-METHYLNAPHTHALENE		88 U	97 U		97 U	93 U	95 U
2-METHYLNAPHTHALENE		88 U	97 U		97 U	93 U	95 U
ACENAPHTHENE		180 U	190 U		190 U	750 U	190 U
ACENAPHTHYLENE		180 U	190 U		190 U	190 U	190 U
ANTHRACENE		180 U	190 U		190 U	190 U	190 U
BENZO(A)ANTHRACENE		88 U	97 U		97 U	163 J	95 U
BENZO(A)PYRENE		18 U	123		19 U	195	19 U
BENZO(B)FLUORANTHENE		18 U	72.9 J		19 U	116	19 U
BENZO(G,H,I)PERYLENE		18 U	114		19 U	178	19 U
BENZO(K)FLUORANTHENE		18 U	49.9 J		19 U	73.4 J	19 U
CHRYSENE		88 U	97 U		97 U	173 J	95 U
DIBENZO(A,H)ANTHRACENE		18 U	19 U		19 U	21.6 J	19 U
FLUORANTHENE		88 U	126 J		97 U	278 J	95 U
FLUORENE		180 U	190 U		190 U	190 U	190 U
INDENO(1,2,3-CD)PYRENE		18 U	82.7		19 U	132	19 U
NAPHTHALENE		88 U	97 U		97 U	93 U	95 U
PHENANTHRENE		180 U	190 U		190 U	190 U	190 U
PYRENE		88 U	120 J		97 U	205 J	95 U
Petroleum Hydrocarbons (mg/kg)							
TOTAL PETROLEUM HYDROCARBONS	7.1 U						
Inorganics (mg/kg)							
ARSENIC							
LEAD				3.4			
Miscellaneous Parameters (%)							
PERCENT SOLIDS	78.3	92.8	83.8	84.2	85.2	87.4	86

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS213	CF15SS218	CF15SS235	CF15SS249	CF15SS262	CF15SS279	CF15SS279	CEF-015-SS-905
SAMPLE NUMBER	CEF-15-SS-807-02	CEF-15-SS-808-02	CEF-15-SS-834-02	CEF-15-SS-831-02	CEF-15-SS-828-02	CEF-15-SS-829-02	CEF-15-SS-829-02-D	CEF-15-SS-905-02
DEPTH	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
SAMPLE DATE	5/22/2003	5/22/2003	5/22/2003	5/22/2003	5/22/2003	5/22/2003	5/23/2003	8/25/2003
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)								
1-METHYLNAPHTHALENE			100 U	98 U	97 U	99 U	820 U	
2-METHYLNAPHTHALENE			100 U	98 U	97 U	99 U	820 U	
ACENAPHTHENE			200 U	200 U	190 U	200 U	820 U	
ACENAPHTHYLENE			200 U	200 U	190 U	200 U	200 U	
ANTHRACENE			200 U	200 U	190 U	200 U	200 U	
BENZO(A)ANTHRACENE			100 U	98 U	97 U	99 UJ	983 J	
BENZO(A)PYRENE			20 U	85.3	19 U	73.1 J	1450 J	
BENZO(B)FLUORANTHENE			20 U	53 J	19 U	45.3 J	849 J	
BENZO(G,H,I)PERYLENE			20 U	62.6 J	19 U	67.4 J	1320 J	
BENZO(K)FLUORANTHENE			20 U	20 U	19 U	20 UJ	553 J	
CHRYSENE			100 U	98 U	97 U	99 UJ	1050 J	
DIBENZO(A,H)ANTHRACENE			20 U	20 U	19 U	20 UJ	154 J	
FLUORANTHENE			100 U	98 U	97 U	99 UJ	1570 J	
FLUORENE			200 U	200 U	190 U	200 U	200 U	
INDENO(1,2,3-CD)PYRENE			20 U	60.3 J	19 U	50.9 J	965 J	
NAPHTHALENE			100 U	98 U	97 U	99 U	100 U	
PHENANTHRENE			200 U	200 U	190 U	200 UJ	416 J	
PYRENE			100 U	98 U	97 U	99 UJ	1420 J	
Petroleum Hydrocarbons (mg/kg)								
TOTAL PETROLEUM HYDROCARBONS								12 U
Inorganics (mg/kg)								
ARSENIC								
LEAD	4.3	1.7 U						
Miscellaneous Parameters (%)								
PERCENT SOLIDS	83	78.1	82.1	84.5	85	84.2	79.8	

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-906	CEF-015-SS-906	CEF-015-SS-907	CEF-015-SS-908
SAMPLE NUMBER	CEF-15-SS-906-02	CEF-15-SS-905-02-D	CEF-15-SS-907-02	CEF-15-SS-908-02
DEPTH	1-2	1-2	1-2	1-2
SAMPLE DATE	8/25/2003	8/25/2003	8/25/2003	8/25/2003
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL
Semivolatile Organics (ug/kg)				
1-METHYLNAPHTHALENE				
2-METHYLNAPHTHALENE				
ACENAPHTHENE				
ACENAPHTHYLENE				
ANTHRACENE				
BENZO(A)ANTHRACENE				
BENZO(A)PYRENE				
BENZO(B)FLUORANTHENE				
BENZO(G,H,I)PERYLENE				
BENZO(K)FLUORANTHENE				
CHRYSENE				
DIBENZO(A,H)ANTHRACENE				
FLUORANTHENE				
FLUORENE				
INDENO(1,2,3-CD)PYRENE				
NAPHTHALENE				
PHENANTHRENE				
PYRENE				
Petroleum Hydrocarbons (mg/kg)				
TOTAL PETROLEUM HYDROCARBONS	22.4	103	9.74 J	41.2
Inorganics (mg/kg)				
ARSENIC				
LEAD				
Miscellaneous Parameters (%)				
PERCENT SOLIDS				

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS001	CF15SS002	CF15SS003	CF15SS004	CF15SS005	CF15SS006
SAMPLE NUMBER	CF-15-SS001 [08/01/94]	CF-15-SS002 [08/01/94]	CF-15-SS003 [08/01/94]	CF-15-SS004 [08/01/94]	CF-15-SS005 [08/01/94]	CF-15-SS006 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	2900	200 U	200 U	200 U
BENZO(A)ANTHRACENE	520	530	6600	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	410	5300	3400	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	1100	1700	21000	13000	640	420
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	7100	1000	200 U	200 U
PYRENE	1500	2100	17000	10000	610	310
Inorganics (mg/kg)						
LEAD	19	22	129	234	823	502

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007	CF15SS008	CF15SS009	CF15SS010	CF15SS011	CF15SS012
SAMPLE NUMBER	CF-15-SS007 [08/01/94]	CF-15-SS008 [08/01/94]	CF-15-SS009 [08/01/94]	CF-15-SS010 [08/01/94]	CF-15-SS011 [08/01/94]	CF-15-SS012 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	230000	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	11000	410	240
BENZO(A)ANTHRACENE	50000	7500	69000	40000	890	1800
BENZO(A)PYRENE	200 U	5600	200 U	9300	870	2200
BENZO(B)FLUORANTHENE	400 U	6200	400 U	33000	850	2000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	9200	610	890
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	18000	520	1200
CHRYSENE	56000	200 U	70000	43000	200 U	1200
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	21000	400 U	960
FLUORANTHENE	130000	21000	200000	99000	3100	4200
FLUORENE	400 U	400 U	400 U	13000	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	14000	1200	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	38000	6000	60000	28000	200 U	1100
PYRENE	180000	16000	190000	110000	3200	4400
Inorganics (mg/kg)						
LEAD	226	0	102	167	297	1240

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS013	CF15SS013	CF15SS014	CF15SS015	CF15SS016	CF15SS017
SAMPLE NUMBER	CF-15-SS013 [08/01/94]	CF-15-SS013 [08/01/94]-D	CF-15-SS014 [08/01/94]	CF-15-SS015 [08/01/94]	CF-15-SS016 [08/01/94]	CF-15-SS017 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	4800	22000	280000	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	1600	25000	200 U
BENZO(A)ANTHRACENE	200 U	200 U	1200	4000	56000	48000
BENZO(A)PYRENE	200 U	200 U	200 U	4100	51000	34000
BENZO(B)FLUORANTHENE	400 U	400 U	1000	4200	48000	41000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	2100	400 U	29000
BENZO(K)FLUORANTHENE	200 U	200 U	410	1900	200 U	16000
CHRYSENE	200 U	200 U	970	4700	89000	13000
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	1200	400 U	19000
FLUORANTHENE	400 U	400 U	2900	14000	220000	130000
FLUORENE	400 U	400 U	460	2100	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	690	4600	88000	34000
PYRENE	200 U	200 U	3100	16000	230000	120000
Inorganics (mg/kg)						
LEAD	32		35	139	503	383

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS018	CF15SS019	CF15SS020	CF15SS021	CF15SS021	CF15SS022
SAMPLE NUMBER	CF-15-SS018 [08/01/94]	CF-15-SS019 [08/01/94]	CF-15-SS020 [08/01/94]	CF-15-SS021 [08/01/94]	CF-15-SS021 [08/01/94]-D	CF-15-SS022 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	190000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	740	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	2800	200 U	200 U	550	200 U	200 U
BENZO(A)PYRENE	2900	200 U	200 U	460	200 U	50000
BENZO(B)FLUORANTHENE	3000	400 U	400 U	820	400 U	44000
BENZO(G,H,I)PERYLENE	1500	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	1500	200 U	200 U	250	200 U	200 U
CHRYSENE	2900	200 U	200 U	450	200 U	97000
DIBENZO(A,H)ANTHRACENE	760	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	8700	400 U	400 U	1100	400 U	150000
FLUORENE	400 U	400 U	400 U	400 U	400 U	22000
INDENO(1,2,3-CD)PYRENE	1300	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	2500	200 U	200 U	310	200 U	45000
PYRENE	5100	200 U	200 U	1200	200 U	170000
Inorganics (mg/kg)						
LEAD	324	18	0	63		371

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS023	CF15SS024	CF15SS025	CF15SS026	CF15SS027	CF15SS028
SAMPLE NUMBER	CF-15-SS023 [08/01/94]	CF-15-SS024 [08/01/94]	CF-15-SS025 [08/01/94]	CF-15-SS026 [08/01/94]	CF-15-SS027 [08/01/94]	CF-15-SS028 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	6200	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	35000	200 U	350	200 U	200 U
BENZO(A)ANTHRACENE	25000	140000	200 U	560	200 U	200 U
BENZO(A)PYRENE	17000	17000	200 U	1900	200 U	4000
BENZO(B)FLUORANTHENE	400 U	51000	400 U	1500	400 U	4200
BENZO(G,H,I)PERYLENE	400 U	50000	400 U	1000	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	33000	200 U	780	200 U	2800
CHRYSENE	25000	120000	200 U	1800	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	15000	400 U	500	400 U	400 U
FLUORANTHENE	72000	380000	400 U	4400	480	12000
FLUORENE	400 U	400 U	400 U	570	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	47000	200 U	990	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	19000	120000	200 U	980	200 U	200 U
PYRENE	67000	280000	200 U	4200	390	14000
Inorganics (mg/kg)						
LEAD	388	607	0	82	27	328

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS029	CF15SS030	CF15SS031	CF15SS032	CF15SS033	CF15SS034
SAMPLE NUMBER	CF-15-SS029 [08/01/94]	CF-15-SS030 [08/01/94]	CF-15-SS031 [08/01/94]	CF-15-SS032 [08/01/94]	CF-15-SS033 [08/01/94]	CF-15-SS034 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	16000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	5600	200 U	200 U	880	200 U
BENZO(A)ANTHRACENE	260	19000	200 U	200 U	200 U	4500
BENZO(A)PYRENE	200 U	19000	200 U	200 U	200 U	2900
BENZO(B)FLUORANTHENE	400 U	18000	400 U	400 U	400 U	3300
BENZO(G,H,I)PERYLENE	400 U	13000	400 U	400 U	400 U	2100
BENZO(K)FLUORANTHENE	200 U	11000	200 U	200 U	200 U	1400
CHRYSENE	260	21000	200 U	200 U	200 U	4300
DIBENZO(A,H)ANTHRACENE	400 U	10000	400 U	400 U	400 U	1400
FLUORANTHENE	800	48000	400 U	400 U	670	11000
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	10000	200 U	200 U	200 U	1700
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	250	16000	200 U	200 U	200 U	3300
PYRENE	750	52000	200 U	200 U	200 U	8800
Inorganics (mg/kg)						
LEAD	561	387	0	0	571	80

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS034	CF15SS035	CF15SS036	CF15SS037	CF15SS038	CF15SS039
SAMPLE NUMBER	CF-15-SS034 [08/01/94]-D	CF-15-SS035 [08/01/94]	CF-15-SS036 [08/01/94]	CF-15-SS037 [08/01/94]	CF-15-SS038 [08/01/94]	CF-15-SS039 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	51000	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	2200	200 U	2200	200 U	200 U	200 U
BENZO(A)ANTHRACENE	8700	4000	9000	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	2600	6000	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	6700	2600	7800	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	7600	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	7400	200 U	3500	200 U	200 U	200 U
CHRYSENE	7700	4400	11000	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	6500	400 U	400 U	400 U
FLUORANTHENE	26000	13000	22000	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	5200	200 U	200 U	200 U	200 U
PYRENE	24000	13000	24000	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD		341	191	0	0	163

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS040	CF15SS041	CF15SS042	CF15SS043	CF15SS044	CF15SS045
SAMPLE NUMBER	CF-15-SS040 [08/01/94]	CF-15-SS041 [08/01/94]	CF-15-SS042 [08/01/94]	CF-15-SS043 [08/01/94]	CF-15-SS044 [08/01/94]	CF-15-SS045 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	12000	200 U	200 U	200 U
BENZO(A)ANTHRACENE	47000	6300	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	3400	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	3400	26000	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	1700	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	36000	4200	37000	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	100000	15000	97000	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	1800	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	4400	42000	200 U	200 U	200 U
PYRENE	110000	17000	100000	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	92	269	276	0	0	

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS046	CF15SS047	CF15SS047	CF15SS048	CF15SS049	CF15SS050
SAMPLE NUMBER	CF-15-SS046 [08/01/94]	CF-15-SS047 [08/01/94]	CF-15-SS047 [08/01/94]-D	CF-15-SS048 [08/01/94]	CF-15-SS049 [08/01/94]	CF-15-SS050 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	8200
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	34000	12000	540
BENZO(A)ANTHRACENE	200 U	4700	3500	200 U	200 U	1600
BENZO(A)PYRENE	200 U	2500	200 U	74000	35000	710
BENZO(B)FLUORANTHENE	400 U	400 U	2800	77000	37000	2200
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	25000	14000	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	42000	24000	1100
CHRYSENE	200 U	5000	3700	100000	200 U	2100
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	330
FLUORANTHENE	400 U	14000	9800	240000	120000	5500
FLUORENE	400 U	22000	400 U	400 U	18000	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	22000	17000	540
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	4100	3100	100000	39000	1200
PYRENE	200 U	16000	11000	250000	130000	5400
Inorganics (mg/kg)						
LEAD	29	60		850	334	60

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS050	CF15SS051	CF15SS052	CF15SS053	CF15SS054	CF15SS055
SAMPLE NUMBER	CF-15-SS050 [08/01/94]-D	CF-15-SS051 [08/01/94]	CF-15-SS052 [08/01/94]	CF-15-SS053 [08/01/94]	CF-15-SS054 [08/01/94]	CF-15-SS055 [08/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	14000	2000 U	2000 U	2000 U	410000	280000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	740	200 U	4200	200 U	26000	21000
BENZO(A)ANTHRACENE	2000	200 U	12000	27000	110000	71000
BENZO(A)PYRENE	780	25000	13000	200 U	17000	47000
BENZO(B)FLUORANTHENE	2600	25000	15000	21000	75000	61000
BENZO(G,H,I)PERYLENE	1200	400 U	4000	400 U	34000	28000
BENZO(K)FLUORANTHENE	1000	14000	8900	200 U	26000	24000
CHRYSENE	2700	39000	19000	25000	82000	200 U
DIBENZO(A,H)ANTHRACENE	720	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	6000	81000	34000	70000	290000	210000
FLUORENE	1200	400 U	7000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	1100	200 U	6900	200 U	24000	26000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	1900	24000	13000	15000	93000	77000
PYRENE	5800	97000	29000	69000	270000	190000
Inorganics (mg/kg)						
LEAD		244	434	169	579	425

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS056	CF15SS057	CF15SS058	CF15SS059	CF15SS060	CF15SS060	CF15SS060
SAMPLE NUMBER	CF-15-SS056 [08/01/94]	CF-15-SS057 [08/01/94]	CF-15-SS058 [08/01/94]	CF-15-SS059 [08/01/94]	CF15SS060	CF-15-SS060 [08/01/94]	CF-15-SS060 [08/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	5/6/1997	8/1/1994	8/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)							
ACENAPHTHENE	2000 U	2000 U	2000 U	140000		2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U		4000 U	4000 U
ANTHRACENE	25000	22000	2600	200 U		37000	200 U
BENZO(A)ANTHRACENE	61000	70000	7100	200 U		120000	15000
BENZO(A)PYRENE	200 U	37000	8400	200 U		200 U	4800
BENZO(B)FLUORANTHENE	14000	12000	8700	29000		16000	22000
BENZO(G,H,I)PERYLENE	41000	34000	2900	400 U		17000	12000
BENZO(K)FLUORANTHENE	68000	17000	4500	12000		80000	8800
CHRYSENE	200 U	200 U	11000	38000		200 U	200 U
DIBENZO(A,H)ANTHRACENE	46000	30000	400 U	400 U		48000	400 U
FLUORANTHENE	38000	130000	22000	100000		250000	50000
FLUORENE	400 U	400 U	5000	400 U		400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	3400	200 U		200 U	10000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U		2000 U	2000 U
PHENANTHRENE	67000	26000	7200	200 U		53000	14000
PYRENE	150000	73000	26000	100000		140000	44000
Inorganics (mg/kg)							
LEAD	739	275	293	431	824		

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS061	CF15SS062	CF15SS063	CF15SS064	CF15SS064	CF15SS065
SAMPLE NUMBER	CF-15-SS061 [08/01/94]	CF-15-SS062 [08/01/94]	CF-15-SS063 [08/01/94]	CF-15-SS064 [08/01/94]	CF-15-SS064 [08/01/94]-D	CF-15-SS065 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	8/1/1994	8/1/1994	8/1/1994	8/1/1994	8/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	4800	2000 U	2000 U	8500
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	18000	770	4200	6400	560
BENZO(A)ANTHRACENE	21000	66000	200 U	200 U	200 U	2400
BENZO(A)PYRENE	200 U	200 U	1400	24000	26000	2400
BENZO(B)FLUORANTHENE	16000	400 U	1700	22000	28000	3000
BENZO(G,H,I)PERYLENE	400 U	38000	600	14000	7200	400 U
BENZO(K)FLUORANTHENE	200 U	47000	760	11000	11000	1600
CHRYSENE	23000	200 U	200 U	200 U	200 U	2900
DIBENZO(A,H)ANTHRACENE	400 U	400 U	820	400 U	400 U	1800
FLUORANTHENE	52000	120000	2300	60000	74000	6300
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	12000	6800	1400
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	13000	22000	590	17000	22000	1200
PYRENE	56000	66000	2900	36000	40000	7100
Inorganics (mg/kg)						
LEAD	265	314	13	778		46

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS065	CF15SS066	CF15SS067	CF15SS068	CF15SS069	CF15SS070
SAMPLE NUMBER	CF-15-SS065 [09/01/94]-D	CF-15-SS066 [09/01/94]	CF-15-SS067 [09/01/94]	CF-15-SS068 [09/01/94]	CF-15-SS069 [09/01/94]	CF-15-SS070 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	13000	2000 U	2000 U	2500	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	27000	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	20000	530	300	200 U
BENZO(A)PYRENE	4000	200 U	60000	400	200 U	200 U
BENZO(B)FLUORANTHENE	6300	400 U	43000	650	400 U	400 U
BENZO(G,H,I)PERYLENE	15000	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	2200	200 U	52000	280	200 U	200 U
CHRYSENE	200 U	200 U	200 U	730	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	26000	400 U	400 U	400 U
FLUORANTHENE	9000	400 U	170000	1800	750	400 U
FLUORENE	400 U	400 U	31000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	1700	200 U	29000	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	1400	200 U	57000	300	200 U	200 U
PYRENE	9200	200 U	140000	2100	980	200 U
Inorganics (mg/kg)						
LEAD		47	138	1510	2530	126

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS071	CF15SS072	CF15SS073	CF15SS074	CF15SS075	CF15SS076
SAMPLE NUMBER	CF-15-SS071 [09/01/94]	CF-15-SS072 [09/01/94]	CF-15-SS073 [09/01/94]	CF-15-SS074 [09/01/94]	CF-15-SS075 [09/01/94]	CF-15-SS076 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	41000	163000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	2900	11000
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	2000	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	10000	24000
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	12000	27000
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	7300	16000
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	8900	14000
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	21000	83000
FLUORENE	400 U	400 U	400 U	400 U	4100	14000
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	3400	10000
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2700	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	7000	29000
PYRENE	200 U	200 U	200 U	200 U	28000	66000
Inorganics (mg/kg)						
LEAD	2860	2880	295	0	275	243

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS077	CF15SS078	CF15SS079	CF15SS080	CF15SS081	CF15SS082
SAMPLE NUMBER	CF-15-SS077 [09/01/94]	CF-15-SS078 [09/01/94]	CF-15-SS079 [09/01/94]	CF-15-SS080 [09/01/94]	CF-15-SS081 [09/01/94]	CF-15-SS082 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	3600	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	570	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	1300	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	1700	400 U	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	1100	200 U	200 U	200 U	200 U
CHRYSENE	1000	2000	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	2500	3000	400 U	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	560	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	400	710	200 U	200 U	200 U	200 U
PYRENE	2000	4300	200 U	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	472	24	4440	1400	1030	5470

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS083	CF15SS084	CF15SS084	CF15SS085	CF15SS086	CF15SS087
SAMPLE NUMBER	CF-15-SS083 [09/01/94]	CF-15-SS084 [09/01/94]	CF-15-SS084 [09/01/94]-D	CF-15-SS085 [09/01/94]	CF-15-SS086 [09/01/94]	CF-15-SS087 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	200 U	200 U
PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
Inorganics (mg/kg)						
LEAD	2680	3380		1630	3410	348

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS088	CF15SS089	CF15SS090	CF15SS091	CF15SS092	CF15SS093
SAMPLE NUMBER	CF-15-SS088 [09/01/94]	CF-15-SS089 [09/01/94]	CF-15-SS090 [09/01/94]	CF-15-SS091 [09/01/94]	CF-15-SS092 [09/01/94]	CF-15-SS093 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	14000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	650
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	510	1100
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	1100
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	880	1600
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	400 U	2100	4500
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	630	1500
PYRENE	200 U	200 U	200 U	200 U	2400	5300
Inorganics (mg/kg)						
LEAD	3180	155	773	1710	2450	3150

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS094	CF15SS094	CF15SS095	CF15SS096	CF15SS097	CF15SS098
SAMPLE NUMBER	CF-15-SS094 [09/01/94]	CF-15-SS094 [09/01/94]-D	CF-15-SS095 [09/01/94]	CF-15-SS096 [09/01/94]	CF-15-SS097 [09/01/94]	CF-15-SS098 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	6700	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	510	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	1100	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	1000	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	1200	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	640	200 U	200 U	200 U
CHRYSENE	200 U	700	1600	350	200 U	580
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	320
FLUORANTHENE	400 U	400 U	4000	610	400 U	1300
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	1700	200 U	200 U	360
PYRENE	200 U	200 U	4200	500	200 U	1700
Inorganics (mg/kg)						
LEAD	30115		3620	3600	1430	1240

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS099	CF15SS100	CF15SS101	CF15SS102	CF15SS103	CF15SS104
SAMPLE NUMBER	CF-15-SS099 [09/01/94]	CF-15-SS100 [09/01/94]	CF-15-SS101 [09/01/94]	CF-15-SS102 [09/01/94]	CF-15-SS103 [09/01/94]	CF-15-SS104 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	140000	11000	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	11000	800	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	910	200 U	200 U
BENZO(A)PYRENE	310	200 U	17000	2900	200 U	200 U
BENZO(B)FLUORANTHENE	400	400 U	21000	3300	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	8600	1300	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	13000	1900	200 U	200 U
CHRYSENE	500	200 U	200 U	3600	660	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	7100	400 U	400 U	400 U
FLUORANTHENE	9800	400 U	72000	4300	840	400 U
FLUORENE	400 U	400 U	12000	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	7400	1200	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	2400	200 U	36000	2200	630	200 U
PYRENE	800	200 U	200 U	2200	630	200 U
Inorganics (mg/kg)						
LEAD	855	1830	20	88	2170	42

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS104	CF15SS105	CF15SS106	CF15SS107	CF15SS108	CF15SS109
SAMPLE NUMBER	CF-15-SS104 [09/01/94]-D	CF-15-SS105 [09/01/94]	CF-15-SS106 [09/01/94]	CF-15-SS107 [09/01/94]	CF-15-SS108 [09/01/94]	CF-15-SS109 [09/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	10000	15000	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	770	990	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	2200	560	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	2500	2400	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	3000	2900	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	1300	1300	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	1700	1700	200 U
CHRYSENE	200 U	200 U	200 U	3400	3400	980
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	1300	400 U
FLUORANTHENE	400 U	400 U	450	6100	6600	1900
FLUORENE	400 U	400 U	400 U	950	1300	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	1200	1100	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	2000	2800	200 U
PYRENE	200 U	200 U	1000	2000	1900	200 U
Inorganics (mg/kg)						
LEAD		57	78	73	84	246

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS110	CF15SS111	CF15SS112	CF15SS113	CF15SS114	CF15SS114
SAMPLE NUMBER	CF-15-SS110 [09/01/94]	CF-15-SS111 [09/01/94]	CF-15-SS112 [09/01/94]	CF-15-SS113 [09/01/94]	CF-15-SS114 [09/01/94]	CF-15-SS114 [09/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994	9/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2300	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	3800	4000	820
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	400 U	910
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	2600	200 U	500
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	400 U	5700	9200	2200
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	200 U	200 U	500
PYRENE	200 U	200 U	200 U	8700	200 U	3200
Inorganics (mg/kg)						
LEAD	50	0	0	23	0	

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS115	CF15SS116	CF15SS117	CF15SS118	CF15SS119	CF15SS120
SAMPLE NUMBER	CF-15-SS115 [09/01/94]	CF-15-SS116 [10/01/94]	CF-15-SS117 [10/01/94]	CF-15-SS118 [10/01/94]	CF-15-SS119 [10/01/94]	CF-15-SS120 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	9/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	230000	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	14000	200 U	200 U	200 U	460	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	31000	200 U	200 U	200 U	1200	200 U
BENZO(B)FLUORANTHENE	36000	400 U	400 U	400 U	1300	400 U
BENZO(G,H,I)PERYLENE	15000	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	20000	200 U	200 U	200 U	650	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	200 U
DIBENZO(A,H)ANTHRACENE	17000	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	93000	400 U	400 U	400 U	3700	400 U
FLUORENE	19000	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	14000	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	38000	200 U	200 U	200 U	1100	200 U
PYRENE	33000	200 U	200 U	200 U	2900	200 U
Inorganics (mg/kg)						
LEAD	28	83	17	321	70	131

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS121	CF15SS122	CF15SS123	CF15SS124	CF15SS125	CF15SS125
SAMPLE NUMBER	CF-15-SS121 [10/01/94]	CF-15-SS122 [10/01/94]	CF-15-SS123 [10/01/94]	CF-15-SS124 [10/01/94]	CF-15-SS125 [10/01/94]	CF-15-SS125 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	4800	200 U	620	800	200 U	1300
BENZO(A)ANTHRACENE	200 U	550	1900	2100	200 U	1800
BENZO(A)PYRENE	200 U	200 U	2700	3200	200 U	4200
BENZO(B)FLUORANTHENE	400 U	400 U	2200	4000	400 U	5000
BENZO(G,H,I)PERYLENE	14000	400 U	1700	2200	400 U	2300
BENZO(K)FLUORANTHENE	13000	200 U	1300	2300	200 U	3100
CHRYSENE	200 U	200 U	2800	3700	200 U	5400
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	49000	400 U	5400	7100	2200	10000
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	1600	2000	200 U	2200
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	14000	200 U	1300	2000	610	2800
PYRENE	39000	200 U	3800	5400	1700	6500
Inorganics (mg/kg)						
LEAD	464	88	63	80	61	

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS126	CF15SS127	CF15SS128	CF15SS129	CF15SS130	CF15SS131
SAMPLE NUMBER	CF-15-SS126 [10/01/94]	CF-15-SS127 [10/01/94]	CF-15-SS128 [10/01/94]	CF-15-SS129 [10/01/94]	CF-15-SS130 [10/01/94]	CF-15-SS131 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	15000	12000	200 U	430	1100	200 U
BENZO(A)ANTHRACENE	43000	27000	200 U	1200	3600	200 U
BENZO(A)PYRENE	200 U	36000	200 U	1700	5000	200 U
BENZO(B)FLUORANTHENE	55000	400 U	400 U	1700	5200	400 U
BENZO(G,H,I)PERYLENE	33000	18000	400 U	1000	400 U	400 U
BENZO(K)FLUORANTHENE	53000	22000	200 U	860	2800	200 U
CHRYSENE	72000	51000	200 U	1800	5700	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	140000	110000	400 U	3900	9400	400 U
FLUORENE	25000	18000	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	33000	16000	200 U	1000	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	120000	33000	200 U	910	2700	200 U
PYRENE	380000	84000	200 U	3100	13000	200 U
Inorganics (mg/kg)						
LEAD	238	19	0	66	26	226

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS132	CF15SS133	CF15SS134	CF15SS135	CF15SS135	CF15SS136
SAMPLE NUMBER	CF-15-SS132 [10/01/94]	CF-15-SS133 [10/01/94]	CF-15-SS134 [10/01/94]	CF-15-SS135 [10/01/94]	CF-15-SS135 [10/01/94]-D	CF-15-SS136 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	500	200 U	200 U
BENZO(A)ANTHRACENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
BENZO(B)FLUORANTHENE	400 U	400 U	26000	400 U	400 U	400 U
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	400 U	400 U
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	730	200 U	200 U
CHRYSENE	200 U	200 U	200 U	200 U	200 U	540
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	400 U	400 U
FLUORANTHENE	400 U	400 U	28000	2600	400 U	1800
FLUORENE	400 U	400 U	400 U	400 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	200 U	200 U
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	1800	200 U	1200
PYRENE	200 U	200 U	31000	2700	200 U	1100
Inorganics (mg/kg)						
LEAD	2570	23	0	42		6630

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS137	CF15SS138	CF15SS139	CF15SS140	CF15SS141	CF15SS141
SAMPLE NUMBER	CF-15-SS137 [10/01/94]	CF-15-SS138 [10/01/94]	CF-15-SS139 [10/01/94]	CF-15-SS140 [10/01/94]	CF-15-SS141 [10/01/94]	CF-15-SS141 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE	2000 U	2000 U	2000 U	2000 U	340000	12000
ACENAPHTHYLENE	4000 U	4000 U	4000 U	4000 U	4000 U	4000 U
ANTHRACENE	200 U	200 U	200 U	560	61000	1600
BENZO(A)ANTHRACENE	200 U	200 U	200 U	970	120000	3400
BENZO(A)PYRENE	200 U	200 U	200 U	200 U	65000	8700
BENZO(B)FLUORANTHENE	400 U	400 U	400 U	400 U	140000	5700
BENZO(G,H,I)PERYLENE	400 U	400 U	400 U	400 U	29000	2700
BENZO(K)FLUORANTHENE	200 U	200 U	200 U	200 U	46000	3900
CHRYSENE	200 U	200 U	200 U	1100	200 U	200 U
DIBENZO(A,H)ANTHRACENE	400 U	400 U	400 U	400 U	68000	3000
FLUORANTHENE	400 U	400 U	400 U	3600	420000	9700
FLUORENE	400 U	400 U	400 U	400 U	58000	400 U
INDENO(1,2,3-CD)PYRENE	200 U	200 U	200 U	200 U	40000	2300
NAPHTHALENE	2000 U	2000 U	2000 U	2000 U	2000 U	2000 U
PHENANTHRENE	200 U	200 U	200 U	2300	160000	2700
PYRENE	200 U	200 U	200 U	3500	84000	15000
Inorganics (mg/kg)						
LEAD	129	14	48	0	206	

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS142	CF15SS143	CF15SS144	CF15SS145	CF15SS146	CF15SS147
SAMPLE NUMBER	CF-15-SS142 [10/01/94]	CF-15-SS143 [10/01/94]	CF-15-SS144 [10/01/94]	CF-15-SS145 [10/01/94]	CF-15-SS146 [10/01/94]	CF-15-SS147 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	1790	3720	1440	3940	64.1	13.6

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS148	CF15SS149	CF15SS150	CF15SS151	CF15SS152	CF15SS153
SAMPLE NUMBER	CF-15-SS148 [10/01/94]	CF-15-SS149 [10/01/94]	CF-15-SS150 [10/01/94]	CF-15-SS151 [10/01/94]	CF-15-SS152 [10/01/94]	CF-15-SS153 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	12.2	8.5	4.8	2620	1140	3240

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS154	CF15SS155	CF15SS156	CF15SS157	CF15SS158	CF15SS159
SAMPLE NUMBER	CF-15-SS154 [10/01/94]	CF-15-SS155 [10/01/94]	CF-15-SS156 [10/01/94]	CF-15-SS157 [10/01/94]	CF-15-SS158 [10/01/94]	CF-15-SS159 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	554	178	79	12.9	3.3 U	4.1

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS160	CF15SS161	CF15SS161	CF15SS162	CF15SS163	CF15SS164
SAMPLE NUMBER	CF-15-SS160 [10/01/94]	CF-15-SS161 [10/01/94]	CF-15-SS161 [10/01/94]-D	CF-15-SS162 [10/01/94]	CF-15-SS163 [10/01/94]	CF-15-SS164 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	208	31	145	7	7.9	3.6

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS165	CF15SS166	CF15SS167	CF15SS168	CF15SS169	CF15SS170
SAMPLE NUMBER	CF-15-SS165 [10/01/94]	CF-15-SS166 [10/01/94]	CF-15-SS167 [10/01/94]	CF-15-SS168 [10/01/94]	CF-15-SS169 [10/01/94]	CF-15-SS170 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2110	211	25.5	32.7	12.3	538

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS171	CF15SS171	CF15SS172	CF15SS173	CF15SS174	CF15SS175
SAMPLE NUMBER	CF-15-SS171 [10/01/94]	CF-15-SS171 [10/01/94]-D	CF-15-SS172 [10/01/94]	CF-15-SS173 [10/01/94]	CF-15-SS174 [10/01/94]	CF-15-SS175 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	1600	2100	9.8	13.5	5.2	3630

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS176	CF15SS177	CF15SS178	CF15SS179	CF15SS180	CF15SS181
SAMPLE NUMBER	CF-15-SS176 [10/01/94]	CF-15-SS177 [10/01/94]	CF-15-SS178 [10/01/94]	CF-15-SS179 [10/01/94]	CF-15-SS180 [10/01/94]	CF-15-SS181 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	4070	43.2	10.6	3.1 U	5320	4190

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS181	CF15SS182	CF15SS183	CF15SS184	CF15SS185	CF15SS186
SAMPLE NUMBER	CF-15-SS181 [10/01/94]-D	CF-15-SS182 [10/01/94]	CF-15-SS183 [10/01/94]	CF-15-SS184 [10/01/94]	CF-15-SS185 [10/01/94]	CF-15-SS186 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	4240	77.3	80	2.9	419	3410

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS187	CF15SS188	CF15SS189	CF15SS190	CF15SS191	CF15SS191
SAMPLE NUMBER	CF-15-SS187 [10/01/94]	CF-15-SS188 [10/01/94]	CF-15-SS189 [10/01/94]	CF-15-SS190 [10/01/94]	CF-15-SS191 [10/01/94]	CF-15-SS191 [10/01/94]-D
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2630	34.2	9.6	1000	388	45.5

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS192	CF15SS193	CF15SS194	CF15SS195	CF15SS196	CF15SS197
SAMPLE NUMBER	CF-15-SS192 [10/01/94]	CF-15-SS193 [10/01/94]	CF-15-SS194 [10/01/94]	CF-15-SS195 [10/01/94]	CF-15-SS196 [10/01/94]	CF-15-SS197 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	769	17.3	3 U	522	3280	1300

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS198	CF15SS199	CF15SS200	CF15SS201	CF15SS201	CF15SS202
SAMPLE NUMBER	CF-15-SS198 [10/01/94]	CF-15-SS199 [10/01/94]	CF-15-SS200 [10/01/94]	CF-15-SS201 [10/01/94]	CF-15-SS201 [10/01/94]-D	CF-15-SS202 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	2.8 U	4.4	186	2540	2850	5250

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS203	CF15SS204	CF15SS205	CF15SS206	CF15SS207	CF15SS208
SAMPLE NUMBER	CF-15-SS203 [10/01/94]	CF-15-SS204 [10/01/94]	CF-15-SS205 [10/01/94]	CF-15-SS206 [10/01/94]	CF-15-SS207 [10/01/94]	CF-15-SS208 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
CHRYSENE						
DIBENZO(A,H)ANTHRACENE						
FLUORANTHENE						
FLUORENE						
INDENO(1,2,3-CD)PYRENE						
NAPHTHALENE						
PHENANTHRENE						
PYRENE						
Inorganics (mg/kg)						
LEAD	75.3	2.8 U	1390	117	2990	23.9

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS209	CF15SS210	CF15SS211	CF15SS211	CF15SS212	CF15SS213
SAMPLE NUMBER	CF-15-SS209 [10/01/94]	CF-15-SS210 [10/01/94]	CF-15-SS211 [10/01/94]	CF-15-SS211 [10/01/94]-D	CF-15-SS212 [10/01/94]	CF-15-SS213 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE		210 U	210 U			
ACENAPHTHYLENE		210 U	210 U			
ANTHRACENE		210 U	210 U			
BENZO(A)ANTHRACENE		210 U	210 U			
BENZO(A)PYRENE		210 U	210 U			
BENZO(B)FLUORANTHENE		210 U	210 U			
BENZO(G,H,I)PERYLENE		210 U	210 U			
BENZO(K)FLUORANTHENE		210 U	210 U			
CHRYSENE		210 U	210 U			
DIBENZO(A,H)ANTHRACENE		210 U	210 U			
FLUORANTHENE		210 U	210 U			
FLUORENE		210 U	210 U			
INDENO(1,2,3-CD)PYRENE		210 U	210 U			
NAPHTHALENE		210 U	210 U			
PHENANTHRENE		210 U	210 U			
PYRENE		210 U	210 U			
Inorganics (mg/kg)						
LEAD	4	3470	2310	3270	2260	25000

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SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS214	CF15SS215	CF15SS216	CF15SS217	CF15SS218	CF15SS219
SAMPLE NUMBER	CF-15-SS214 [10/01/94]	CF-15-SS215 [10/01/94]	CF-15-SS216 [10/01/94]	CF-15-SS217 [10/01/94]	CF-15-SS218 [10/01/94]	CF-15-SS219 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE				240 U		
ACENAPHTHYLENE				240 U		
ANTHRACENE				240 U		
BENZO(A)ANTHRACENE				240 U		
BENZO(A)PYRENE				240 U		
BENZO(B)FLUORANTHENE				240 U		
BENZO(G,H,I)PERYLENE				240 U		
BENZO(K)FLUORANTHENE				240 U		
CHRYSENE				240 U		
DIBENZO(A,H)ANTHRACENE				240 U		
FLUORANTHENE				240 U		
FLUORENE				240 U		
INDENO(1,2,3-CD)PYRENE				240 U		
NAPHTHALENE				240 U		
PHENANTHRENE				240 U		
PYRENE				240 U		
Inorganics (mg/kg)						
LEAD	254	43.8	6.1	488	65500	1900

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS220	CF15SS221	CF15SS221	CF15SS222	CF15SS223	CF15SS224
SAMPLE NUMBER	CF-15-SS220 [10/01/94]	CF-15-SS221 [10/01/94]	CF-15-SS221 [10/01/94]-D	CF-15-SS222 [10/01/94]	CF-15-SS223 [10/01/94]	CF-15-SS224 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	NORMAL	ORIG	DUP	NORMAL	NORMAL	ORIG
Semivolatile Organics (ug/kg)						
ACENAPHTHENE						220 U
ACENAPHTHYLENE						220 U
ANTHRACENE						220 U
BENZO(A)ANTHRACENE						690
BENZO(A)PYRENE						630
BENZO(B)FLUORANTHENE						890
BENZO(G,H,I)PERYLENE						390
BENZO(K)FLUORANTHENE						810
CHRYSENE						1100
DIBENZO(A,H)ANTHRACENE						220 U
FLUORANTHENE						1200
FLUORENE						220 U
INDENO(1,2,3-CD)PYRENE						220 U
NAPHTHALENE						220 U
PHENANTHRENE						340
PYRENE						1300
Inorganics (mg/kg)						
LEAD	1260	40	40	9.2	3.2	90.2

APPENDIX C-1.5

SUPPLEMENTAL SOIL ANALYTIC RESULTS (MAY AND AUGUST 2003)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS224	CF15SS225	CF15SS226	CF15SS227	CF15SS228	CF15SS229
SAMPLE NUMBER	CF-15-SS224 [10/01/94]-D	CF-15-SS225 [10/01/94]	CF-15-SS226 [10/01/94]	CF-15-SS227 [10/01/94]	CF-15-SS228 [10/01/94]	CF-15-SS229 [10/01/94]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	1/1/1995	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994
SAMPLE CODE	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)						
ACENAPHTHENE		200 U	210 U	9900 U	200 U	210 U
ACENAPHTHYLENE		200 U	210 U	9900 U	200 U	210 U
ANTHRACENE		200 U	210 U	9900 U	200 U	210 U
BENZO(A)ANTHRACENE		200 U	930	120000	240	280
BENZO(A)PYRENE		200 U	900	96000	200 U	210 U
BENZO(B)FLUORANTHENE		200 U	1400	120000	400	460
BENZO(G,H,I)PERYLENE		200 U	990	73000	200 U	210 U
BENZO(K)FLUORANTHENE		200 U	1300	9900 U	200 U	460
CHRYSENE		250	1400	140000	250	1100
DIBENZO(A,H)ANTHRACENE		200 U	210 U	11000	200 U	210 U
FLUORANTHENE		200 U	1800	170000	200 U	260
FLUORENE		200 U	210 U	9900 U	200 U	210 U
INDENO(1,2,3-CD)PYRENE		200 U	530	44000	200 U	210 U
NAPHTHALENE		200 U	210 U	9900 U	200 U	210 U
PHENANTHRENE		200 U	530	45000	200 U	210 U
PYRENE		200 U	1800	160000	200 U	290
Inorganics (mg/kg)						
LEAD	26.4		181		5.1	866

E-2: GROUNDWATER

LOCATION	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-02S	CEF-015-02S
NSAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-1S-01-D	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-DUP-01	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE DATE	04/01/98	04/18/00	04/19/00	05/22/00	08/10/95	08/10/95	08/10/95	08/30/06	08/14/95	08/14/95
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE					1 U		1 U		1 U	
1,1,2,2-TETRACHLOROETHANE					1 U		1 U		1 U	
1,1,2-TRICHLOROETHANE					1 U		1 U		1 U	
1,1-DICHLOROETHANE					1 U		1 U		1 U	
1,1-DICHLOROETHENE					1 U		1 U		1 U	
1,2-DIBROMOETHANE										
1,2-DICHLOROETHANE					1 U		1 U		1 U	
1,2-DICHLOROPROPANE					1 U		1 U		1 U	
2-BUTANONE					2 U		2 U		2 U	
2-CHLOROETHYL VINYL ETHER										
2-HEXANONE					2 U		2 U		2 U	
4-METHYL-2-PENTANONE					2 U		2 U		2 U	
ACETONE					2 U		98		2 U	
BENZENE					1 U		1 U		1 U	
BROMODICHLOROMETHANE					1 U		1 U		1 U	
BROMOFORM					1 U		1 U		1 U	
BROMOMETHANE					2 U		2 U		2 U	
CARBON DISULFIDE					1 U		1 U		1 U	
CARBON TETRACHLORIDE					1 U		1 U		1 U	
CHLOROBENZENE					1 U		1 U		1 U	
CHLORODIBROMOMETHANE					1 U		1 U		1 U	
CHLOROETHANE					2 U		2 U		2 U	
CHLOROFORM					1 U		1 U		1 U	
CHLOROMETHANE					2 U		2 U		2 U	
CIS-1,3-DICHLOROPROPENE					1 U		1 U		1 U	
DICHLORODIFLUOROMETHANE										
ETHYLBENZENE					1 U		1 U		1 U	
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE					1 U		2		1 U	
STYRENE					1 U		1 U		1 U	
TETRACHLOROETHENE					1 U		1 U		1 U	
TOLUENE					2 U		1 U		1 U	
TOTAL 1,2-DICHLOROETHENE					1 U		1 U		1 U	
TOTAL XYLENES					1 U		1 U		1 U	
TRANS-1,2-DICHLOROETHENE										
TRANS-1,3-DICHLOROPROPENE					1 U		1 U		1 U	
TRICHLOROETHENE					1 U		1 U		1 U	
TRICHLOROFLUOROMETHANE										
VINYL CHLORIDE					2 U		2 U		2 U	
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE					10 U				10 U	
1,2-DICHLOROBENZENE					10 U				10 U	
1,3,5-TRINITROBENZENE					0.20 U				0.20 U	
1,3-DICHLOROBENZENE					10 U				10 U	
1,3-DINITROBENZENE					0.20 U				0.20 U	

LOCATION	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-02S	CEF-015-02S
NSAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-1S-01-D	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-DUP-01	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE DATE	04/01/98	04/18/00	04/19/00	05/22/00	08/10/95	08/10/95	08/10/95	08/30/06	08/14/95	08/14/95
1,4-DICHLOROBENZENE					10 U				10 U	
1-METHYLNAPHTHALENE		2 U	2 U							
2,2'-OXYBIS(1-CHLOROPROPANE)					10 U				10 U	
2,4,5-TRICHLOROPHENOL					25 U				25 U	
2,4,6-TRICHLOROPHENOL					10 U				10 U	
2,4-DICHLOROPHENOL					10 U				10 U	
2,4-DIMETHYLPHENOL					10 U				10 U	
2,4-DINITROPHENOL					25 U				25 U	
2,4-DINITROTOLUENE					10 U				10 U	
2,6-DINITROTOLUENE					10 U				10 U	
2-CHLORONAPHTHALENE					10 U				10 U	
2-CHLOROPHENOL					10 U				10 U	
2-METHYLNAPHTHALENE		2 U	2 U		10 U				10 U	
2-METHYLPHENOL					10 U				10 U	
2-NITROANILINE					25 U				25 U	
2-NITROPHENOL					10 U				10 U	
3,3'-DICHLOROBENZIDINE					10 U				10 U	
3-NITROANILINE					25 U				25 U	
4,6-DINITRO-2-METHYLPHENOL					25 U				25 U	
4-BROMOPHENYL PHENYL ETHER					10 U				10 U	
4-CHLORO-3-METHYLPHENOL					10 U				10 U	
4-CHLOROANILINE					10 U				10 U	
4-CHLOROPHENYL PHENYL ETHER					10 U				10 U	
4-METHYLPHENOL					10 U				10 U	
4-NITROANILINE					25 U				25 U	
4-NITROPHENOL					25 U				25 U	
ACENAPHTHENE		2 U	2 U		10 U				10 U	
ACENAPHTHYLENE		2 U	2 U		10 U				10 U	
ANTHRACENE		2 U	2 U		10 U				10 U	
BAP EQUIVALENT		0.10	0.10		5				5	
BENZO(A)ANTHRACENE		0.20 U	0.20 U		10 U				10 U	
BENZO(A)PYRENE		0.20 U	0.20 U		10 U				10 U	
BENZO(B)FLUORANTHENE		0.20 U	0.20 U		10 U				10 U	
BENZO(G,H,I)PERYLENE		0.20 U	0.20 U		10 U				10 U	
BENZO(K)FLUORANTHENE		0.20 U	0.20 U		10 U				10 U	
BIS(2-CHLOROETHOXY)METHANE					10 U				10 U	
BIS(2-CHLOROETHYL)ETHER					10 U				10 U	
BIS(2-ETHYLHEXYL)PHTHALATE					1 J				10 U	
BUTYL BENZYL PHTHALATE					10 U				10 U	
CARBAZOLE					10 U				10 U	
CHRYSENE		0.20 U	0.20 U		10 U				10 U	
DI-N-BUTYL PHTHALATE					10 U				10 U	
DI-N-OCTYL PHTHALATE					10 U				10 U	
DIBENZO(A,H)ANTHRACENE		0.20 U	0.20 U		10 U				10 U	
DIBENZOFURAN					10 U				10 U	
DIETHYL PHTHALATE					10 U				10 U	

LOCATION	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-02S	CEF-015-02S
NSAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-1S-01-D	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-DUP-01	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE DATE	04/01/98	04/18/00	04/19/00	05/22/00	08/10/95	08/10/95	08/10/95	08/30/06	08/14/95	08/14/95
DIMETHYL PHTHALATE					10 U				10 U	
FLUORANTHENE		2 U	2 U		10 U				10 U	
FLUORENE		2 U	2 U		10 U				10 U	
HEXACHLOROBENZENE					10 U				10 U	
HEXACHLOROBUTADIENE					10 U				10 U	
HEXACHLOROCYCLOPENTADIENE					10 U				10 U	
HEXACHLOROETHANE					10 U				10 U	
INDENO(1,2,3-CD)PYRENE		0.20 U	0.20 U		10 U				10 U	
ISOPHORONE					10 U				10 U	
N-NITROSO-DI-N-PROPYLAMINE					10 U				10 U	
N-NITROSODIPHENYLAMINE					10 U				10 U	
NAPHTHALENE		2 U	2 U		10 U				10 U	
NITROBENZENE					10 U				10 U	
PENTACHLOROPHENOL					25 U				25 U	
PHENANTHRENE		2 U	2 U		10 U				10 U	
PHENOL					10 U				10 U	
PYRENE		2 U	2 U		10 U				10 U	
TOTAL PAHS					10 U				10 U	
Pesticides/PCBs (ug/L)										
4,4'-DDD					0.10 UJ				0.10 UJ	
4,4'-DDE					0.10 UJ				0.10 UJ	
4,4'-DDT					0.10 UJ				0.10 UJ	
ALDRIN					0.05 UJ				0.05 UJ	
ALPHA-BHC					0.05 UJ				0.05 UJ	
ALPHA-CHLORDANE					0.05 UJ				0.05 UJ	
AROCLOR-1016					1 UJ				1 UJ	
AROCLOR-1221					2 UJ				2 UJ	
AROCLOR-1232					1 UJ				1 UJ	
AROCLOR-1242					1 UJ				1 UJ	
AROCLOR-1248					1 UJ				1 UJ	
AROCLOR-1254					1 UJ				1 UJ	
AROCLOR-1260					1 UJ				1 UJ	
BETA-BHC					0.05 UJ				0.05 UJ	
DELTA-BHC					0.05 UJ				0.05 UJ	
DIELDRIN					0.10 UJ				0.10 UJ	
ENDOSULFAN I					0.05 UJ				0.05 UJ	
ENDOSULFAN II					0.10 UJ				0.10 UJ	
ENDOSULFAN SULFATE					0.10 UJ				0.10 UJ	
ENDRIN					0.10 UJ				0.10 UJ	
ENDRIN ALDEHYDE					0.10 UJ				0.10 UJ	
ENDRIN KETONE					0.10 UJ				0.10 UJ	
GAMMA-BHC (LINDANE)					0.05 UJ				0.05 UJ	
GAMMA-CHLORDANE					0.05 UJ				0.05 UJ	
HEPTACHLOR					0.05 UJ				0.05 UJ	
HEPTACHLOR EPOXIDE					0.05 UJ				0.05 UJ	
METHOXYCHLOR					0.50 UJ				0.50 UJ	

LOCATION	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-02S	CEF-015-02S
NSAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-1S-01-D	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-DUP-01	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE DATE	04/01/98	04/18/00	04/19/00	05/22/00	08/10/95	08/10/95	08/10/95	08/30/06	08/14/95	08/14/95
TOXAPHENE					5 UJ				5 UJ	
Explosives (ug/L)										
1,3,5-TRINITROBENZENE										
1,3-DINITROBENZENE										
2,4,6-TRINITROTOLUENE		3.9 U	3.9 U		0.20 U				0.20 U	
2,4-DINITROTOLUENE										
2,6-DINITROTOLUENE										
2-AMINO-4,6-DINITROTOLUENE										
2-NITROTOLUENE					0.40 UJ				0.40 UJ	
3-NITROTOLUENE		3.9 U	3.9 U		3.39				1.87	
4-AMINO-2,6-DINITROTOLUENE					0.20 U				0.20 U	
4-NITROTOLUENE		3.9 U	3.9 U		0.40 U				0.40 U	
HMX					0.40 U				0.40 U	
NITROBENZENE										
RDX					0.451			0.072 U	0.40 U	
TETRYL					0.20 U				0.20 U	
Petroleum Hydrocarbons (mg/L)										
TOTAL PETROLEUM HYDROCARBONS					0.50 U				0.50 U	
Radiochemistry (pci/L)										
AMERICIUM-241	0.01									
PLUTONIUM-238	0.01									
PLUTONIUM-241	-0.60									
TOTAL PLUTONIUM	0.00									
TOTAL URANIUM-233+234	0.10									
TRITIUM	-0.03									
URANIUM	0.00									
URANIUM-235	0.00									
Total Inorganics (ug/L)										
ALUMINUM					448				205	
ANTIMONY		2.4 U	2.4 U		2 U				2 U	
ARSENIC		3.4 U	3.4 U		4 U				4 U	
BARIUM					28.3				15	
BERYLLIUM					1 U				1 U	
CADMIUM					1 U				1 U	
CALCIUM					1850 U				5620	
CHROMIUM					1 U				1 U	
COBALT					1 U				1 U	
COPPER					3 U				4.7	
IRON					2670				3140	
LEAD		19.8	21.7	9 U	2 U				2 U	
MAGNESIUM					1270				1500	
MANGANESE					30				49.6	
MERCURY					0.20 U	0.20 UJ			0.20 U	0.20 UJ
NICKEL					12 U				17.5	
POTASSIUM					461 U				260 U	
SELENIUM					4 U				4 U	

LOCATION	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-01S	CEF-015-02S	CEF-015-02S
NSAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-1S-01-D	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE	CEF-15-1S	CEF-15-GW-1S-01	CEF-15-GW-DUP-01	CEF-15-GW-1S-02	CF15MW1S	CF15MW1S-R	CF15MW1ST	CEF-015-GW-01S-06	CF15MW2S	CF15MW2S-R
SAMPLE DATE	04/01/98	04/18/00	04/19/00	05/22/00	08/10/95	08/10/95	08/10/95	08/30/06	08/14/95	08/14/95
SILVER					1 U				1 U	
SODIUM					6800 J				4310 U	
THALLIUM					5 U				6.1 J	
VANADIUM					1 U				1 U	
ZINC					32.5 U				246	
Filtered Inorganics (ug/L)										
ALUMINUM					385					
ANTIMONY		2.4 U	2.4 U		8.1					
ARSENIC		3.4 U	3.4 U		4 U					
BARIUM					32.2					
BERYLLIUM					1 U					
CADMIUM					1 U					
CALCIUM					1750 U					
CHROMIUM					1 U					
COBALT					1.8					
COPPER					3 U					
IRON					2410					
LEAD		1.6 U	1.6 U	1.6 U	2 U					
MAGNESIUM					1230					
MANGANESE					29.1					
MERCURY					0.20 U	0.20 UJ				
NICKEL					12 U					
POTASSIUM					443 U					
SELENIUM					4 U					
SILVER					1 U					
SODIUM					6820 J					
THALLIUM					5.4 J					
VANADIUM					1.5					
ZINC					17.8 U					
Miscellaneous Parameters										
CYANIDE (UG/L)					3 UJ				3.8 J	
PERCHLORATE (UG/L)										
TOTAL ORGANIC CARBON (MG/L)										
Field Parameters										
DISSOLVED OXYGEN - METER (MG/L)										
OXIDATION REDUCTION POTENTIAL (MV)										
PH										
SPECIFIC CONDUCTANCE (MS/CM)										
TEMPERATURE (C)										
TURBIDITY (NTU)		501	501							

LOCATION	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-04S	CEF-015-04S
NSAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE DATE	04/18/00	07/16/03	02/17/05	04/04/97	04/18/00	08/17/95	08/17/95	08/17/95	08/21/95	04/17/00
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE				1 U		1 U		1 U	1 U	
1,1,2,2-TETRACHLOROETHANE				1 U		1 U		1 U	1 U	
1,1,2-TRICHLOROETHANE				1 U		1 U		1 U	1 U	
1,1-DICHLOROETHANE				1 U		1 U		1 U	1 U	
1,1-DICHLOROETHENE				1 U		1 U		1 U	1 U	
1,2-DIBROMOETHANE				0.02 U						
1,2-DICHLOROETHANE				1 U		1 U		1 U	1 U	
1,2-DICHLOROPROPANE				1 U		1 U		1 U	1 U	
2-BUTANONE						2 U		2 U	2 U	
2-CHLOROETHYL VINYL ETHER				0.00 U						
2-HEXANONE						2 U		2 U	2 U	
4-METHYL-2-PENTANONE						2 U		2 U	2 U	
ACETONE						7 U		30	2 U	
BENZENE				1 U		1 U		1 U	1 U	
BROMODICHLOROMETHANE				1 U		1 U		1 U	1 U	
BROMOFORM				1 U		1 U		1 U	1 U	
BROMOMETHANE				1 U		2 U		2 U	2 U	
CARBON DISULFIDE						1 U		1 U	1 U	
CARBON TETRACHLORIDE				1 U		1 U		1 U	1 U	
CHLOROBENZENE				1 U		1 U		1 U	1 U	
CHLORODIBROMOMETHANE				1 U		1 U		1 U	1 U	
CHLOROETHANE				1 U		2 U		2 U	2 U	
CHLOROFORM				2.4		1 U		1 U	1 U	
CHLOROMETHANE				1 U		2 U		2 U	2 U	
CIS-1,3-DICHLOROPROPENE				1 U		1 U		1 U	1 U	
DICHLORODIFLUOROMETHANE				1 U						
ETHYLBENZENE				1 U		1 U		1 U	1 U	
METHYL TERT-BUTYL ETHER				1 U						
METHYLENE CHLORIDE				1 U		1 U		1 U	1 U	
STYRENE						1 U		1 U	1 U	
TETRACHLOROETHENE				1 U		1 U		1 U	1 U	
TOLUENE				1 U		1 U		1 U	1 U	
TOTAL 1,2-DICHLOROETHENE						1 U		1 U	1 U	
TOTAL XYLENES				1 U		1 U		1 U	1 U	
TRANS-1,2-DICHLOROETHENE				1 U						
TRANS-1,3-DICHLOROPROPENE				1 U		1 U		1 U	1 U	
TRICHLOROETHENE				1 U		1 U		1 U	1 U	
TRICHLOROFLUOROMETHANE				1 U						
VINYL CHLORIDE				1 U		2 U		2 U	2 U	
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE						10 U	40 U		10 U	
1,2-DICHLOROBENZENE				1 U		10 U	40 U		10 U	
1,3,5-TRINITROBENZENE						0.20 U			0.20 U	
1,3-DICHLOROBENZENE				1 U		10 U	40 U		10 U	
1,3-DINITROBENZENE						0.20 U			0.20 U	

LOCATION	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-04S	CEF-015-04S
NSAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE DATE	04/18/00	07/16/03	02/17/05	04/04/97	04/18/00	08/17/95	08/17/95	08/17/95	08/21/95	04/17/00
1,4-DICHLOROBENZENE				1 U		10 U	40 U		10 U	
1-METHYLNAPHTHALENE	2.2 U	0.27 U		2 U	2.2 U					2.2 U
2,2'-OXYBIS(1-CHLOROPROPANE)						10 U	40 U		10 U	
2,4,5-TRICHLOROPHENOL						25 U	100 U		25 U	
2,4,6-TRICHLOROPHENOL						10 U	40 U		10 U	
2,4-DICHLOROPHENOL						10 U	40 U		10 U	
2,4-DIMETHYLPHENOL						10 U	40 U		10 U	
2,4-DINITROPHENOL						25 U	100 U		25 U	
2,4-DINITROTOLUENE						10 U	40 U		10 U	
2,6-DINITROTOLUENE						10 U	40 U		10 U	
2-CHLORONAPHTHALENE						10 U	40 U		10 U	
2-CHLOROPHENOL						10 U	40 U		10 U	
2-METHYLNAPHTHALENE	2.2 U	0.27 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
2-METHYLPHENOL						10 U	40 U		10 U	
2-NITROANILINE						25 U	100 U		25 U	
2-NITROPHENOL						10 U	40 U		10 U	
3,3'-DICHLOROBENZIDINE						10 U	40 U		10 U	
3-NITROANILINE						25 U	100 U		25 U	
4,6-DINITRO-2-METHYLPHENOL						25 U	100 U		25 U	
4-BROMOPHENYL PHENYL ETHER						10 U	40 U		10 U	
4-CHLORO-3-METHYLPHENOL						10 U	40 U		10 U	
4-CHLOROANILINE						10 U	40 U		10 U	
4-CHLOROPHENYL PHENYL ETHER						10 U	40 U		10 U	
4-METHYLPHENOL						10 U	40 U		10 U	
4-NITROANILINE						25 U	100 U		25 U	
4-NITROPHENOL						25 U	100 U		25 U	
ACENAPHTHENE	2.2 U	0.53 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
ACENAPHTHYLENE	2.2 U	0.53 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
ANTHRACENE	2.2 U	0.27 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
BAP EQUIVALENT	0.11	0.055		0.05	0.11	5	20		5	0.11
BENZO(A)ANTHRACENE	0.22 U	0.11 U		0.10 U	0.22 U	10 U	40 U		10 U	0.22 U
BENZO(A)PYRENE	0.22 U	0.11 U		0.10 U	0.22 U	10 U	40 U		10 U	0.22 U
BENZO(B)FLUORANTHENE	0.22 U	0.11 U		0.10 U	0.22 U	10 U	40 U		10 U	0.22 U
BENZO(G,H,I)PERYLENE	0.22 U	0.11 U		0.20 U	0.22 U	10 U	40 U		10 U	0.22 U
BENZO(K)FLUORANTHENE	0.22 U	0.11 U		0.15 U	0.22 U	10 U	40 U		10 U	0.22 U
BIS(2-CHLOROETHOXY)METHANE						10 U	40 U		10 U	
BIS(2-CHLOROETHYL)ETHER						10 U	40 U		10 U	
BIS(2-ETHYLHEXYL)PHTHALATE						220 J	240		14	
BUTYL BENZYL PHTHALATE						10 U	40 U		10 U	
CARBAZOLE						10 U	40 U		10 U	
CHRYSENE	0.22 U	0.11 U		0.10 U	0.22 U	10 U	40 U		10 U	0.22 U
DI-N-BUTYL PHTHALATE						10 U	40 U		10 U	
DI-N-OCTYL PHTHALATE						10 U	40 U		10 U	
DIBENZO(A,H)ANTHRACENE	0.22 U	0.11 U		0.20 U	0.22 U	10 U	40 U		10 U	0.22 U
DIBENZOFURAN						10 U	40 U		10 U	
DIETHYL PHTHALATE						10 U	40 U		10 U	

LOCATION	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-04S	CEF-015-04S
NSAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE DATE	04/18/00	07/16/03	02/17/05	04/04/97	04/18/00	08/17/95	08/17/95	08/17/95	08/21/95	04/17/00
DIMETHYL PHTHALATE						10 U	40 U		10 U	
FLUORANTHENE	2.2 U	0.27 U		0.20 U	2.2 U	10 U	40 U		10 U	2.2 U
FLUORENE	2.2 U	0.27 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
HEXACHLOROBENZENE						10 U	40 U		10 U	
HEXACHLOROBUTADIENE						10 U	40 U		10 U	
HEXACHLOROCYCLOPENTADIENE						10 U	40 U		10 U	
HEXACHLOROETHANE						10 U	40 U		10 U	
INDENO(1,2,3-CD)PYRENE	0.22 U	0.11 U		0.10 U	0.22 U	10 U	40 U		10 U	0.22 U
ISOPHORONE						10 U	40 U		10 U	
N-NITROSO-DI-N-PROPYLAMINE						10 U	40 U		10 U	
N-NITROSODIPHENYLAMINE						10 U	40 U		10 U	
NAPHTHALENE	2.2 U	0.27 U		2 U	2.2 U	0.50 J	40 U		10 U	2.2 U
NITROBENZENE						10 U	40 U		10 U	
PENTACHLOROPHENOL						25 U	100 U		25 U	
PHENANTHRENE	2.2 U	0.27 U		2 U	2.2 U	10 U	40 U		10 U	2.2 U
PHENOL						10 U	40 U		10 U	
PYRENE	2.2 U	0.27 U		0.20 U	2.2 U	10 U	40 U		10 U	2.2 U
TOTAL PAHS				0.10 U		70.5	40 U		10 U	
Pesticides/PCBs (ug/L)										
4,4'-DDD						0.10 U			0.10 U	
4,4'-DDE						0.10 U			0.10 U	
4,4'-DDT						0.10 U			0.10 U	
ALDRIN						0.05 U			0.05 U	
ALPHA-BHC						0.05 U			0.05 U	
ALPHA-CHLORDANE						0.05 U			0.05 U	
AROCLOR-1016						1 U			1 U	
AROCLOR-1221						2 U			2 U	
AROCLOR-1232						1 U			1 U	
AROCLOR-1242						1 U			1 U	
AROCLOR-1248						1 U			1 U	
AROCLOR-1254						1 U			1 U	
AROCLOR-1260						1 U			1 U	
BETA-BHC						0.05 U			0.05 U	
DELTA-BHC						0.05 U			0.05 U	
DIELDRIN						0.10 U			0.10 U	
ENDOSULFAN I						0.05 U			0.05 U	
ENDOSULFAN II						0.10 U			0.10 U	
ENDOSULFAN SULFATE						0.10 U			0.10 U	
ENDRIN						0.10 U			0.10 U	
ENDRIN ALDEHYDE						0.10 U			0.10 U	
ENDRIN KETONE						0.10 U			0.017 R	
GAMMA-BHC (LINDANE)						0.05 U			0.05 U	
GAMMA-CHLORDANE						0.05 U			0.05 U	
HEPTACHLOR						0.05 U			0.05 U	
HEPTACHLOR EPOXIDE						0.05 U			0.05 U	
METHOXYCHLOR						0.50 U			0.50 U	

LOCATION	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-04S	CEF-015-04S
NSAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE DATE	04/18/00	07/16/03	02/17/05	04/04/97	04/18/00	08/17/95	08/17/95	08/17/95	08/21/95	04/17/00
TOXAPHENE						5 U			5 U	
Explosives (ug/L)										
1,3,5-TRINITROBENZENE										
1,3-DINITROBENZENE										
2,4,6-TRINITROTOLUENE	5 U				5 U	0.20 U			0.20 U	5.2 U
2,4-DINITROTOLUENE										
2,6-DINITROTOLUENE										
2-AMINO-4,6-DINITROTOLUENE										
2-NITROTOLUENE						0.40 U			0.40 U	
3-NITROTOLUENE	5 U				5 U	3.29			2.11	5.2 U
4-AMINO-2,6-DINITROTOLUENE						0.20 U			0.20 U	
4-NITROTOLUENE	5 U				5 U	0.40 U			0.40 U	5.2 U
HMX						0.40 U			0.40 U	
NITROBENZENE										
RDX						0.40 U			0.40 U	
TETRYL						0.20 U			0.20 U	
Petroleum Hydrocarbons (mg/L)										
TOTAL PETROLEUM HYDROCARBONS				0.50 U		0.50 U			0.50 U	
Radiochemistry (pci/L)										
AMERICIUM-241										
PLUTONIUM-238										
PLUTONIUM-241										
TOTAL PLUTONIUM										
TOTAL URANIUM-233+234										
TRITIUM										
URANIUM										
URANIUM-235										
Total Inorganics (ug/L)										
ALUMINUM						635			500	
ANTIMONY	2.4 U				2.9 U	2 U			2 U	2.4 U
ARSENIC	3.4 U				3.4 U	4 U			4 U	3.4 U
BARIUM						17.3			26.9	
BERYLLIUM						1 U			1 U	
CADMIUM						1 U			1 U	
CALCIUM						2260 U			2570 U	
CHROMIUM						1 U			1 U	
COBALT						1 U			1.4 J	
COPPER						5.5			7.7	
IRON						1510			2200	
LEAD	1.6 U			5 U	2.1 U	2 U			2 U	1.6 U
MAGNESIUM						948			1260	
MANGANESE						16.1			17.8	
MERCURY						0.20 U			0.20 U	
NICKEL						12 U			12 U	
POTASSIUM						2010			262 U	
SELENIUM						4 U			4 U	

LOCATION	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-02S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-03S	CEF-015-04S	CEF-015-04S
NSAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE	CEF-15-GW-2S-01	CEF-015-GW-02S-02	CEF-015-GW-02S-03	CEF15-2S	CEF-15-GW-3S-01	CF15MW3S	CF15MW3SDL	CF15MW3ST	CF15MW4S	CEF-15-GW-4S-01
SAMPLE DATE	04/18/00	07/16/03	02/17/05	04/04/97	04/18/00	08/17/95	08/17/95	08/17/95	08/21/95	04/17/00
SILVER						1 U			1 U	
SODIUM						6810 J			3390 U	
THALLIUM						5 U			5 U	
VANADIUM						1 U			1 U	
ZINC						96			92	
Filtered Inorganics (ug/L)										
ALUMINUM						162				
ANTIMONY	2.9 U				2.4 U	4 J				2.4 U
ARSENIC	3.4 U				3.4 U	4 U				3.4 U
BARIUM						17				
BERYLLIUM						1 U				
CADMIUM						1 U				
CALCIUM						2340 U				
CHROMIUM						1 U				
COBALT						1 U				
COPPER						3 U				
IRON						1420				
LEAD	1.6 U				1.6 U	2 U				1.6 U
MAGNESIUM						927				
MANGANESE						17.4				
MERCURY						0.20 U				
NICKEL						12 U				
POTASSIUM						2040				
SELENIUM						4 U				
SILVER						1 U				
SODIUM						7030 J				
THALLIUM						5 U				
VANADIUM						1 U				
ZINC						109				
Miscellaneous Parameters										
CYANIDE (UG/L)						3 UJ			3 UJ	
PERCHLORATE (UG/L)			0.50 U							
TOTAL ORGANIC CARBON (MG/L)										
Field Parameters										
DISSOLVED OXYGEN - METER (MG/L)		0.19								
OXIDATION REDUCTION POTENTIAL (MV)		-93.90								
PH		5.87								
SPECIFIC CONDUCTANCE (MS/CM)		0.174								
TEMPERATURE (C)		22.61								
TURBIDITY (NTU)	4 U	0.00			52 U					10 U

LOCATION	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S
NSAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE DATE	04/17/00	08/21/95	08/21/95	08/21/95	08/30/06	08/15/95	08/15/95	08/15/95	08/15/95	04/18/00
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
1,1,2,2-TETRACHLOROETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
1,1,2-TRICHLOROETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
1,1-DICHLOROETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
1,1-DICHLOROETHENE		1 U	1 U	1 U		1 U		1 U	1 U	
1,2-DIBROMOETHANE										
1,2-DICHLOROETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
1,2-DICHLOROPROPANE		1 U	1 U	1 U		1 U		1 U	1 U	
2-BUTANONE		2 U	2 U	2 U		2 U		2 U	2 U	
2-CHLOROETHYL VINYL ETHER										
2-HEXANONE		2 U	2 U	2 U		2 U		2 U	2 U	
4-METHYL-2-PENTANONE		2 U	2 U	2 U		2 U		2 U	2 U	
ACETONE		2 U	2 U	46		2 U		2 U	46	
BENZENE		1 U	1 U	1 U		1 U		1 U	1 U	
BROMODICHLOROMETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
BROMOFORM		1 U	1 U	1 U		1 U		1 U	1 U	
BROMOMETHANE		2 U	2 U	2 U		2 U		2 U	2 U	
CARBON DISULFIDE		1 U	1 U	1 U		1 U		1 U	1 U	
CARBON TETRACHLORIDE		1 U	1 U	1 U		1 U		1 U	1 U	
CHLOROBENZENE		1 U	1 U	1 U		1 U		1 U	1 U	
CHLORODIBROMOMETHANE		1 U	1 U	1 U		1 U		1 U	1 U	
CHLOROETHANE		2 U	2 U	2 U		2 U		2 U	2 U	
CHLOROFORM		1 U	1 U	1 U		1 U		1 U	1 U	
CHLOROMETHANE		2 U	2 U	2 U		2 U		2 U	2 U	
CIS-1,3-DICHLOROPROPENE		1 U	1 U	1 U		1 U		1 U	1 U	
DICHLORODIFLUOROMETHANE										
ETHYLBENZENE		1 U	1 U	1 U		1 U		1 U	1 U	
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE		1 U	1 U	1		1 U		1	1	
STYRENE		1 U	1 U	1 U		1 U		1 U	1 U	
TETRACHLOROETHENE		1 U	1 U	1 U		1 U		1 U	1 U	
TOLUENE		1 U	1 U	1 U		1 U		1 U	1 U	
TOTAL 1,2-DICHLOROETHENE		1 U	1 U	1 U		1 U		1 U	1 U	
TOTAL XYLENES		1 U	1 U	1 U		1 U		1 U	1 U	
TRANS-1,2-DICHLOROETHENE										
TRANS-1,3-DICHLOROPROPENE		1 U	1 U	1 U		1 U		1 U	1 U	
TRICHLOROETHENE		1 U	1 U	1 U		1 U		1 U	1 U	
TRICHLOROFLUOROMETHANE										
VINYL CHLORIDE		2 U	2 U	2 U		2 U		2 U	2 U	
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE		10 U	10 U			10 U		10 U		
1,2-DICHLOROBENZENE		10 U	10 U			10 U		10 U		
1,3,5-TRINITROBENZENE		0.20 U	0.20 U			0.20 U		0.20 U		
1,3-DICHLOROBENZENE		10 U	10 U			10 U		10 U		
1,3-DINITROBENZENE		0.20 U	0.20 U			0.20 U		0.20 U		

LOCATION	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S
NSAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE DATE	04/17/00	08/21/95	08/21/95	08/21/95	08/30/06	08/15/95	08/15/95	08/15/95	08/15/95	04/18/00
1,4-DICHLOROBENZENE		10 U	10 U			10 U		10 U		
1-METHYLNAPHTHALENE	2 U									2.2 U
2,2'-OXYBIS(1-CHLOROPROPANE)		10 U	10 U			10 U		10 U		
2,4,5-TRICHLOROPHENOL		25 U	25 U			25 U		25 U		
2,4,6-TRICHLOROPHENOL		10 U	10 U			10 U		10 U		
2,4-DICHLOROPHENOL		10 U	10 U			10 U		10 U		
2,4-DIMETHYLPHENOL		10 U	10 U			10 U		10 U		
2,4-DINITROPHENOL		25 U	25 U			25 U		25 U		
2,4-DINITROTOLUENE		10 U	10 U			10 U		10 U		
2,6-DINITROTOLUENE		10 U	10 U			10 U		10 U		
2-CHLORONAPHTHALENE		10 U	10 U			10 U		10 U		
2-CHLOROPHENOL		10 U	10 U			10 U		10 U		
2-METHYLNAPHTHALENE	2 U	10 U	10 U			10 U		10 U		2.2 U
2-METHYLPHENOL		10 U	10 U			10 U		10 U		
2-NITROANILINE		25 U	25 U			25 U		25 U		
2-NITROPHENOL		10 U	10 U			10 U		10 U		
3,3'-DICHLOROBENZIDINE		10 U	10 U			10 U		10 U		
3-NITROANILINE		25 U	25 U			25 U		25 U		
4,6-DINITRO-2-METHYLPHENOL		25 U	25 U			25 U		25 U		
4-BROMOPHENYL PHENYL ETHER		10 U	10 U			10 U		10 U		
4-CHLORO-3-METHYLPHENOL		10 U	10 U			10 U		10 U		
4-CHLOROANILINE		10 U	10 U			10 U		10 U		
4-CHLOROPHENYL PHENYL ETHER		10 U	10 U			10 U		10 U		
4-METHYLPHENOL		10 U	10 U			10 U		10 U		
4-NITROANILINE		25 U	25 U			25 U		25 U		
4-NITROPHENOL		25 U	25 U			25 U		25 U		
ACENAPHTHENE	2 U	10 U	10 U			10 U		10 U		2.2 U
ACENAPHTHYLENE	2 U	10 U	10 U			10 U		10 U		2.2 U
ANTHRACENE	2 U	10 U	10 U			10 U		10 U		2.2 U
BAP EQUIVALENT	0.10	5	5			5		5		0.11
BENZO(A)ANTHRACENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
BENZO(A)PYRENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
BENZO(B)FLUORANTHENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
BENZO(G,H,I)PERYLENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
BENZO(K)FLUORANTHENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
BIS(2-CHLOROETHOXY)METHANE		10 U	10 U			10 U		10 U		
BIS(2-CHLOROETHYL)ETHER		10 U	10 U			10 U		10 U		
BIS(2-ETHYLHEXYL)PHTHALATE		2 J	14			10 U		10 U		
BUTYL BENZYL PHTHALATE		10 U	10 U			10 U		10 U		
CARBAZOLE		10 U	10 U			10 U		10 U		
CHRYSENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
DI-N-BUTYL PHTHALATE		10 U	10 U			10 U		10 U		
DI-N-OCTYL PHTHALATE		10 U	10 U			10 U		10 U		
DIBENZO(A,H)ANTHRACENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
DIBENZOFURAN		10 U	10 U			10 U		10 U		
DIETHYL PHTHALATE		10 U	10 U			10 U		10 U		

LOCATION	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S
NSAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE DATE	04/17/00	08/21/95	08/21/95	08/21/95	08/30/06	08/15/95	08/15/95	08/15/95	08/15/95	04/18/00
DIMETHYL PHTHALATE		10 U	10 U			10 U		10 U		
FLUORANTHENE	2 U	10 U	10 U			10 U		10 U		2.2 U
FLUORENE	2 U	10 U	10 U			10 U		10 U		2.2 U
HEXACHLOROBENZENE		10 U	10 U			10 U		10 U		
HEXACHLOROBUTADIENE		10 U	10 U			10 U		10 U		
HEXACHLOROCYCLOPENTADIENE		10 U	10 U			10 U		10 U		
HEXACHLOROETHANE		10 U	10 U			10 U		10 U		
INDENO(1,2,3-CD)PYRENE	0.20 U	10 U	10 U			10 U		10 U		0.22 U
ISOPHORONE		10 U	10 U			10 U		10 U		
N-NITROSO-DI-N-PROPYLAMINE		10 U	10 U			10 U		10 U		
N-NITROSODIPHENYLAMINE		10 U	10 U			10 U		10 U		
NAPHTHALENE	2 U	10 U	10 U			10 U		10 U		2.2 U
NITROBENZENE		10 U	10 U			10 U		10 U		
PENTACHLOROPHENOL		25 U	25 U			25 U		25 U		
PHENANTHRENE	2 U	10 U	10 U			10 U		10 U		2.2 U
PHENOL		10 U	10 U			10 U		10 U		
PYRENE	2 U	10 U	10 U			10 U		10 U		2.2 U
TOTAL PAHS		10 U	10 U			10 U		10 U		
Pesticides/PCBs (ug/L)										
4,4'-DDD		0.029 J	0.10 U			0.10 U		0.10 U		
4,4'-DDE		0.26	0.10 U		0.02 U	0.10 U		0.10 U		
4,4'-DDT		0.034 J	0.10 U			0.10 U		0.10 U		
ALDRIN		0.05 U	0.05 U			0.05 U		0.05 U		
ALPHA-BHC		0.05 U	0.05 U			0.05 U		0.05 U		
ALPHA-CHLORDANE		0.05 U	0.05 U			0.05 U		0.05 U		
AROCLOR-1016		1 U	1 U			1 U		1 U		
AROCLOR-1221		2 U	2 U			2 U		2 U		
AROCLOR-1232		1 U	1 U			1 U		1 U		
AROCLOR-1242		1 U	1 U			1 U		1 U		
AROCLOR-1248		1 U	1 U			1 U		1 U		
AROCLOR-1254		1 U	1 U			1 U		1 U		
AROCLOR-1260		1 U	1 U			1 U		1 U		
BETA-BHC		0.05 U	0.05 U			0.05 U		0.05 U		
DELTA-BHC		0.05 U	0.05 U			0.05 U		0.05 U		
DIELDRIN		0.10 U	0.10 U			0.10 U		0.10 U		
ENDOSULFAN I		0.05 U	0.05 U			0.05 U		0.05 U		
ENDOSULFAN II		0.10 U	0.10 U			0.10 U		0.10 U		
ENDOSULFAN SULFATE		0.10 U	0.10 U			0.10 U		0.10 U		
ENDRIN		0.10 U	0.10 U			0.10 U		0.10 U		
ENDRIN ALDEHYDE		0.10 U	0.10 U			0.10 U		0.10 U		
ENDRIN KETONE		0.10 U	0.10 U			0.10 U		0.10 U		
GAMMA-BHC (LINDANE)		0.05 U	0.05 U			0.05 U		0.05 U		
GAMMA-CHLORDANE		0.05 U	0.05 U			0.05 U		0.05 U		
HEPTACHLOR		0.05 U	0.05 U			0.05 U		0.05 U		
HEPTACHLOR EPOXIDE		0.05 U	0.05 U			0.05 U		0.05 U		
METHOXYCHLOR		0.50 U	0.50 U			0.50 U		0.50 U		

LOCATION	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S
NSAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE DATE	04/17/00	08/21/95	08/21/95	08/21/95	08/30/06	08/15/95	08/15/95	08/15/95	08/15/95	04/18/00
TOXAPHENE		5 U	5 U			5 U		5 U		
Explosives (ug/L)										
1,3,5-TRINITROBENZENE										
1,3-DINITROBENZENE										
2,4,6-TRINITROTOLUENE	5.2 U	0.20 U	0.20 U			0.20 U		0.20 U		5 U
2,4-DINITROTOLUENE										
2,6-DINITROTOLUENE										
2-AMINO-4,6-DINITROTOLUENE										
2-NITROTOLUENE		0.40 U	0.40 U			0.40 UJ		0.40 U		
3-NITROTOLUENE	5.2 U	2.62	2.06			1.89		0.40 U		5 U
4-AMINO-2,6-DINITROTOLUENE		0.20 U	0.20 U			0.20 U		0.20 U		
4-NITROTOLUENE	5.2 U	0.40 U	0.40 U			0.40 U		0.40 U		5 U
HMX		0.40 U	0.40 U			0.40 U		0.40 U		
NITROBENZENE										
RDX		0.404	0.40 U		0.073 U	0.40 U		0.40 U		
TETRYL		0.20 U	0.20 U			0.20 U		0.20 U		
Petroleum Hydrocarbons (mg/L)										
TOTAL PETROLEUM HYDROCARBONS		0.50 U	0.50 U			0.50 U		0.50 U		
Radiochemistry (pci/L)										
AMERICIUM-241										
PLUTONIUM-238										
PLUTONIUM-241										
TOTAL PLUTONIUM										
TOTAL URANIUM-233+234										
TRITIUM										
URANIUM										
URANIUM-235										
Total Inorganics (ug/L)										
ALUMINUM		419	570			364		70 U		
ANTIMONY	3.3 U	2 U	2 U			2 U		2 U		2.4 U
ARSENIC	3.9	4 U	4 U			4 U		4 U		3.4 U
BARIUM		14.3	14.3			17.9		1.2		
BERYLLIUM		1 U	1 U			1 U		1 U		
CADMIUM		1 U	1 U			1 U		1 U		
CALCIUM		936 U	829 U			3010 U		783		
CHROMIUM		1 U	1 U			1 U		1 U		
COBALT		1.7 J	1.9			1 U		1 U		
COPPER		9.3	5.5			6.4		3 U		
IRON		992	1010			832		14 U		
LEAD	1.6 U	2 U	2 U			2 U		2 U		1.6 U
MAGNESIUM		1050	1050			783		53		
MANGANESE		8.4	8.3			15.1		1 U		
MERCURY		0.20 U	0.20 U			0.20 U	0.20 UJ	0.20 U		
NICKEL		12 U	12 U			12 U		12 U		
POTASSIUM		163 U	139 U			117 U		92 U		
SELENIUM		4 U	4 U			4 U		4 U		

LOCATION	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-05S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S	CEF-015-06S
NSAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE	CEF-15-GW-5S-01	CF15MW5S	CF15MW5SD	CF15MW5ST	CEF-015-GW-05S-06	CF15MW6S	CF15MW6S-R	CF15MW6SR	CF15MW6ST	CEF-15-GW-6S-01
SAMPLE DATE	04/17/00	08/21/95	08/21/95	08/21/95	08/30/06	08/15/95	08/15/95	08/15/95	08/15/95	04/18/00
SILVER		1 U	1 U			1 U		1 U		
SODIUM		4880 U	4530 U			5510 J		987		
THALLIUM		5 U	5.6 J			5 U		5 U		
VANADIUM		1 U	1 U			1 U		1 U		
ZINC		26.6 U	19.2 U			25.1 U		7.6		
Filtered Inorganics (ug/L)										
ALUMINUM								70 U		
ANTIMONY	2.4 U							5.7		2.4 U
ARSENIC	3.4 U							4 U		3.4 U
BARIUM								4.9		
BERYLLIUM								1 U		
CADMIUM								1 U		
CALCIUM								701		
CHROMIUM								1 U		
COBALT								1 U		
COPPER								3 U		
IRON								14.4		
LEAD	1.6 U							2 U		1.6 U
MAGNESIUM								46.5		
MANGANESE								1 U		
MERCURY							0.20 U	0.20 U		
NICKEL								12 U		
POTASSIUM								92 U		
SELENIUM								4 U		
SILVER								1 U		
SODIUM								882		
THALLIUM								5 U		
VANADIUM								1 U		
ZINC								12.4		
Miscellaneous Parameters										
CYANIDE (UG/L)		3 UJ	3.3 J			3 UJ		4.4		
PERCHLORATE (UG/L)										
TOTAL ORGANIC CARBON (MG/L)		1	1					1 U		
Field Parameters										
DISSOLVED OXYGEN - METER (MG/L)										
OXIDATION REDUCTION POTENTIAL (MV)										
PH										
SPECIFIC CONDUCTANCE (MS/CM)										
TEMPERATURE (C)										
TURBIDITY (NTU)	-2.00 U									0.00 U

LOCATION	CEF-015-07S	CEF-015-07S	CEF-015-07S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-09S	CEF-015-10S	CEF-015-11S
NSAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE DATE	04/18/00	08/10/95	08/10/95	08/14/95	08/14/95	08/14/95	04/19/00	07/15/03	07/15/03	07/16/03
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE		1 U		1 U		1 U				
1,1,2,2-TETRACHLOROETHANE		1 U		1 U		1 U				
1,1,2-TRICHLOROETHANE		1 U		1 U		1 U				
1,1-DICHLOROETHANE		1 U		1 U		1 U				
1,1-DICHLOROETHENE		1 U		1 U		1 U				
1,2-DIBROMOETHANE										
1,2-DICHLOROETHANE		1 U		1 U		1 U				
1,2-DICHLOROPROPANE		1 U		1 U		1 U				
2-BUTANONE		2 U		2 U		2 U				
2-CHLOROETHYL VINYL ETHER										
2-HEXANONE		2 U		2 U		2 U				
4-METHYL-2-PENTANONE		2 U		2 U		2 U				
ACETONE		2 U		2 U		25				
BENZENE		1 U		1 U		1 U				
BROMODICHLOROMETHANE		1 U		1 U		1 U				
BROMOFORM		1 U		1 U		1 U				
BROMOMETHANE		2 U		2 U		2 U				
CARBON DISULFIDE		1 U		1 U		1 U				
CARBON TETRACHLORIDE		1 U		1 U		1 U				
CHLOROBENZENE		1 U		1 U		1 U				
CHLORODIBROMOMETHANE		1 U		1 U		1 U				
CHLOROETHANE		2 U		2 U		2 U				
CHLOROFORM		1 U		1 U		1 U				
CHLOROMETHANE		2 U		2 U		2 U				
CIS-1,3-DICHLOROPROPENE		1 U		1 U		1 U				
DICHLORODIFLUOROMETHANE										
ETHYLBENZENE		1 U		1 U		1 U				
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE		1 U		1 U		2				
STYRENE		1 U		1 U		1 U				
TETRACHLOROETHENE		1 U		1 U		1 U				
TOLUENE		1 U		1 U		1 U				
TOTAL 1,2-DICHLOROETHENE		1 U		1 U		1 U				
TOTAL XYLENES		1 U		1 U		1 U				
TRANS-1,2-DICHLOROETHENE										
TRANS-1,3-DICHLOROPROPENE		1 U		1 U		1 U				
TRICHLOROETHENE		1 U		1 U		1 U				
TRICHLOROFLUOROMETHANE										
VINYL CHLORIDE		2 U		2 U		2 U				
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE		10 U		10 U						
1,2-DICHLOROBENZENE		10 U		10 U						
1,3,5-TRINITROBENZENE		0.20 U		0.20 U						
1,3-DICHLOROBENZENE		10 U		10 U						
1,3-DINITROBENZENE		0.20 U		0.20 U						

LOCATION	CEF-015-07S	CEF-015-07S	CEF-015-07S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-09S	CEF-015-10S	CEF-015-11S
NSAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE DATE	04/18/00	08/10/95	08/10/95	08/14/95	08/14/95	08/14/95	04/19/00	07/15/03	07/15/03	07/16/03
1,4-DICHLOROBENZENE		10 U		10 U						
1-METHYLNAPHTHALENE	2.2 U						2 U	0.26 U		0.26 U
2,2'-OXYBIS(1-CHLOROPROPANE)		10 U		10 U						
2,4,5-TRICHLOROPHENOL		25 U		25 U						
2,4,6-TRICHLOROPHENOL		10 U		10 U						
2,4-DICHLOROPHENOL		10 U		10 U						
2,4-DIMETHYLPHENOL		10 U		10 U						
2,4-DINITROPHENOL		25 U		25 U						
2,4-DINITROTOLUENE		10 U		10 U						
2,6-DINITROTOLUENE		10 U		10 U						
2-CHLORONAPHTHALENE		10 U		10 U						
2-CHLOROPHENOL		10 U		10 U						
2-METHYLNAPHTHALENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
2-METHYLPHENOL		10 U		10 U						
2-NITROANILINE		25 U		25 U						
2-NITROPHENOL		10 U		10 U						
3,3'-DICHLOROBENZIDINE		10 U		10 U						
3-NITROANILINE		25 U		25 U						
4,6-DINITRO-2-METHYLPHENOL		25 U		25 U						
4-BROMOPHENYL PHENYL ETHER		10 U		10 U						
4-CHLORO-3-METHYLPHENOL		10 U		10 U						
4-CHLOROANILINE		10 U		10 U						
4-CHLOROPHENYL PHENYL ETHER		10 U		10 U						
4-METHYLPHENOL		10 U		10 U						
4-NITROANILINE		25 U		25 U						
4-NITROPHENOL		25 U		25 U						
ACENAPHTHENE	2.2 U	10 U		10 U			2 U	0.52 U		0.53 U
ACENAPHTHYLENE	2.2 U	10 U		10 U			2 U	0.52 U		0.53 U
ANTHRACENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
BAP EQUIVALENT	0.11	5		5			0.10	0.05		0.055
BENZO(A)ANTHRACENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
BENZO(A)PYRENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
BENZO(B)FLUORANTHENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
BENZO(G,H,I)PERYLENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
BENZO(K)FLUORANTHENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
BIS(2-CHLOROETHOXY)METHANE		10 U		10 U						
BIS(2-CHLOROETHYL)ETHER		10 U		10 U						
BIS(2-ETHYLHEXYL)PHTHALATE		10 U		10 U						
BUTYL BENZYL PHTHALATE		10 U		10 U						
CARBAZOLE		10 U		10 U						1.1 U
CHRYSENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
DI-N-BUTYL PHTHALATE		10 U		10 U						
DI-N-OCTYL PHTHALATE		10 U		10 U						
DIBENZO(A,H)ANTHRACENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
DIBENZOFURAN		10 U		10 U						
DIETHYL PHTHALATE		10 U		10 U						

LOCATION	CEF-015-07S	CEF-015-07S	CEF-015-07S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-09S	CEF-015-10S	CEF-015-11S
NSAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE DATE	04/18/00	08/10/95	08/10/95	08/14/95	08/14/95	08/14/95	04/19/00	07/15/03	07/15/03	07/16/03
DIMETHYL PHTHALATE		10 U		10 U						
FLUORANTHENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
FLUORENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
HEXACHLOROBENZENE		10 U		10 U						
HEXACHLOROBUTADIENE		10 U		10 U						
HEXACHLOROCYCLOPENTADIENE		10 U		10 U						
HEXACHLOROETHANE		10 U		10 U						
INDENO(1,2,3-CD)PYRENE	0.22 U	10 U		10 U			0.20 U	0.10 U		0.11 U
ISOPHORONE		10 U		10 U						
N-NITROSO-DI-N-PROPYLAMINE		10 U		10 U						
N-NITROSODIPHENYLAMINE		10 U		10 U						
NAPHTHALENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
NITROBENZENE		10 U		10 U						
PENTACHLOROPHENOL		25 U		25 U						
PHENANTHRENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
PHENOL		10 U		10 U						
PYRENE	2.2 U	10 U		10 U			2 U	0.26 U		0.26 U
TOTAL PAHS		10 U		10 U						
Pesticides/PCBs (ug/L)										
4,4'-DDD		0.10 U		0.10 U						
4,4'-DDE		0.10 U		0.10 U						
4,4'-DDT		0.10 U		0.10 U						
ALDRIN		0.05 U		0.05 U						
ALPHA-BHC		0.05 U		0.05 U						
ALPHA-CHLORDANE		0.05 U		0.05 U						
AROCLOR-1016		1 U		1 U						
AROCLOR-1221		2 U		2 U						
AROCLOR-1232		1 U		1 U						
AROCLOR-1242		1 U		1 U						
AROCLOR-1248		1 U		1 U						
AROCLOR-1254		1 U		1 U						
AROCLOR-1260		1 U		1 U						
BETA-BHC		0.05 U		0.05 U						
DELTA-BHC		0.05 U		0.05 U						
DIELDRIN		0.10 U		0.10 U						
ENDOSULFAN I		0.05 U		0.05 U						
ENDOSULFAN II		0.10 U		0.10 U						
ENDOSULFAN SULFATE		0.10 U		0.10 U						
ENDRIN		0.10 U		0.10 U						
ENDRIN ALDEHYDE		0.10 U		0.10 U						
ENDRIN KETONE		0.10 U		0.10 U						
GAMMA-BHC (LINDANE)		0.05 U		0.05 U						
GAMMA-CHLORDANE		0.05 U		0.05 U						
HEPTACHLOR		0.05 U		0.05 U						
HEPTACHLOR EPOXIDE		0.05 U		0.05 U						
METHOXYCHLOR		0.50 U		0.50 U						

LOCATION	CEF-015-07S	CEF-015-07S	CEF-015-07S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-09S	CEF-015-10S	CEF-015-11S
NSAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE DATE	04/18/00	08/10/95	08/10/95	08/14/95	08/14/95	08/14/95	04/19/00	07/15/03	07/15/03	07/16/03
TOXAPHENE		5 U		5 U						
Explosives (ug/L)										
1,3,5-TRINITROBENZENE										0.054 U
1,3-DINITROBENZENE										0.054 U
2,4,6-TRINITROTOLUENE	18 U	0.20 U		0.20 U			6.5 U			0.054 U
2,4-DINITROTOLUENE										0.054 U
2,6-DINITROTOLUENE										0.054 U
2-AMINO-4,6-DINITROTOLUENE										0.054 U
2-NITROTOLUENE		0.40 UJ		0.40 UJ						0.054 U
3-NITROTOLUENE	18 U	2.46		2.53			6.5 U			0.054 U
4-AMINO-2,6-DINITROTOLUENE		0.20 U		0.20 U						0.054 U
4-NITROTOLUENE	18 U	0.40 U		0.40 U			6.5 U			0.081 U
HMX		0.40 U		0.40 U						0.081 U
NITROBENZENE										0.054 U
RDX		0.40 U		0.40 U						0.081 U
TETRYL		0.20 U		0.20 U						0.081 U
Petroleum Hydrocarbons (mg/L)										
TOTAL PETROLEUM HYDROCARBONS		0.50 U		0.50 U						
Radiochemistry (pci/L)										
AMERICIUM-241										
PLUTONIUM-238										
PLUTONIUM-241										
TOTAL PLUTONIUM										
TOTAL URANIUM-233+234										
TRITIUM										
URANIUM										
URANIUM-235										
Total Inorganics (ug/L)										
ALUMINUM		265		506						
ANTIMONY	2.4 U	2.2 J		2 J			42.9			
ARSENIC	3.4 U	4 U		4 U			3.4 U			
BARIUM		28.7		15.6						
BERYLLIUM		1		1 U						
CADMIUM		1 U		1 U						
CALCIUM		3370 U		6380						
CHROMIUM		1 U		1 U						
COBALT		1.5		1 U						
COPPER		8.7		3 U						
IRON		2010		633						
LEAD	1.6 U	2 U		2 U			2.3 U		3.4 U	
MAGNESIUM		1360		598						
MANGANESE		20.5		12.2						
MERCURY		0.20 U	0.20 UJ	0.20 U	0.20 UJ					
NICKEL		12 U		12 U						
POTASSIUM		296 U		235 U						
SELENIUM		4 U		4 U						

LOCATION	CEF-015-07S	CEF-015-07S	CEF-015-07S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-08S	CEF-015-09S	CEF-015-10S	CEF-015-11S
NSAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE	CEF-15-GW-7S-01	CF15MW7S	CF15MW7S-R	CF15MW8S	CF15MW8S-R	CF15MW8ST	CEF-15-GW-8S-01	CEF-015-GW-09S-02	CEF-015-GW-10S-02	CEF-015-GW-11S-02
SAMPLE DATE	04/18/00	08/10/95	08/10/95	08/14/95	08/14/95	08/14/95	04/19/00	07/15/03	07/15/03	07/16/03
SILVER		1 U		1 U						
SODIUM		10800 J		9390 J						
THALLIUM		5 J		5 U						
VANADIUM		1 U		1.8						
ZINC		28.5 U		8 U						
Filtered Inorganics (ug/L)										
ALUMINUM				85.7						
ANTIMONY	2.4 U			2.5			46.2			
ARSENIC	3.4 U			4 U			3.4 U			
BARIUM				15.1						
BERYLLIUM				1 U						
CADMIUM				1 U						
CALCIUM				6400						
CHROMIUM				1 U						
COBALT				1 U						
COPPER				3 U						
IRON				598						
LEAD	1.6 U			2 U			1.6 U			
MAGNESIUM				597						
MANGANESE				12.3						
MERCURY				0.20 U	0.20 UJ					
NICKEL				12 U						
POTASSIUM				227 U						
SELENIUM				4 U						
SILVER				11.2						
SODIUM				9560 J						
THALLIUM				5 U						
VANADIUM				1						
ZINC				18.9 U						
Miscellaneous Parameters										
CYANIDE (UG/L)		3 UJ		3.1 J						
PERCHLORATE (UG/L)										
TOTAL ORGANIC CARBON (MG/L)		1 U		4						
Field Parameters										
DISSOLVED OXYGEN - METER (MG/L)								0.57	0.50	0.85
OXIDATION REDUCTION POTENTIAL (MV)								131.4	107.9	91.4
PH								5.56	5.14	5.48
SPECIFIC CONDUCTANCE (MS/CM)								0.101	0.072	0.092
TEMPERATURE (C)								23.24	21.93	22
TURBIDITY (NTU)	3 U						131 U	0.00	0.00	6.2

LOCATION	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-12S	CEF-015-13S	CEF-015-13S
NSAMPLE	CEF-015-GW-11S-02-D	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-11S-03-D	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE	CEF-015-GW-DUP-02	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-DUP-03	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE DATE	07/16/03	02/17/05	02/17/05	02/17/05	07/15/03	07/15/03	03/15/06
Volatile Organics (ug/L)							
1,1,1-TRICHLOROETHANE							
1,1,2,2-TETRACHLOROETHANE							
1,1,2-TRICHLOROETHANE							
1,1-DICHLOROETHANE							
1,1-DICHLOROETHENE							
1,2-DIBROMOETHANE							
1,2-DICHLOROETHANE							
1,2-DICHLOROPROPANE							
2-BUTANONE							
2-CHLOROETHYL VINYL ETHER							
2-HEXANONE							
4-METHYL-2-PENTANONE							
ACETONE							
BENZENE							
BROMODICHLOROMETHANE							
BROMOFORM							
BROMOMETHANE							
CARBON DISULFIDE							
CARBON TETRACHLORIDE							
CHLOROBENZENE							
CHLORODIBROMOMETHANE							
CHLOROETHANE							
CHLOROFORM							
CHLOROMETHANE							
CIS-1,3-DICHLOROPROPENE							
DICHLORODIFLUOROMETHANE							
ETHYLBENZENE							
METHYL TERT-BUTYL ETHER							
METHYLENE CHLORIDE							
STYRENE							
TETRACHLOROETHENE							
TOLUENE							
TOTAL 1,2-DICHLOROETHENE							
TOTAL XYLENES							
TRANS-1,2-DICHLOROETHENE							
TRANS-1,3-DICHLOROPROPENE							
TRICHLOROETHENE							
TRICHLOROFLUOROMETHANE							
VINYL CHLORIDE							
Semivolatile Organics (ug/L)							
1,2,4-TRICHLOROBENZENE							
1,2-DICHLOROBENZENE							
1,3,5-TRINITROBENZENE							
1,3-DICHLOROBENZENE							
1,3-DINITROBENZENE							

LOCATION	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-12S	CEF-015-13S	CEF-015-13S
NSAMPLE	CEF-015-GW-11S-02-D	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-11S-03-D	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE	CEF-015-GW-DUP-02	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-DUP-03	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE DATE	07/16/03	02/17/05	02/17/05	02/17/05	07/15/03	07/15/03	03/15/06
1,4-DICHLOROBENZENE							
1-METHYLNAPHTHALENE	0.27 U						
2,2'-OXYBIS(1-CHLOROPROPANE)							
2,4,5-TRICHLOROPHENOL							
2,4,6-TRICHLOROPHENOL							
2,4-DICHLOROPHENOL							
2,4-DIMETHYLPHENOL							
2,4-DINITROPHENOL							
2,4-DINITROTOLUENE							
2,6-DINITROTOLUENE							
2-CHLORONAPHTHALENE							
2-CHLOROPHENOL							
2-METHYLNAPHTHALENE	0.27 U						
2-METHYLPHENOL							
2-NITROANILINE							
2-NITROPHENOL							
3,3'-DICHLOROBENZIDINE							
3-NITROANILINE							
4,6-DINITRO-2-METHYLPHENOL							
4-BROMOPHENYL PHENYL ETHER							
4-CHLORO-3-METHYLPHENOL							
4-CHLOROANILINE							
4-CHLOROPHENYL PHENYL ETHER							
4-METHYLPHENOL							
4-NITROANILINE							
4-NITROPHENOL							
ACENAPHTHENE	0.53 U						
ACENAPHTHYLENE	0.53 U						
ANTHRACENE	0.27 U						
BAP EQUIVALENT	0.055						
BENZO(A)ANTHRACENE	0.11 U						
BENZO(A)PYRENE	0.11 U						
BENZO(B)FLUORANTHENE	0.11 U						
BENZO(G,H,I)PERYLENE	0.11 U						
BENZO(K)FLUORANTHENE	0.11 U						
BIS(2-CHLOROETHOXY)METHANE							
BIS(2-CHLOROETHYL)ETHER							
BIS(2-ETHYLHEXYL)PHTHALATE							
BUTYL BENZYL PHTHALATE							
CARBAZOLE	1.1 U						
CHRYSENE	0.11 U						
DI-N-BUTYL PHTHALATE							
DI-N-OCTYL PHTHALATE							
DIBENZO(A,H)ANTHRACENE	0.11 U						
DIBENZOFURAN							
DIETHYL PHTHALATE							

LOCATION	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-12S	CEF-015-13S	CEF-015-13S
NSAMPLE	CEF-015-GW-11S-02-D	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-11S-03-D	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE	CEF-015-GW-DUP-02	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-DUP-03	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE DATE	07/16/03	02/17/05	02/17/05	02/17/05	07/15/03	07/15/03	03/15/06
DIMETHYL PHTHALATE							
FLUORANTHENE	0.27 U						
FLUORENE	0.27 U						
HEXACHLOROBENZENE							
HEXACHLOROBUTADIENE							
HEXACHLOROCYCLOPENTADIENE							
HEXACHLOROETHANE							
INDENO(1,2,3-CD)PYRENE	0.11 U						
ISOPHORONE							
N-NITROSO-DI-N-PROPYLAMINE							
N-NITROSODIPHENYLAMINE							
NAPHTHALENE	0.27 U						
NITROBENZENE							
PENTACHLOROPHENOL							
PHENANTHRENE	0.27 U						
PHENOL							
PYRENE	0.27 U						
TOTAL PAHS							
Pesticides/PCBs (ug/L)							
4,4'-DDD							
4,4'-DDE							
4,4'-DDT							
ALDRIN							
ALPHA-BHC							
ALPHA-CHLORDANE							
AROCLOR-1016							
AROCLOR-1221							
AROCLOR-1232							
AROCLOR-1242							
AROCLOR-1248							
AROCLOR-1254							
AROCLOR-1260							
BETA-BHC							
DELTA-BHC							
DIELDRIN							
ENDOSULFAN I							
ENDOSULFAN II							
ENDOSULFAN SULFATE							
ENDRIN							
ENDRIN ALDEHYDE							
ENDRIN KETONE							
GAMMA-BHC (LINDANE)							
GAMMA-CHLORDANE							
HEPTACHLOR							
HEPTACHLOR EPOXIDE							
METHOXYCHLOR							

LOCATION	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-12S	CEF-015-13S	CEF-015-13S
NSAMPLE	CEF-015-GW-11S-02-D	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-11S-03-D	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE	CEF-015-GW-DUP-02	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-DUP-03	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE DATE	07/16/03	02/17/05	02/17/05	02/17/05	07/15/03	07/15/03	03/15/06
TOXAPHENE							
Explosives (ug/L)							
1,3,5-TRINITROBENZENE	0.053 U				0.054 U		
1,3-DINITROBENZENE	0.053 U				0.054 U		
2,4,6-TRINITROTOLUENE	0.053 U				0.054 U		
2,4-DINITROTOLUENE	0.053 U				0.054 U		
2,6-DINITROTOLUENE	0.053 U				0.054 U		
2-AMINO-4,6-DINITROTOLUENE	0.053 U				0.054 U		
2-NITROTOLUENE	0.053 U				0.054 U		
3-NITROTOLUENE	0.053 U				0.054 U		
4-AMINO-2,6-DINITROTOLUENE	0.053 U				0.054 U		
4-NITROTOLUENE	0.08 U				0.081 U		
HMX	0.08 U				0.081 U		
NITROBENZENE	0.053 U				0.054 U		
RDX	0.08 U				0.081 U		
TETRYL	0.08 U				0.081 U		
Petroleum Hydrocarbons (mg/L)							
TOTAL PETROLEUM HYDROCARBONS							
Radiochemistry (pci/L)							
AMERICIUM-241							
PLUTONIUM-238							
PLUTONIUM-241							
TOTAL PLUTONIUM							
TOTAL URANIUM-233+234							
TRITIUM							
URANIUM							
URANIUM-235							
Total Inorganics (ug/L)							
ALUMINUM							
ANTIMONY							
ARSENIC						13.7	14.7
BARIUM							
BERYLLIUM							
CADMIUM							
CALCIUM							
CHROMIUM							
COBALT							
COPPER							
IRON							
LEAD							
MAGNESIUM							
MANGANESE							
MERCURY							
NICKEL							
POTASSIUM							
SELENIUM							

LOCATION	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-11S	CEF-015-12S	CEF-015-13S	CEF-015-13S
NSAMPLE	CEF-015-GW-11S-02-D	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-11S-03-D	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE	CEF-015-GW-DUP-02	CEF-015-GW-11S-03	CEF-015-GW-11S-03-AVG	CEF-015-GW-DUP-03	CEF-015-GW-12S-02	CEF-015-GW-13S-02	CEF-015-GW-13S-04
SAMPLE DATE	07/16/03	02/17/05	02/17/05	02/17/05	07/15/03	07/15/03	03/15/06
SILVER							
SODIUM							
THALLIUM							
VANADIUM							
ZINC							
Filtered Inorganics (ug/L)							
ALUMINUM							
ANTIMONY							
ARSENIC							3.5
BARIUM							
BERYLLIUM							
CADMIUM							
CALCIUM							
CHROMIUM							
COBALT							
COPPER							
IRON							
LEAD							
MAGNESIUM							
MANGANESE							
MERCURY							
NICKEL							
POTASSIUM							
SELENIUM							
SILVER							
SODIUM							
THALLIUM							
VANADIUM							
ZINC							
Miscellaneous Parameters							
CYANIDE (UG/L)							
PERCHLORATE (UG/L)		0.50 U	0.50 U	0.50 U			
TOTAL ORGANIC CARBON (MG/L)							
Field Parameters							
DISSOLVED OXYGEN - METER (MG/L)					0.35	0.14	
OXIDATION REDUCTION POTENTIAL (MV)					61.9	55.2	
PH					5.49	5.11	
SPECIFIC CONDUCTANCE (MS/CM)					0.08	0.061	
TEMPERATURE (C)					21.64	23	
TURBIDITY (NTU)					0.00	1000 >	

LOCATION	CEF-015-13S	CEF-015-14S	CEF-015-15S	CF15S11R
NSAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE DATE	03/21/06	07/16/03	11/22/05	07/20/95
Volatile Organics (ug/L)				
1,1,1-TRICHLOROETHANE				
1,1,2,2-TETRACHLOROETHANE				
1,1,2-TRICHLOROETHANE				
1,1-DICHLOROETHANE				
1,1-DICHLOROETHENE				
1,2-DIBROMOETHANE				
1,2-DICHLOROETHANE				
1,2-DICHLOROPROPANE				
2-BUTANONE				
2-CHLOROETHYL VINYL ETHER				
2-HEXANONE				
4-METHYL-2-PENTANONE				
ACETONE				
BENZENE				
BROMODICHLOROMETHANE				
BROMOFORM				
BROMOMETHANE				
CARBON DISULFIDE				
CARBON TETRACHLORIDE				
CHLOROBENZENE				
CHLORODIBROMOMETHANE				
CHLOROETHANE				
CHLOROFORM				
CHLOROMETHANE				
CIS-1,3-DICHLOROPROPENE				
DICHLORODIFLUOROMETHANE				
ETHYLBENZENE				
METHYL TERT-BUTYL ETHER				
METHYLENE CHLORIDE				
STYRENE				
TETRACHLOROETHENE				
TOLUENE				
TOTAL 1,2-DICHLOROETHENE				
TOTAL XYLENES				
TRANS-1,2-DICHLOROETHENE				
TRANS-1,3-DICHLOROPROPENE				
TRICHLOROETHENE				
TRICHLOROFLUOROMETHANE				
VINYL CHLORIDE				
Semivolatile Organics (ug/L)				
1,2,4-TRICHLOROBENZENE				
1,2-DICHLOROBENZENE				
1,3,5-TRINITROBENZENE				
1,3-DICHLOROBENZENE				
1,3-DINITROBENZENE				

LOCATION	CEF-015-13S	CEF-015-14S	CEF-015-15S	CF15S11R
NSAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE DATE	03/21/06	07/16/03	11/22/05	07/20/95
1,4-DICHLOROBENZENE				
1-METHYLNAPHTHALENE				
2,2'-OXYBIS(1-CHLOROPROPANE)				
2,4,5-TRICHLOROPHENOL				
2,4,6-TRICHLOROPHENOL				
2,4-DICHLOROPHENOL				
2,4-DIMETHYLPHENOL				
2,4-DINITROPHENOL				
2,4-DINITROTOLUENE				
2,6-DINITROTOLUENE				
2-CHLORONAPHTHALENE				
2-CHLOROPHENOL				
2-METHYLNAPHTHALENE				
2-METHYLPHENOL				
2-NITROANILINE				
2-NITROPHENOL				
3,3'-DICHLOROBENZIDINE				
3-NITROANILINE				
4,6-DINITRO-2-METHYLPHENOL				
4-BROMOPHENYL PHENYL ETHER				
4-CHLORO-3-METHYLPHENOL				
4-CHLOROANILINE				
4-CHLOROPHENYL PHENYL ETHER				
4-METHYLPHENOL				
4-NITROANILINE				
4-NITROPHENOL				
ACENAPHTHENE				
ACENAPHTHYLENE				
ANTHRACENE				
BAP EQUIVALENT				
BENZO(A)ANTHRACENE				
BENZO(A)PYRENE				
BENZO(B)FLUORANTHENE				
BENZO(G,H,I)PERYLENE				
BENZO(K)FLUORANTHENE				
BIS(2-CHLOROETHOXY)METHANE				
BIS(2-CHLOROETHYL)ETHER				
BIS(2-ETHYLHEXYL)PHTHALATE				
BUTYL BENZYL PHTHALATE				
CARBAZOLE				
CHRYSENE				
DI-N-BUTYL PHTHALATE				
DI-N-OCTYL PHTHALATE				
DIBENZO(A,H)ANTHRACENE				
DIBENZOFURAN				
DIETHYL PHTHALATE				

LOCATION	CEF-015-13S	CEF-015-14S	CEF-015-15S	CF15S11R
NSAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE DATE	03/21/06	07/16/03	11/22/05	07/20/95
DIMETHYL PHTHALATE				
FLUORANTHENE				
FLUORENE				
HEXACHLOROBENZENE				
HEXACHLOROBUTADIENE				
HEXACHLOROCYCLOPENTADIENE				
HEXACHLOROETHANE				
INDENO(1,2,3-CD)PYRENE				
ISOPHORONE				
N-NITROSO-DI-N-PROPYLAMINE				
N-NITROSODIPHENYLAMINE				
NAPHTHALENE				
NITROBENZENE				
PENTACHLOROPHENOL				
PHENANTHRENE				
PHENOL				
PYRENE				
TOTAL PAHS				
Pesticides/PCBs (ug/L)				
4,4'-DDD				
4,4'-DDE				
4,4'-DDT				
ALDRIN				
ALPHA-BHC				
ALPHA-CHLORDANE				
AROCLOR-1016				
AROCLOR-1221				
AROCLOR-1232				
AROCLOR-1242				
AROCLOR-1248				
AROCLOR-1254				
AROCLOR-1260				
BETA-BHC				
DELTA-BHC				
DIELDRIN				
ENDOSULFAN I				
ENDOSULFAN II				
ENDOSULFAN SULFATE				
ENDRIN				
ENDRIN ALDEHYDE				
ENDRIN KETONE				
GAMMA-BHC (LINDANE)				
GAMMA-CHLORDANE				
HEPTACHLOR				
HEPTACHLOR EPOXIDE				
METHOXYCHLOR				

LOCATION	CEF-015-13S	CEF-015-14S	CEF-015-15S	CF15S11R
NSAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE DATE	03/21/06	07/16/03	11/22/05	07/20/95
TOXAPHENE				
Explosives (ug/L)				
1,3,5-TRINITROBENZENE		0.054 U		
1,3-DINITROBENZENE		0.054 U		
2,4,6-TRINITROTOLUENE		0.054 U		
2,4-DINITROTOLUENE		0.054 U		
2,6-DINITROTOLUENE		0.054 U		
2-AMINO-4,6-DINITROTOLUENE		0.054 U		
2-NITROTOLUENE		0.054 U		
3-NITROTOLUENE		0.054 U		
4-AMINO-2,6-DINITROTOLUENE		0.054 U		
4-NITROTOLUENE		0.081 U		
HMX		0.081 U		
NITROBENZENE		0.054 U		
RDX		0.081 U		
TETRYL		0.081 U		
Petroleum Hydrocarbons (mg/L)				
TOTAL PETROLEUM HYDROCARBONS				1 UJ
Radiochemistry (pci/L)				
AMERICIUM-241				
PLUTONIUM-238				
PLUTONIUM-241				
TOTAL PLUTONIUM				
TOTAL URANIUM-233+234				
TRITIUM				
URANIUM				
URANIUM-235				
Total Inorganics (ug/L)				
ALUMINUM				
ANTIMONY				
ARSENIC	22.4		16.5 U	
BARIUM				
BERYLLIUM				
CADMIUM				
CALCIUM				
CHROMIUM				
COBALT				
COPPER				
IRON				
LEAD				
MAGNESIUM				
MANGANESE				
MERCURY				
NICKEL				
POTASSIUM				
SELENIUM				

LOCATION	CEF-015-13S	CEF-015-14S	CEF-015-15S	CF15S11R
NSAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE	CEF-015-13S(R)-05	CEF-015-GW-14S-02	CEF-015-GW-15S-03	CF15S11R
SAMPLE DATE	03/21/06	07/16/03	11/22/05	07/20/95
SILVER				
SODIUM				
THALLIUM				
VANADIUM				
ZINC				
Filtered Inorganics (ug/L)				
ALUMINUM				
ANTIMONY				
ARSENIC	2.9 U		8 U	
BARIUM				
BERYLLIUM				
CADMIUM				
CALCIUM				
CHROMIUM				
COBALT				
COPPER				
IRON				
LEAD				
MAGNESIUM				
MANGANESE				
MERCURY				
NICKEL				
POTASSIUM				
SELENIUM				
SILVER				
SODIUM				
THALLIUM				
VANADIUM				
ZINC				
Miscellaneous Parameters				
CYANIDE (UG/L)				
PERCHLORATE (UG/L)				
TOTAL ORGANIC CARBON (MG/L)				
Field Parameters				
DISSOLVED OXYGEN - METER (MG/L)		0.54		
OXIDATION REDUCTION POTENTIAL (MV)		178		
PH		5.08		
SPECIFIC CONDUCTANCE (MS/CM)		0.082		
TEMPERATURE (C)		22.48		
TURBIDITY (NTU)		0.00		

E-3: SEDIMENT

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SD-100 CEF-015-SD-100 4/13/1999	CEF-015-SD-101 CEF-015-SD-101 4/13/1999	CEF-015-SD-102 CEF-015-SD-102 4/13/1999	CEF-015-SD-103 CEF-015-SD-103 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-AVG 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-D 4/14/1999	CEF-015-SD-104 CEF-015-SD-104 4/14/1999	CEF-015-SD-105 CEF-015-SD-105 4/14/1999	CEF-015-SW/SD1 CF15SD1 [07/05/95] 7/5/1995
Volatile Organics (ug/kg)									
1,1,1-TRICHLOROETHANE									7 U
1,1,2,2-TETRACHLOROETHANE									7 U
1,1,2-TRICHLOROETHANE									7 U
1,1-DICHLOROETHANE									7 U
1,1-DICHLOROETHENE									7 U
1,2-DICHLOROETHANE									7 U
1,2-DICHLOROPROPANE									7 U
2-BUTANONE									18
2-HEXANONE									14 U
4-METHYL-2-PENTANONE									14 U
ACETONE									14 U
BENZENE									7 U
BROMODICHLOROMETHANE									7 U
BROMOFORM									7 U
BROMOMETHANE									14 U
CARBON DISULFIDE									7 U
CARBON TETRACHLORIDE									7 U
CHLOROBENZENE									7 U
CHLORODIBROMOMETHANE									7 U
CHLOROETHANE									14 U
CHLOROFORM									7 U
CHLOROMETHANE									14 U
CIS-1,3-DICHLOROPROPENE									7 U
ETHYLBENZENE									7 U
METHYLENE CHLORIDE									7 U
STYRENE									7 U
TETRACHLOROETHENE									7 U
TOLUENE									7 U
TOTAL 1,2-DICHLOROETHENE									7 U
TOTAL XYLENES									7 U
TRANS-1,3-DICHLOROPROPENE									7 U
TRICHLOROETHENE									7 U
VINYL CHLORIDE									14 U
Semivolatile Organics (ug/kg)									
1,2,4-TRICHLOROBENZENE									460 U
1,2-DICHLOROBENZENE									460 U
1,3,5-TRINITROBENZENE									250 U
1,3-DICHLOROBENZENE									460 U
1,3-DINITROBENZENE									250 U

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SD-100 CEF-015-SD-100 4/13/1999	CEF-015-SD-101 CEF-015-SD-101 4/13/1999	CEF-015-SD-102 CEF-015-SD-102 4/13/1999	CEF-015-SD-103 CEF-015-SD-103 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-AVG 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-D 4/14/1999	CEF-015-SD-104 CEF-015-SD-104 4/14/1999	CEF-015-SD-105 CEF-015-SD-105 4/14/1999	CEF-015-SW/SD1 CF15SD1 [07/05/95] 7/5/1995
1,4-DICHLOROBENZENE									460 U
1-METHYLNAPHTHALENE	47 U	43 U	45 U	45 U	44.5 U	44 U	36 U	40 U	
2,2'-OXYBIS(1-CHLOROPROPANE)									460 U
2,4,5-TRICHLOROPHENOL									1100 U
2,4,6-TRICHLOROPHENOL									460 U
2,4-DICHLOROPHENOL									460 U
2,4-DIMETHYLPHENOL									460 U
2,4-DINITROPHENOL									1100 U
2,4-DINITROTOLUENE									460 U
2,6-DINITROTOLUENE									460 U
2-CHLORONAPHTHALENE									460 U
2-CHLOROPHENOL									460 U
2-METHYLNAPHTHALENE	47 U	43 U	45 U	31700 J	17890 J	4080 J	2710	189	460 U
2-METHYLPHENOL									460 U
2-NITROANILINE									1100 U
2-NITROPHENOL									460 U
3,3'-DICHLOROBENZIDINE									460 U
3-NITROANILINE									1100 U
4,6-DINITRO-2-METHYLPHENOL									1100 U
4-BROMOPHENYL PHENYL ETHER									460 U
4-CHLORO-3-METHYLPHENOL									460 U
4-CHLOROANILINE									460 U
4-CHLOROPHENYL PHENYL ETHER									460 U
4-METHYLPHENOL									460 U
4-NITROANILINE									1100 U
4-NITROPHENOL									1100 U
ACENAPHTHENE	47 U	69.2	45 U	46900 J	26125 J	5350 J	3600	225	460 U
ACENAPHTHYLENE	47 U	99.6	45 U	45 UJ	170.75 J	319 J	36 U	40 U	460 U
ANTHRACENE	47 U	43 U	45 U	3480 J	2345 J	1210 J	1100	40 U	460 U
BAP EQUIVALENT(2)	1355.777	106.52	30.1442	52112.0234	30722.7467	9333.47	5556.485	435.079	421.93
BENZO(A)ANTHRACENE	7.1 U	76.3	12.6	6.7 UJ	2861.675 J	5720 J	3510	231	230 J
BENZO(A)PYRENE	1350	74.3	23.1	48200 J	28080 J	7960 J	4790	352	290 J
BENZO(B)FLUORANTHENE	7.1 U	105	20.1	38000 J	22840 J	7680 J	3880	286	450 J
BENZO(G,H,I)PERYLENE	7.1 U	108	6.7 U	6.7 UJ	1711.675 J	3420 J	1030	241	140 J
BENZO(K)FLUORANTHENE	71.4	58.5	6.7 U	10800 J	6535 J	2270 J	2080	150	160 J
BIS(2-CHLOROETHOXY)METHANE									460 U
BIS(2-CHLOROETHYL)ETHER									460 U
BIS(2-ETHYLHEXYL)PHTHALATE									460 U
BUTYL BENZYL PHTHALATE									460 U
CARBAZOLE									460 U

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SD-100 CEF-015-SD-100 4/13/1999	CEF-015-SD-101 CEF-015-SD-101 4/13/1999	CEF-015-SD-102 CEF-015-SD-102 4/13/1999	CEF-015-SD-103 CEF-015-SD-103 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-AVG 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-D 4/14/1999	CEF-015-SD-104 CEF-015-SD-104 4/14/1999	CEF-015-SD-105 CEF-015-SD-105 4/14/1999	CEF-015-SW/SD1 CF15SD1 [07/05/95] 7/5/1995
CHRYSENE	448	255	55.7	6.7 UJ	3571.675 J	7140 J	3660	329	330 J
DI-N-BUTYL PHTHALATE									380 J
DI-N-OCTYL PHTHALATE									460 U
DIBENZO(A,H)ANTHRACENE	7.1 U	6.5 U	6.7 U	6.7 U	6.65 U	6.6 U	5.5 U	6.1 U	48 J
DIBENZOFURAN									460 U
DIETHYL PHTHALATE									460 U
DIMETHYL PHTHALATE									460 U
FLUORANTHENE	7.1 U	390	106	73400 J	42550 J	11700 J	9190	545	400 J
FLUORENE	47 U	30.3	45 U	21900 J	12155 J	2410 J	1660	82.2	460 U
HEXACHLOROBENZENE									460 U
HEXACHLOROBUTADIENE									460 U
HEXACHLOROCYCLOPENTADIENE									460 U
HEXACHLOROETHANE									460 U
INDENO(1,2,3-CD)PYRENE	7.1 U	100	6.7 U	6.7 U	6.65 U	6.6 U	5.5 U	265	140 J
ISOPHORONE									460 U
N-NITROSO-DI-N-PROPYLAMINE									460 U
N-NITROSODIPHENYLAMINE									460 U
NAPHTHALENE	47 U	43 U	45 U	45 U	44.5 U	44 U	36 U	40 U	460 U
NITROBENZENE									460 U
PENTACHLOROPHENOL									1100 U
PHENANTHRENE	47 U	114	45 U	23300 J	13675 J	4050 J	4000	40 U	100 J
PHENOL									460 U
PYRENE	7.1 U	171	26.3	65200 J	37365 J	9530 J	6820	399	310 J
TOTAL PAHS	2011.75	1667.15	369.7	309341.75	187859.675	66377.6	43701.5	3106.05	3518
Pesticides/PCBs (ug/kg)									
4,4'-DDD									4.6 U
4,4'-DDE									4.6 U
4,4'-DDT									4.6 U
ALDRIN									0.56 R
ALPHA-BHC									2.3 U
ALPHA-CHLORDANE									2.3 U
AROCLOR-1016									46 U
AROCLOR-1221									92 U
AROCLOR-1232									46 U
AROCLOR-1242									46 U
AROCLOR-1248									46 U
AROCLOR-1254									46 U
AROCLOR-1260									46 U
BETA-BHC									2.3 U
DELTA-BHC									2.3 U

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SD-100 CEF-015-SD-100 4/13/1999	CEF-015-SD-101 CEF-015-SD-101 4/13/1999	CEF-015-SD-102 CEF-015-SD-102 4/13/1999	CEF-015-SD-103 CEF-015-SD-103 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-AVG 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-D 4/14/1999	CEF-015-SD-104 CEF-015-SD-104 4/14/1999	CEF-015-SD-105 CEF-015-SD-105 4/14/1999	CEF-015-SW/SD1 CF15SD1 [07/05/95] 7/5/1995
DIELDRIN									4.6 U
ENDOSULFAN I									2.3 U
ENDOSULFAN II									4.6 U
ENDOSULFAN SULFATE									4.6 U
ENDRIN									4.6 U
ENDRIN ALDEHYDE									4.6 U
ENDRIN KETONE									4.6 U
GAMMA-BHC (LINDANE)									2.3 U
GAMMA-CHLORDANE									2.3 U
HEPTACHLOR									2.3 UJ
HEPTACHLOR EPOXIDE									2.3 U
METHOXYCHLOR									23 U
TOXAPHENE									230 U
Petroleum Hydrocarbons (mg/kg)									
TOTAL PETROLEUM HYDROCARBONS									15 J
Explosives (ug/kg)									
2,4,6-TRINITROTOLUENE									250 U
2-AMINO-4,6-DINITROTOLUENE									250 U
2-NITROTOLUENE									500 U
3-NITROTOLUENE									500 U
4-AMINO-2,6-DINITROTOLUENE									250 U
4-NITROTOLUENE									500 U
HMX									500 U
RDX									500 U
TETRYL									500 U
Inorganics (mg/kg)									
ALUMINUM									2120
ANTIMONY									5.5 U
ARSENIC									1.1 UJ
BARIUM									3.1
BERYLLIUM									0.28 U
CADMIUM									0.28 U
CALCIUM									62.8 J
CHROMIUM									2.5 U
COBALT									1.7 U
COPPER									0.83 U
IRON									207
LEAD	574	104	105	453	398	343	147	163	29
MAGNESIUM									58.8
MANGANESE									1.5 U

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SD-100 CEF-015-SD-100 4/13/1999	CEF-015-SD-101 CEF-015-SD-101 4/13/1999	CEF-015-SD-102 CEF-015-SD-102 4/13/1999	CEF-015-SD-103 CEF-015-SD-103 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-AVG 4/14/1999	CEF-015-SD-103 CEF-015-SD-103-D 4/14/1999	CEF-015-SD-104 CEF-015-SD-104 4/14/1999	CEF-015-SD-105 CEF-015-SD-105 4/14/1999	CEF-015-SW/SD1 CF15SD1 [07/05/95] 7/5/1995
MERCURY									0.14 UJ
NICKEL									3.3 U
POTASSIUM									39.9 U
SELENIUM									1.1 U
SILVER									1.1 U
SODIUM									221 J
THALLIUM									1.4 U
VANADIUM									2.4
ZINC									1.1 UJ
Miscellaneous Parameters (mg/kg)									
CYANIDE									0.23 U
TOTAL ORGANIC CARBON									8000

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD2 CF15SD2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-AVG 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-D 7/5/1995	CEF-015-SW/SD3 CF15SD3 [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SD4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SD5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SD6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SD7 [05/07/97] 5/7/1997
Volatile Organics (ug/kg)								
1,1,1-TRICHLOROETHANE	7 U	7 U	7 U	5 U				
1,1,2,2-TETRACHLOROETHANE	7 U	7 U	7 U	5 U				
1,1,2-TRICHLOROETHANE	7 U	7 U	7 U	5 U				
1,1-DICHLOROETHANE	7 U	7 U	7 U	5 U				
1,1-DICHLOROETHENE	7 U	7 U	7 U	5 U				
1,2-DICHLOROETHANE	7 U	7 U	7 U	5 U				
1,2-DICHLOROPROPANE	7 U	7 U	7 U	5 U				
2-BUTANONE	14 U	14 U	14 U	9 J				
2-HEXANONE	14 U	14 U	14 U	11 U				
4-METHYL-2-PENTANONE	14 U	14 U	14 U	11 U				
ACETONE	14 U	14 U	14 U	13 U				
BENZENE	7 U	7 U	7 U	5 U				
BROMODICHLOROMETHANE	7 U	7 U	7 U	5 U				
BROMOFORM	7 U	7 U	7 U	5 U				
BROMOMETHANE	14 U	14 U	14 U	11 U				
CARBON DISULFIDE	7 U	7 U	7 U	5 U				
CARBON TETRACHLORIDE	7 U	7 U	7 U	5 U				
CHLOROBENZENE	7 U	7 U	7 U	5 U				
CHLORODIBROMOMETHANE	7 U	7 U	7 U	5 U				
CHLOROETHANE	14 U	14 U	14 U	11 U				
CHLOROFORM	7 U	7 U	7 U	5 U				
CHLOROMETHANE	14 U	14 U	14 U	11 U				
CIS-1,3-DICHLOROPROPENE	7 U	7 U	7 U	5 U				
ETHYLBENZENE	7 U	7 U	7 U	5 U				
METHYLENE CHLORIDE	7 U	7 U	7 U	5 U				
STYRENE	7 U	7 U	7 U	5 U				
TETRACHLOROETHENE	7 U	7 U	7 U	5 U				
TOLUENE	7 U	7 U	7 U	5 U				
TOTAL 1,2-DICHLOROETHENE	7 U	7 U	7 U	5 U				
TOTAL XYLENES	7 U	7 U	7 U	5 U				
TRANS-1,3-DICHLOROPROPENE	7 U	7 U	7 U	5 U				
TRICHLOROETHENE	7 U	7 U	7 U	5 U				
VINYL CHLORIDE	14 U	14 U	14 U	11 U				
Semivolatile Organics (ug/kg)								
1,2,4-TRICHLOROBENZENE	450 U	460 U	470 U	350 U		440 U		
1,2-DICHLOROBENZENE	450 U	460 U	470 U	350 U				
1,3,5-TRINITROBENZENE	250 U	250 U	250 U	2500 U				
1,3-DICHLOROBENZENE	450 U	460 U	470 U	350 U				
1,3-DINITROBENZENE	250 U	250 U	250 U	2500 U				

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD2 CF15SD2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-AVG 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-D 7/5/1995	CEF-015-SW/SD3 CF15SD3 [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SD4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SD5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SD6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SD7 [05/07/97] 5/7/1997
1,4-DICHLOROBENZENE	450 U	460 U	470 U	350 U		440 U		
1-METHYLNAPHTHALENE								
2,2'-OXYBIS(1-CHLOROPROPANE)	450 U	460 U	470 U	350 U				
2,4,5-TRICHLOROPHENOL	1100 U	1100 U	1100 U	850 U				
2,4,6-TRICHLOROPHENOL	450 U	460 U	470 U	350 U				
2,4-DICHLOROPHENOL	450 U	460 U	470 U	350 U				
2,4-DIMETHYLPHENOL	450 U	460 U	470 U	350 U				
2,4-DINITROPHENOL	1100 U	1100 U	1100 U	850 U				
2,4-DINITROTOLUENE	450 U	460 U	470 U	350 U		440 U		
2,6-DINITROTOLUENE	450 U	460 U	470 U	350 U				
2-CHLORONAPHTHALENE	450 U	460 U	470 U	350 U				
2-CHLOROPHENOL	450 U	460 U	470 U	350 U		440 U		
2-METHYLNAPHTHALENE	450 U	460 U	470 U	350 U	450 U	440 U	660 U	2300 U
2-METHYLPHENOL	450 U	460 U	470 U	350 U				
2-NITROANILINE	1100 U	1100 U	1100 U	850 U				
2-NITROPHENOL	450 U	460 U	470 U	350 U				
3,3'-DICHLOROBENZIDINE	450 U	460 U	470 U	350 U				
3-NITROANILINE	1100 U	1100 U	1100 U	850 U				
4,6-DINITRO-2-METHYLPHENOL	1100 U	1100 U	1100 U	850 U				
4-BROMOPHENYL PHENYL ETHER	450 U	460 U	470 U	350 U				
4-CHLORO-3-METHYLPHENOL	450 U	460 U	470 U	350 U		440 U		
4-CHLOROANILINE	450 U	460 U	470 U	350 U				
4-CHLOROPHENYL PHENYL ETHER	450 U	460 U	470 U	350 U				
4-METHYLPHENOL	450 U	460 U	470 U	350 U				
4-NITROANILINE	1100 U	1100 U	1100 U	850 U				
4-NITROPHENOL	1100 U	1100 U	1100 U	850 U		1100 U		
ACENAPHTHENE	450 U	460 U	470 U	350 U	450 U	440 U	660 U	2300 U
ACENAPHTHYLENE	450 U	460 U	470 U	350 U	450 U	440 U	660 U	2300 U
ANTHRACENE	450 U	460 U	470 U	43 J	450 U	440 U	660 U	550 J
BAP EQUIVALENT(2)	289.83	324.355	358.88	1075.36				
BENZO(A)ANTHRACENE	180 J	200 J	220 J	560	51 J	330 J	230 J	6100
BENZO(A)PYRENE	200 J	225 J	250 J	760	68 J	360 J	280 J	8000
BENZO(B)FLUORANTHENE	270 J	300 J	330 J	1100	80 J	460	420 J	10000
BENZO(G,H,I)PERYLENE	100 J	115 J	130 J	210 J	450 U	100 J	130 J	3500
BENZO(K)FLUORANTHENE	120 J	140 J	160 J	460	450 U	190 J	130 J	3700
BIS(2-CHLOROETHOXY)METHANE	450 U	460 U	470 U	350 U				
BIS(2-CHLOROETHYL)ETHER	450 U	460 U	470 U	350 U				
BIS(2-ETHYLHEXYL)PHTHALATE	450 U	460 U	470 U	350 U				
BUTYL BENZYL PHTHALATE	450 U	460 U	470 U	350 U				
CARBAZOLE	450 U	460 U	470 U	58 J				

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD2 CF15SD2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-AVG 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-D 7/5/1995	CEF-015-SW/SD3 CF15SD3 [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SD4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SD5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SD6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SD7 [05/07/97] 5/7/1997
CHRYSENE	230 J	255 J	280 J	760	64 J	430 J	290 J	7300
DI-N-BUTYL PHTHALATE	2700	3100	3500	2100				
DI-N-OCTYL PHTHALATE	450 U	460 U	470 U	350 U				
DIBENZO(A,H)ANTHRACENE	34 J	37.5 J	41 J	110 J	450 U	440 U	660 U	1100 J
DIBENZOFURAN	450 U	460 U	470 U	350 U				
DIETHYL PHTHALATE	450 U	460 U	470 U	350 U				
DIMETHYL PHTHALATE	450 U	460 U	470 U	350 U				
FLUORANTHENE	260 J	305 J	350 J	980	79 J	590	330 J	10000
FLUORENE	450 U	460 U	470 U	350 U	450 U	440 U	660 U	2300 U
HEXACHLOROBENZENE	450 U	460 U	470 U	350 U				
HEXACHLOROBUTADIENE	450 U	460 U	470 U	350 U				
HEXACHLOROCYCLOPENTADIENE	450 U	460 U	470 U	350 U				
HEXACHLOROETHANE	450 U	460 U	470 U	350 U				
INDENO(1,2,3-CD)PYRENE	94 J	102 J	110 J	340 J	450 U	140 J	160 J	4300
ISOPHORONE	450 U	460 U	470 U	350 U				
N-NITROSO-DI-N-PROPYLAMINE	450 U	460 U	470 U	350 U		440 U		
N-NITROSODIPHENYLAMINE	450 U	460 U	470 U	350 U				
NAPHTHALENE	450 U	460 U	470 U	350 U	450 U	440 U	660 U	2300 U
NITROBENZENE	450 U	460 U	470 U	350 U				
PENTACHLOROPHENOL	1100 U	1100 U	1100 U	850 U		1100 U		
PHENANTHRENE	73 J	85.5 J	98 J	220 J	450 U	170 J	96 J	3100
PHENOL	450 U	460 U	470 U	350 U		440 U		
PYRENE	210 J	230 J	250 J	600	84 J	510	330 J	9100
TOTAL PAHS	2671	2915	3159	6668				
Pesticides/PCBs (ug/kg)								
4,4'-DDD	4.5 J	3.55 J	2.6 J	11 J				
4,4'-DDE	3.7 J	3.45 J	3.2 J	8.3 J				
4,4'-DDT	4 J	4 J	4.8 U	8.1 J				
ALDRIN	1.7 R	1.5 R	1.5 R	0.84 R				
ALPHA-BHC	2.3 U	2.35 U	2.4 U	1.8 U				
ALPHA-CHLORDANE	2.3 U	2.35 U	2.4 U	1.8 U				
AROCLOR-1016	46 U	47 U	48 U	35 U				
AROCLOR-1221	91 U	93 U	95 U	71 U				
AROCLOR-1232	46 U	47 U	48 U	35 U				
AROCLOR-1242	46 U	47 U	48 U	35 U				
AROCLOR-1248	46 U	47 U	48 U	35 U				
AROCLOR-1254	46 U	47 U	48 U	35 U				
AROCLOR-1260	46 U	47 U	48 U	35 U				
BETA-BHC	2.3 U	2.35 U	2.4 U	1.8 U				
DELTA-BHC	2.3 U	2.35 U	2.4 U	1.8 U				

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SW/SD2	CEF-015-SW/SD2	CEF-015-SW/SD2	CEF-015-SW/SD3	CEF-015-SW/SD4	CEF-015-SW/SD5	CEF-015-SW/SD6	CEF-015-SW/SD7
SAMPLE NUMBER	CF15SD2 [07/05/95]	CF15SD2 [07/05/95]-AVG	CF15SD2 [07/05/95]-D	CF15SD3 [07/06/95]	CF15SD4 [05/07/97]	CF15SD5 [05/07/97]	CF15SD6 [05/07/97]	CF15SD7 [05/07/97]
SAMPLE DATE	7/5/1995	7/5/1995	7/5/1995	7/6/1995	5/7/1997	5/7/1997	5/7/1997	5/7/1997
DIELDRIN	0.46 J	0.46 J	4.8 U	3.5 U				
ENDOSULFAN I	2.3 U	2.35 U	2.4 U	1.8 U				
ENDOSULFAN II	4.6 U	4.7 U	4.8 U	3.5 U				
ENDOSULFAN SULFATE	4.6 U	4.7 U	4.8 U	3.5 U				
ENDRIN	4.6 U	4.7 U	4.8 U	3.5 U				
ENDRIN ALDEHYDE	4.6 U	4.7 U	4.8 U	3.5 U				
ENDRIN KETONE	4.6 U	4.7 U	4.8 U	3.5 U				
GAMMA-BHC (LINDANE)	2.3 U	2.35 U	2.4 U	1.8 U				
GAMMA-CHLORDANE	2.3 U	2.35 U	2.4 U	1.8 U				
HEPTACHLOR	2.3 UJ	2.35 UJ	2.4 UJ	1.8 UJ				
HEPTACHLOR EPOXIDE	2.3 U	2.35 U	2.4 U	1.8 U				
METHOXYCHLOR	4.6 U	14.3 U	24 U	18 U				
TOXAPHENE	230 U	235 U	240 U	180 U				
Petroleum Hydrocarbons (mg/kg)								
TOTAL PETROLEUM HYDROCARBONS	68 J	114 J	160 J	72 J	56	13 U	16 U	18 U
Explosives (ug/kg)								
2,4,6-TRINITROTOLUENE	250 U	250 U	250 U	2500 U				
2-AMINO-4,6-DINITROTOLUENE	250 U	250 U	250 U	2500 U				
2-NITROTOLUENE	500 U	500 U	500 U	5000 U				
3-NITROTOLUENE	500 U	500 U	500 U	5000 U				
4-AMINO-2,6-DINITROTOLUENE	250 U	250 U	250 U	2500 U				
4-NITROTOLUENE	500 U	500 U	500 U	37500				
HMX	500 U	500 U	500 U	5000 U				
RDX	500 U	500 U	500 U	5000 U				
TETRYL	500 U	500 U	500 U	5000 U				
Inorganics (mg/kg)								
ALUMINUM	2850	2630	2410	543				
ANTIMONY	5.5 U	5.65 U	5.8 U	4.3 U				
ARSENIC	1.1 UJ	1.15 UJ	1.2 UJ	0.85 UJ				
BARIUM	4.1	3.85	3.6	2.3				
BERYLLIUM	0.28 U	0.285 U	0.29 U	0.21 U				
CADMIUM	0.28 U	0.285 U	0.29 U	0.21 U				
CALCIUM	89.6 J	90.5 J	91.4 J	76.3 J				
CHROMIUM	3.1	2.2	2.6 U	1.9 U				
COBALT	1.7 U	1.7 U	1.7 U	1.3 U				
COPPER	0.83 U	0.85 U	0.87 U	0.64 U				
IRON	87.8	88	88.2	101				
LEAD	37.9	46.25	54.6	189	261 J	219 J	167 J	840 J
MAGNESIUM	33.3 U	29.5	29.5	25.4 U				
MANGANESE	0.73 U	0.68 U	0.63 U	0.66 U				

APPENDIX C-3

SEDIMENT ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD2 CF15SD2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-AVG 7/5/1995	CEF-015-SW/SD2 CF15SD2 [07/05/95]-D 7/5/1995	CEF-015-SW/SD3 CF15SD3 [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SD4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SD5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SD6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SD7 [05/07/97] 5/7/1997
MERCURY	0.14 UJ	0.145 UJ	0.15 UJ	0.11 UJ				
NICKEL	3.3 U	3.4 U	3.5 U	2.6 U				
POTASSIUM	39.4 U	34.6 U	29.8 U	20.2 U				
SELENIUM	1.1 U	1.15 U	1.2 U	0.85 U				
SILVER	1.1 U	1.15 U	1.2 U	0.85 U				
SODIUM	184 J	177.5 J	171 J	145 J				
THALLIUM	1.4 U	1.4 U	1.4 U	1.1 U				
VANADIUM	2.7	2.35	2	0.72 J				
ZINC	1.1 UJ	1.15 UJ	1.2 UJ	0.85 UJ				
Miscellaneous Parameters (mg/kg)								
CYANIDE	0.19 U	0.225 U	0.26 U	0.11 U				
TOTAL ORGANIC CARBON	14000	13000	12000	5600				

E-4: SURFACE WATER

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD1 CF15SW1 [07/05/95] 7/5/1995	CEF-015-SW/SD1 CF15SW1F [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2D [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2DF [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2F [07/05/95] 7/5/1995	CEF-015-SW/SD3 CF15SW3 [07/06/95] 7/6/1995
Volatile Organics (ug/L)							
1,1,1-TRICHLOROETHANE	1 U		1 U	1 U			1 U
1,1,2,2-TETRACHLOROETHANE	1 U		1 U	1 U			1 U
1,1,2-TRICHLOROETHANE	1 U		1 U	1 U			1 U
1,1-DICHLOROETHANE	1 U		1 U	1 U			1 U
1,1-DICHLOROETHENE	1 U		1 U	1 U			1 U
1,2-DICHLOROETHANE	1 U		1 U	1 U			1 U
1,2-DICHLOROPROPANE	1 U		1 U	1 U			1 U
2-BUTANONE	2 U		2 U	2 U			2 U
2-HEXANONE	2 U		2 U	2 U			2 U
4-METHYL-2-PENTANONE	2 U		2 U	2 U			2 U
ACETONE	4 U		4 U	4 U			2 U
BENZENE	1 U		1 U	1 U			1 U
BROMODICHLOROMETHANE	1 U		1 U	1 U			1 U
BROMOFORM	1 U		1 U	1 U			1 U
BROMOMETHANE	2 U		2 U	2 U			2 U
CARBON DISULFIDE	1 U		1 U	1 U			1 U
CARBON TETRACHLORIDE	1 U		1 U	1 U			1 U
CHLOROBENZENE	1 U		1 U	1 U			1 U
CHLORODIBROMOMETHANE	1 U		1 U	1 U			1 U
CHLOROETHANE	2 U		2 U	2 U			2 U
CHLOROFORM	1 U		1 U	1 U			1 U
CHLOROMETHANE	2 U		2 U	2 U			2 U
CIS-1,3-DICHLOROPROPENE	1 U		1 U	1 U			1 U
ETHYLBENZENE	1 U		1 U	1 U			1 U
METHYLENE CHLORIDE	1 U		1 U	1 U			1 U
STYRENE	1 U		1 U	1 U			1 U
TETRACHLOROETHENE	1 U		1 U	1 U			1 U
TOLUENE	1 U		1 U	1 U			1 U
TOTAL 1,2-DICHLOROETHENE	1 U		1 U	1 U			1 U
TOTAL XYLENES	1 U		1 U	1 U			1 U
TRANS-1,3-DICHLOROPROPENE	1 U		1 U	1 U			1 U
TRICHLOROETHENE	1 U		1 U	1 U			1 U
VINYL CHLORIDE	2 U		2 U	2 U			2 U
Semivolatile Organics (ug/L)							
1,2,4-TRICHLOROBENZENE	10 U		10 U	10 U			10 U
1,2-DICHLOROBENZENE	10 U		10 U	10 U			10 U
1,3,5-TRINITROBENZENE	6.73		0.4 U	0.4 U			0.4 U
1,3-DICHLOROBENZENE	10 U		10 U	10 U			10 U
1,3-DINITROBENZENE	0.65 U		0.4 U	0.4 U			0.4 U

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD1 CF15SW1 [07/05/95] 7/5/1995	CEF-015-SW/SD1 CF15SW1F [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2D [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2DF [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2F [07/05/95] 7/5/1995	CEF-015-SW/SD3 CF15SW3 [07/06/95] 7/6/1995
1,4-DICHLOROBENZENE	10 U		10 U	10 U			10 U
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U		10 U	10 U			10 U
2,4,5-TRICHLOROPHENOL	25 U		25 U	25 U			25 U
2,4,6-TRICHLOROPHENOL	10 U		10 U	10 U			10 U
2,4-DICHLOROPHENOL	10 U		10 U	10 U			10 U
2,4-DIMETHYLPHENOL	10 U		10 U	10 U			10 U
2,4-DINITROPHENOL	25 U		25 U	25 U			25 U
2,4-DINITROTOLUENE	10 U		10 U	10 U			10 U
2,6-DINITROTOLUENE	10 U		10 U	10 U			10 U
2-CHLORONAPHTHALENE	10 U		10 U	10 U			10 U
2-CHLOROPHENOL	10 U		10 U	10 U			10 U
2-METHYLNAPHTHALENE	10 U		10 U	10 U			10 U
2-METHYLPHENOL	10 U		10 U	10 U			10 U
2-NITROANILINE	25 U		25 U	25 U			25 U
2-NITROPHENOL	10 U		10 U	10 U			10 U
3,3'-DICHLOROBENZIDINE	10 U		10 U	10 U			10 U
3-NITROANILINE	25 U		25 U	25 U			25 U
4,6-DINITRO-2-METHYLPHENOL	25 U		25 U	25 U			25 U
4-BROMOPHENYL PHENYL ETHER	10 U		10 U	10 U			10 U
4-CHLORO-3-METHYLPHENOL	10 U		10 U	10 U			10 U
4-CHLOROANILINE	10 U		10 U	10 U			10 U
4-CHLOROPHENYL PHENYL ETHER	10 U		10 U	10 U			10 U
4-METHYLPHENOL	10 U		10 U	10 U			10 U
4-NITROANILINE	25 U		25 U	25 U			25 U
4-NITROPHENOL	25 U		25 U	25 U			25 U
ACENAPHTHENE	10 U		10 U	10 U			10 U
ACENAPHTHYLENE	10 U		10 U	10 U			10 U
ANTHRACENE	10 U		10 U	10 U			10 U
BENZO(A)ANTHRACENE	10 U		10 U	10 U			10 U
BENZO(A)PYRENE	10 U		10 U	10 U			10 U
BENZO(B)FLUORANTHENE	10 U		10 U	10 U			10 U
BENZO(G,H,I)PERYLENE	10 U		10 U	10 U			10 U
BENZO(K)FLUORANTHENE	10 U		10 U	10 U			10 U
BIS(2-CHLOROETHOXY)METHANE	10 U		10 U	10 U			10 U
BIS(2-CHLOROETHYL)ETHER	10 U		10 U	10 U			10 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U		10 U	10 U			10 U
BUTYL BENZYL PHTHALATE	10 U		10 U	10 U			10 U
CARBAZOLE	10 U		10 U	10 U			10 U
CHRYSENE	10 U		10 U	10 U			10 U
DI-N-BUTYL PHTHALATE	10 U		10 U	10 U			10 U

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD1 CF15SW1 [07/05/95] 7/5/1995	CEF-015-SW/SD1 CF15SW1F [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2D [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2DF [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2F [07/05/95] 7/5/1995	CEF-015-SW/SD3 CF15SW3 [07/06/95] 7/6/1995
DI-N-OCTYL PHTHALATE	10 U		10 U	10 U			10 U
DIBENZO(A,H)ANTHRACENE	10 U		10 U	10 U			10 U
DIBENZOFURAN	10 U		10 U	10 U			10 U
DIETHYL PHTHALATE	10 U		10 U	10 U			10 U
DIMETHYL PHTHALATE	10 U		10 U	10 U			10 U
FLUORANTHENE	10 U		10 U	10 U			10 U
FLUORENE	10 U		10 U	10 U			10 U
HEXACHLOROBENZENE	10 U		10 U	10 U			10 U
HEXACHLOROBUTADIENE	10 U		10 U	10 U			10 U
HEXACHLOROCYCLOPENTADIENE	10 U		10 U	10 U			10 U
HEXACHLOROETHANE	10 U		10 U	10 U			10 U
INDENO(1,2,3-CD)PYRENE	10 U		10 U	10 U			10 U
ISOPHORONE	10 U		10 U	10 U			10 U
N-NITROSO-DI-N-PROPYLAMINE	10 U		10 U	10 U			10 U
N-NITROSODIPHENYLAMINE	10 U		10 U	10 U			10 U
NAPHTHALENE	10 U		10 U	10 U			10 U
NITROBENZENE	10 U		10 U	10 U			10 U
PENTACHLOROPHENOL	25 U		25 U	25 U			25 U
PHENANTHRENE	10 U		10 U	10 U			10 U
PHENOL	10 U		10 U	10 U			10 U
PYRENE	10 U		10 U	10 U			10 U
Pesticides/PCBs (ug/L)							
4,4'-DDD	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
4,4'-DDE	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
4,4'-DDT	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
ALDRIN	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
ALPHA-BHC	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
ALPHA-CHLORDANE	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
AROCLOR-1016	1 UJ		1 UJ	1 UJ			1 UJ
AROCLOR-1221	2 UJ		2 UJ	2 UJ			2 UJ
AROCLOR-1232	1 UJ		1 UJ	1 UJ			1 UJ
AROCLOR-1242	1 UJ		1 UJ	1 UJ			1 UJ
AROCLOR-1248	1 UJ		1 UJ	1 UJ			1 UJ
AROCLOR-1254	1 UJ		1 UJ	1 UJ			1 UJ
AROCLOR-1260	1 UJ		1 UJ	1 UJ			1 UJ
BETA-BHC	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
DELTA-BHC	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
DIELDRIN	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
ENDOSULFAN I	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
ENDOSULFAN II	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD1 CF15SW1 [07/05/95] 7/5/1995	CEF-015-SW/SD1 CF15SW1F [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2D [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2DF [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2F [07/05/95] 7/5/1995	CEF-015-SW/SD3 CF15SW3 [07/06/95] 7/6/1995
ENDOSULFAN SULFATE	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
ENDRIN	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
ENDRIN ALDEHYDE	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
ENDRIN KETONE	0.1 UJ		0.1 UJ	0.1 UJ			0.1 UJ
GAMMA-BHC (LINDANE)	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
GAMMA-CHLORDANE	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
HEPTACHLOR	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
HEPTACHLOR EPOXIDE	0.05 UJ		0.05 UJ	0.05 UJ			0.05 UJ
METHOXYCHLOR	0.5 UJ		0.5 UJ	0.5 UJ			0.5 UJ
TOXAPHENE	5 UJ		5 UJ	5 UJ			5 UJ
Petroleum Hydrocarbons (mg/L)							
TOTAL PETROLEUM HYDROCARBONS	0.6 J		0.5 UJ	0.5 UJ			0.5 UJ
Explosives (ug/L)							
2,4,6-TRINITROTOLUENE	0.645 U		0.4 U	0.4 U			0.4 U
2-NITROTOLUENE	1.29 U		0.8 U	0.8 U			0.8 U
3-NITROTOLUENE	4.95		0.8 U	0.8 U			0.8 U
4-AMINO-2,6-DINITROTOLUENE	0.65 U		0.4 U	0.4 U			0.4 U
4-NITROTOLUENE	46.1		1.18	0.8 U			1.11
HMX	1.29 U		0.8 U	0.8 U			0.8 U
RDX	1.29 U		0.8 U	0.8 U			0.8 U
TETRYL	0.645 U		18.7	18.1			18.4
Inorganics (ug/L)							
ALUMINUM	586	513	441	447	403	450	649
ANTIMONY	20 U	20 U	20 U	20 U	20 U	20 U	20 U
ARSENIC	4.9	5.6	4	4.8 J	4 UJ	4 UJ	12
BARIUM	17.1	14.9	10.9	9.3	8.3	9.3	11.9
BERYLLIUM	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CADMIUM	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CALCIUM	620	538	4940	4080	3570	3960	2100
CHROMIUM	9 U	9 U	9 U	9 U	9 U	9 U	9 U
COBALT	6 U	6 U	6 U	6 U	6 U	6 U	6 U
COPPER	3 U	3 U	9	3 U	3 U	3 U	3 U
IRON	1370	1020	620	605	468	512	1980
LEAD	91	79.5	269	281	189	205	264
MAGNESIUM	503	458	557	440	396	493	429
MANGANESE	5.5 U	5.5 U	12.3 U	8.3 U	8.2 U	7.2 U	6.7 U
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	12 U	12 U	12 U	12 U	12 U	12 U	12 U
POTASSIUM	159 U	68.4 U	362	132 U	134 U	528	144 U
SELENIUM	4 U	4 U	4 U	4 U	4 U	4 U	4 U

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD1 CF15SW1 [07/05/95] 7/5/1995	CEF-015-SW/SD1 CF15SW1F [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2 [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2D [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2DF [07/05/95] 7/5/1995	CEF-015-SW/SD2 CF15SW2F [07/05/95] 7/5/1995	CEF-015-SW/SD3 CF15SW3 [07/06/95] 7/6/1995
SILVER	4 U	4 U	4 U	4 U	4 U	4 U	4 U
SODIUM	4190 J	4070	5220 J	3650 J	3400	3800	4000 J
THALLIUM	5 U	5 U	5 U	5 U	5 U	5 U	5 U
VANADIUM	3 U	3 U	3 U	3 U	3 U	3 U	3.3
ZINC	10.9 UJ	9.5 UJ	10.8 U	4 UJ	4 UJ	21.3 UJ	13 UJ
Miscellaneous Parameters							
ALKALINITY (MG/L)	10 U		10 U	10 U			
BICARBONATE ALKALINITY (MG/L)	10 U		10 U	10 U			
CARBONATE ALKALINITY (MG/L)	10 U		10 U	10 U			10 U
CHLORIDE (MG/L)	10 J		8 J	8 J			9 J
CYANIDE (UG/L)	3.8 U		4.4 UJ	2.4 U			2 U
HARDNESS (MG/L)	8 J		70 J	14 J			8 J
HEXAVALENT CHROMIUM (MG/L)	0.02 U		0.02 U	0.02 U			0.02 U
ORTHOPHOSPHATE (MG/L)	0.2		0.1 U	0.1 U			0.1 U
SULFATE (MG/L)	10 U		10 U	10 U			
SULFIDE (MG/L)	1 U		1	1 U			1 U
TOTAL DISSOLVED SOLIDS (MG/L)	52		70	63			77
TOTAL KJELDAHL NITROGEN (MG/L)	2 U		1 U	1 U			1 U

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD3 CF15SW3F [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SW4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SW5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SW6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SW7 [05/07/97] 5/7/1997
Volatile Organics (ug/L)					
1,1,1-TRICHLOROETHANE					
1,1,2,2-TETRACHLOROETHANE					
1,1,2-TRICHLOROETHANE					
1,1-DICHLOROETHANE					
1,1-DICHLOROETHENE					
1,2-DICHLOROETHANE					
1,2-DICHLOROPROPANE					
2-BUTANONE					
2-HEXANONE					
4-METHYL-2-PENTANONE					
ACETONE					
BENZENE					
BROMODICHLOROMETHANE					
BROMOFORM					
BROMOMETHANE					
CARBON DISULFIDE					
CARBON TETRACHLORIDE					
CHLOROBENZENE					
CHLORODIBROMOMETHANE					
CHLOROETHANE					
CHLOROFORM					
CHLOROMETHANE					
CIS-1,3-DICHLOROPROPENE					
ETHYLBENZENE					
METHYLENE CHLORIDE					
STYRENE					
TETRACHLOROETHENE					
TOLUENE					
TOTAL 1,2-DICHLOROETHENE					
TOTAL XYLENES					
TRANS-1,3-DICHLOROPROPENE					
TRICHLOROETHENE					
VINYL CHLORIDE					
Semivolatile Organics (ug/L)					
1,2,4-TRICHLOROBENZENE					
1,2-DICHLOROBENZENE					
1,3,5-TRINITROBENZENE					
1,3-DICHLOROBENZENE					
1,3-DINITROBENZENE					

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD3 CF15SW3F [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SW4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SW5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SW6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SW7 [05/07/97] 5/7/1997
1,4-DICHLOROBENZENE					
2,2'-OXYBIS(1-CHLOROPROPANE)					
2,4,5-TRICHLOROPHENOL					
2,4,6-TRICHLOROPHENOL					
2,4-DICHLOROPHENOL					
2,4-DIMETHYLPHENOL					
2,4-DINITROPHENOL					
2,4-DINITROTOLUENE					
2,6-DINITROTOLUENE					
2-CHLORONAPHTHALENE					
2-CHLOROPHENOL					
2-METHYLNAPHTHALENE					
2-METHYLPHENOL					
2-NITROANILINE					
2-NITROPHENOL					
3,3'-DICHLOROBENZIDINE					
3-NITROANILINE					
4,6-DINITRO-2-METHYLPHENOL					
4-BROMOPHENYL PHENYL ETHER					
4-CHLORO-3-METHYLPHENOL					
4-CHLOROANILINE					
4-CHLOROPHENYL PHENYL ETHER					
4-METHYLPHENOL					
4-NITROANILINE					
4-NITROPHENOL					
ACENAPHTHENE					
ACENAPHTHYLENE					
ANTHRACENE					
BENZO(A)ANTHRACENE					
BENZO(A)PYRENE					
BENZO(B)FLUORANTHENE					
BENZO(G,H,I)PERYLENE					
BENZO(K)FLUORANTHENE					
BIS(2-CHLOROETHOXY)METHANE					
BIS(2-CHLOROETHYL)ETHER					
BIS(2-ETHYLHEXYL)PHTHALATE					
BUTYL BENZYL PHTHALATE					
CARBAZOLE					
CHRYSENE					
DI-N-BUTYL PHTHALATE					

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD3 CF15SW3F [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SW4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SW5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SW6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SW7 [05/07/97] 5/7/1997
DI-N-OCTYL PHTHALATE					
DIBENZO(A,H)ANTHRACENE					
DIBENZOFURAN					
DIETHYL PHTHALATE					
DIMETHYL PHTHALATE					
FLUORANTHENE					
FLUORENE					
HEXACHLOROBENZENE					
HEXACHLOROBUTADIENE					
HEXACHLOROCYCLOPENTADIENE					
HEXACHLOROETHANE					
INDENO(1,2,3-CD)PYRENE					
ISOPHORONE					
N-NITROSO-DI-N-PROPYLAMINE					
N-NITROSODIPHENYLAMINE					
NAPHTHALENE					
NITROBENZENE					
PENTACHLOROPHENOL					
PHENANTHRENE					
PHENOL					
PYRENE					
Pesticides/PCBs (ug/L)					
4,4'-DDD					
4,4'-DDE					
4,4'-DDT					
ALDRIN					
ALPHA-BHC					
ALPHA-CHLORDANE					
AROCLOR-1016					
AROCLOR-1221					
AROCLOR-1232					
AROCLOR-1242					
AROCLOR-1248					
AROCLOR-1254					
AROCLOR-1260					
BETA-BHC					
DELTA-BHC					
DIELDRIN					
ENDOSULFAN I					
ENDOSULFAN II					

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD3 CF15SW3F [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SW4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SW5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SW6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SW7 [05/07/97] 5/7/1997
ENDOSULFAN SULFATE					
ENDRIN					
ENDRIN ALDEHYDE					
ENDRIN KETONE					
GAMMA-BHC (LINDANE)					
GAMMA-CHLORDANE					
HEPTACHLOR					
HEPTACHLOR EPOXIDE					
METHOXYCHLOR					
TOXAPHENE					
Petroleum Hydrocarbons (mg/L)					
TOTAL PETROLEUM HYDROCARBONS					
Explosives (ug/L)					
2,4,6-TRINITROTOLUENE					
2-NITROTOLUENE					
3-NITROTOLUENE					
4-AMINO-2,6-DINITROTOLUENE					
4-NITROTOLUENE					
HMX					
RDX					
TETRYL					
Inorganics (ug/L)					
ALUMINUM	585				
ANTIMONY	20 U				
ARSENIC	12.2				
BARIUM	11.3				
BERYLLIUM	1 U				
CADMIUM	1 U				
CALCIUM	1980				
CHROMIUM	9 U				
COBALT	6 U				
COPPER	3 U				
IRON	1650				
LEAD	225	398	359	195	271
MAGNESIUM	396				
MANGANESE	8 U				
MERCURY	0.2 U				
NICKEL	12 U				
POTASSIUM	137 U				
SELENIUM	4 U				

APPENDIX C-4

SURFACE WATER ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION SAMPLE NUMBER SAMPLE DATE	CEF-015-SW/SD3 CF15SW3F [07/06/95] 7/6/1995	CEF-015-SW/SD4 CF15SW4 [05/07/97] 5/7/1997	CEF-015-SW/SD5 CF15SW5 [05/07/97] 5/7/1997	CEF-015-SW/SD6 CF15SW6 [05/07/97] 5/7/1997	CEF-015-SW/SD7 CF15SW7 [05/07/97] 5/7/1997
SILVER	4 U				
SODIUM	4020				
THALLIUM	5 U				
VANADIUM	3 U				
ZINC	10.9 UJ				
Miscellaneous Parameters					
ALKALINITY (MG/L)					
BICARBONATE ALKALINITY (MG/L)					
CARBONATE ALKALINITY (MG/L)					
CHLORIDE (MG/L)					
CYANIDE (UG/L)					
HARDNESS (MG/L)					
HEXAVALENT CHROMIUM (MG/L)					
ORTHOPHOSPHATE (MG/L)					
SULFATE (MG/L)					
SULFIDE (MG/L)					
TOTAL DISSOLVED SOLIDS (MG/L)					
TOTAL KJELDAHL NITROGEN (MG/L)					

E-5 ECOLOGICAL

E-5.1: INVERTEBRATE ANALYTICAL RESULTS

APPENDIX C-5.1

INVERTEBRATE ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-701	CEF-015-SS-703	CEF-015-SS-704	CEF-015-SS-706	CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708	CEF-015-SS-708A
SAMPLE NUMBER	CEF-015-IV-024	CEF-015-IV-003	CEF-015-IV-004	CEF-015-IV-006	CEF-015-IV-007	CEF-015-IV-007A	CEF-015-IV-008	CEF-015-IV-008A
SAMPLE DATE	6/23/2001	6/27/2001	6/26/2001	6/27/2001	6/25/2001	6/25/2001	6/26/2001	6/23/2001
Inorganics (mg/kg)								
LEAD	5.2	46.5	36.7	333	3.8	1.7	157	3.5

APPENDIX C-5.1

INVERTEBRATE ANALYTIC RESULTS
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-709	CEF-015-SS-717	CEF-015-SS-719	CEF-015-SS-719A	CEF-015-SS-739	CEF-015-SS-740	CEF-015-SS-741
SAMPLE NUMBER	CEF-015-IV-009	CEF-015-IV-017	CEF-015-IV-019	CEF-015-IV-019A	CEF-015-IV-021	CEF-015-IV-022	CEF-015-IV-023
SAMPLE DATE	6/26/2001	6/27/2001	6/26/2001	6/23/2001	6/24/2001	6/24/2001	6/24/2001
Inorganics (mg/kg)							
LEAD	11.6	3.7	0.7	1.7	0.16 U	0.16 U	0.16 U

E-5.2: INVERTEBRATE SOIL ANALYTICAL RESULTS

APPENDIX C-5.2

INVERTEBRATE SOIL ANALYTIC RESULTS (JUNE 2001)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-701	CEF-015-SS-703	CEF-015-SS-704	CEF-015-SS-706	CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708	CEF-015-SS-708A	CEF-015-SS-709
SAMPLE NUMBER	CEF-015-SS-701	CEF-015-SS-703	CEF-015-SS-704	CEF-015-SS-706	CEF-015-SS-707	CEF-015-SS-707A	CEF-015-SS-708	CEF-015-SS-708A	CEF-015-SS-709
DEPTH	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
SAMPLE DATE	6/23/2001	6/27/2001	6/26/2001	6/27/2001	6/25/2001	6/25/2001	6/26/2001	6/23/2001	6/26/2001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	45000 U	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	1600 U
2-METHYLNAPHTHALENE	45000 U	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	1600 U
ACENAPHTHENE	90000 U	3400 U	3300 U	3300 U	5000 U	4900 U	4500 U	3700 U	3200 U
ACENAPHTHYLENE	90000 U	3400 U	3300 U	3300 U	5000 U	4900 U	4500 U	3700 U	3200 U
ANTHRACENE	45000 U	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	1600 U
BENZO(A)ANTHRACENE	74200	1700 U	1600 U	1600 U	2500 U	2400 U	1720 J	1800 U	1600 U
BENZO(A)PYRENE	72200	340 U	325 J	282 J	500 U	490 U	2120	370 U	288 J
BENZO(B)FLUORANTHENE	54400	340 U	219 J	188 J	500 U	490 U	1500	370 U	170 J
BENZO(G,H,I)PERYLENE	40600	340 U	366	298 J	500 U	490 U	1960	370 U	274 J
BENZO(K)FLUORANTHENE	38600	340 U	151 J	330 U	500 U	490 U	999	370 U	320 U
CHRYSENE	79600	1700 U	1600 U	1600 U	2500 U	2400 U	1720 J	1800 U	1600 U
DIBENZO(A,H)ANTHRACENE	8030 J	340 U	330 U	330 U	500 U	490 U	450 U	370 U	320 U
FLUORANTHENE	97300	1700 U	1600 U	1600 U	2500 U	2400 U	1990 J	1800 U	1600 U
FLUORENE	45000 U	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	1600 U
INDENO(1,2,3-CD)PYRENE	47200	340 U	244 J	191 J	500 U	490 U	1310	370 U	174 J
NAPHTHALENE	45000 U	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	3200 U
PHENANTHRENE	20800 J	1700 U	1600 U	1600 U	2500 U	2400 U	2200 U	1800 U	1600 U
PYRENE	87800	1700 U	3200 U	1600 U	2500 U	2400 U	1780 J	1800 U	1600 U
Inorganics (mg/kg)									
LEAD	419	1400	3380	5470	3080	672	2200	894	709
Miscellaneous Parameters (mg/kg)									
CATION EXCHANGE CAPACITY	5350	5010	5840	4730	7820	9610	8950	7830	5360
TOTAL ORGANIC CARBON	63300	40700	53700	25300	121000	119000	93000	98600	30400

APPENDIX C-5.2

INVERTEBRATE SOIL ANALYTIC RESULTS (JUNE 2001)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-717	CEF-015-SS-719	CEF-015-SS-719A	CEF-015-SS-719A	CEF-015-SS-721	CEF-015-SS-722	CEF-015-SS-724	CEF-015-SS-724	CEF-015-SS-726A
SAMPLE NUMBER	CEF-015-SS-717	CEF-015-SS-719	CEF-015-SS-719A	CEF-015-SS-719A-D	CEF-015-SS-721	CEF-015-SS-722	CEF-015-SS-724	CEF-015-SS-724B	CEF-015-SS-726A
DEPTH	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
SAMPLE DATE	6/27/2001	6/26/2001	6/23/2001	6/23/2001	6/19/2001	6/20/2001	6/20/2001	6/27/2001	6/21/2001
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)									
1-METHYLNAPHTHALENE	1600 U	1700 U	2300 U	2200 U	17000 U	1900 U	1800 U	1600 U	31000 U
2-METHYLNAPHTHALENE	1600 U	1700 U	2300 U	2200 U	17000 U	1900 U	1800 U	1600 U	31000 U
ACENAPHTHENE	3200 U	3500 U	4700 U	4400 U	35000 U	3700 U	3600 U	3300 U	63000 U
ACENAPHTHYLENE	3200 U	3500 U	4700 U	4400 U	35000 U	3700 U	3600 U	3300 U	63000 U
ANTHRACENE	1600 U	1700 U	2300 U	2200 U	17000 U	1900 U	1800 U	1600 U	23700 J
BENZO(A)ANTHRACENE	1600 U	1060 J	2300 U	2200 U	36500	1900 U	1800 U	1600 U	111000
BENZO(A)PYRENE	320 U	1330	292 J	282 J	43300	370 U	460	517	116000
BENZO(B)FLUORANTHENE	320 U	800	368 J	424 J	31400	370 U	629	351	83300
BENZO(G,H,I)PERYLENE	320 U	1280	470 U	440 U	29800	370 U	390	585	63300
BENZO(K)FLUORANTHENE	320 U	625	152 J	440 U	19500	370 U	214 J	364	56000
CHRYSENE	1600 U	1000 J	2300 U	2200 U	43100	1900 U	1800 U	1600 U	116000
DIBENZO(A,H)ANTHRACENE	320 U	350 U	470 U	440 U	3000 J	370 U	360 U	330 U	9220
FLUORANTHENE	1600 U	1180 J	2300 U	2200 U	70500	1900 U	1800 U	1600 U	211000
FLUORENE	1600 U	1700 U	2300 U	2200 U	17000 U	1900 U	1800 U	1600 U	31000 U
INDENO(1,2,3-CD)PYRENE	320 U	850	305 J	313 J	30700	370 U	468	374	65400
NAPHTHALENE	3200 U	1700 U	2300 U	2200 U	17000 U	1900 U	1800 U	1600 U	31000 U
PHENANTHRENE	1600 U	1700 U	2300 U	2200 U	26800	1900 U	1800 U	1600 U	87600
PYRENE	1600 U	1300 J	2300 U	2200 U	61100	1900 U	1800 U	1600 U	179000
Inorganics (mg/kg)									
LEAD	120	66.3	109	86.6	102	23.4	48.5	31	532
Miscellaneous Parameters (mg/kg)									
CATION EXCHANGE CAPACITY	5310	4190	9840		5470	6800	4970		5540
TOTAL ORGANIC CARBON	32900	37100	80500		58600	68600	49200		28000

APPENDIX C-5.2

INVERTEBRATE SOIL ANALYTIC RESULTS (JUNE 2001)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-727A	CEF-015-SS-727A	CEF-015-SS-728A	CEF-015-SS-732	CEF-015-SS-733	CEF-015-SS-734	CEF-015-SS-735A	CEF-015-SS-735A
SAMPLE NUMBER	CEF-015-SS-727A	CEF-015-SS-727A-D	CEF-015-SS-728A	CEF-015-SS-732	CEF-015-SS-733	CEF-015-SS-734	CEF-015-SS-735A	CEF-015-SS-735A-D
DEPTH	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
SAMPLE DATE	6/22/2001	6/22/2001	6/21/2001	6/20/2001	6/19/2001	6/19/2001	6/21/2001	6/21/2001
SAMPLE CODE	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP
Semivolatile Organics (ug/kg)								
1-METHYLNAPHTHALENE	1600 U	1500 U	2200 U	1700 U	4100 U	33000 U	1600 U	1500 U
2-METHYLNAPHTHALENE	1600 U	1500 U	2200 U	1700 U	4100 U	33000 U	1600 U	1500 U
ACENAPHTHENE	3200 U	3000 U	4300 U	3400 U	8200 U	66000 U	3300 U	3000 U
ACENAPHTHYLENE	3200 U	3000 U	4300 U	3400 U	8200 U	66000 U	3300 U	3000 U
ANTHRACENE	1600 U	1500 U	2200 U	1700 U	4100 U	33000 U	1600 U	1500 U
BENZO(A)ANTHRACENE	1440 J	1570	4560	863 J	8520	59900	1600 U	1500 U
BENZO(A)PYRENE	1610	1810	5500	576	10000	71300	291 J	298 J
BENZO(B)FLUORANTHENE	1250	1430	4150	489	7090	49200	327 J	276 J
BENZO(G,H,I)PERYLENE	1190	1460	3890	432	6880	44400	280 J	211 J
BENZO(K)FLUORANTHENE	768	878	2560	271 J	4510	29800	330 U	152 J
CHRYSENE	1610	1770	5130	566 J	9680	71600	1600 U	1500 U
DIBENZO(A,H)ANTHRACENE	167 J	180 J	497	340 U	927	3650 J	330 U	300 U
FLUORANTHENE	2660	2870	8790	783 J	15600	113000	1600 U	1500 U
FLUORENE	1600 U	1500 U	2200 U	1700 U	4100 U	33000 U	1600 U	1500 U
INDENO(1,2,3-CD)PYRENE	1260	1430	4050	577	6820	47100	360	270 J
NAPHTHALENE	1600 U	1500 U	2200 U	1700 U	4100 U	33000 U	1600 U	1500 U
PHENANTHRENE	1220 J	1260 J	3590	1700 U	6290	35200	1600 U	1500 U
PYRENE	2380	2580	7620	846 J	13400	104000	1600 U	1500 U
Inorganics (mg/kg)								
LEAD	276	290	84.8	214	336	73	40.5	40.7
Miscellaneous Parameters (mg/kg)								
CATION EXCHANGE CAPACITY	3580		5530	4590	7130	6140	5480	
TOTAL ORGANIC CARBON	31300		54100	53600	43000	48500	53900	

APPENDIX C-5.2

INVERTEBRATE SOIL ANALYTIC RESULTS (JUNE 2001)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-736A	CEF-015-SS-737	CEF-015-SS-739	CEF-015-SS-740	CEF-015-SS-741
SAMPLE NUMBER	CEF-015-SS-736A	CEF-015-SS-737	CEF-015-SS-739	CEF-015-SS-740	CEF-015-SS-741
DEPTH	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
SAMPLE DATE	6/22/2001	6/20/2001	6/24/2001	6/24/2001	6/24/2001
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Semivolatile Organics (ug/kg)					
1-METHYLNAPHTHALENE	2100 U	1900 U	2000 U	2100 U	960 U
2-METHYLNAPHTHALENE	2100 U	1900 U	2000 U	2100 U	960 U
ACENAPHTHENE	4200 U	3800 U	4000 U	4300 U	1900 U
ACENAPHTHYLENE	4200 U	3800 U	4000 U	4300 U	1900 U
ANTHRACENE	2100 U	1900 U	2000 U	2100 U	960 U
BENZO(A)ANTHRACENE	2100 U	1900 U	2000 U	2100 U	960 U
BENZO(A)PYRENE	420 U	739	400 U	430 U	190 U
BENZO(B)FLUORANTHENE	420 U	696	400 U	430 U	190 U
BENZO(G,H,I)PERYLENE	420 U	578	400 U	430 U	190 U
BENZO(K)FLUORANTHENE	420 U	366 J	400 U	430 U	190 U
CHRYSENE	2100 U	1900 U	2000 U	2100 U	960 U
DIBENZO(A,H)ANTHRACENE	420 U	380 U	400 U	430 U	190 U
FLUORANTHENE	2100 U	972 J	2000 U	2100 U	960 U
FLUORENE	2100 U	1900 U	2000 U	2100 U	960 U
INDENO(1,2,3-CD)PYRENE	420 U	638	400 U	430 U	190 U
NAPHTHALENE	2100 U	1900 U	2000 U	2100 U	960 U
PHENANTHRENE	2100 U	1900 U	2000 U	2100 U	960 U
PYRENE	2100 U	969 J	2000 U	2100 U	960 U
Inorganics (mg/kg)					
LEAD	0.73 U	45.8	11.4	9.3	7.8
Miscellaneous Parameters (mg/kg)					
CATION EXCHANGE CAPACITY	10200	6580	5440	5810	6610
TOTAL ORGANIC CARBON	137000	42100	59700	55000	71500

E-6 ADDITIONAL DATA

E-6.1: TOXICITY SOIL ANALYTICAL RESULTS

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS015	CF15SS015	CF15SS015	CF15SS018	CF15SS020
SAMPLE NUMBER	CF15SS007 [06/21/96]	CF15SS015-12.5 [06/21/96]	CF15SS015-25 [06/21/96]	CF15SS015-50 [06/21/96]	CF15SS018 [06/21/96]	CF15SS020 [06/21/96]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE						
1,1,2,2-TETRACHLOROETHANE						
1,1,2-TRICHLOROETHANE						
1,1-DICHLOROETHANE						
1,1-DICHLOROETHENE						
1,2-DICHLOROETHANE						
1,2-DICHLOROPROPANE						
2-BUTANONE						
2-HEXANONE						
4-METHYL-2-PENTANONE						
ACETONE						
BENZENE						
BROMODICHLOROMETHANE						
BROMOFORM						
BROMOMETHANE						
CARBON DISULFIDE						
CARBON TETRACHLORIDE						
CHLOROBENZENE						
CHLORODIBROMOMETHANE						
CHLOROETHANE						
CHLOROFORM						
CHLOROMETHANE						
CIS-1,3-DICHLOROPROPENE						
ETHYLBENZENE						
METHYLENE CHLORIDE						
STYRENE						
TETRACHLOROETHENE						
TOLUENE						
TOTAL 1,2-DICHLOROETHENE						
TOTAL XYLENES						
TRANS-1,3-DICHLOROPROPENE						
TRICHLOROETHENE						
VINYL CHLORIDE						
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE						
1,2-DICHLOROBENZENE						
1,3-DICHLOROBENZENE						

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS015	CF15SS015	CF15SS015	CF15SS018	CF15SS020
SAMPLE NUMBER	CF15SS007 [06/21/96]	CF15SS015-12.5 [06/21/96]	CF15SS015-25 [06/21/96]	CF15SS015-50 [06/21/96]	CF15SS018 [06/21/96]	CF15SS020 [06/21/96]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
1,4-DICHLOROBENZENE						
2,2'-OXYBIS(1-CHLOROPROPANE)						
2,4,5-TRICHLOROPHENOL						
2,4,6-TRICHLOROPHENOL						
2,4-DICHLOROPHENOL						
2,4-DIMETHYLPHENOL						
2,4-DINITROPHENOL						
2,4-DINITROTOLUENE						
2,6-DINITROTOLUENE						
2-CHLORONAPHTHALENE						
2-CHLOROPHENOL						
2-METHYLNAPHTHALENE						
2-METHYLPHENOL						
2-NITROANILINE						
2-NITROPHENOL						
3,3'-DICHLOROBENZIDINE						
3-NITROANILINE						
4,6-DINITRO-2-METHYLPHENOL						
4-BROMOPHENYL PHENYL ETHER						
4-CHLORO-3-METHYLPHENOL						
4-CHLOROANILINE						
4-CHLOROPHENYL PHENYL ETHER						
4-METHYLPHENOL						
4-NITROANILINE						
4-NITROPHENOL						
ACENAPHTHENE						
ACENAPHTHYLENE						
ANTHRACENE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						
BIS(2-CHLOROETHOXY)METHANE						
BIS(2-CHLOROETHYL)ETHER						
BIS(2-ETHYLHEXYL)PHTHALATE						
BUTYL BENZYL PHTHALATE						
CARBAZOLE						

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS015	CF15SS015	CF15SS015	CF15SS018	CF15SS020
SAMPLE NUMBER	CF15SS007 [06/21/96]	CF15SS015-12.5 [06/21/96]	CF15SS015-25 [06/21/96]	CF15SS015-50 [06/21/96]	CF15SS018 [06/21/96]	CF15SS020 [06/21/96]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
CHRYSENE						
DI-N-BUTYL PHTHALATE						
DI-N-OCTYL PHTHALATE						
DIBENZO(A,H)ANTHRACENE						
DIBENZOFURAN						
DIETHYL PHTHALATE						
DIMETHYL PHTHALATE						
FLUORANTHENE						
FLUORENE						
HEXACHLOROBENZENE						
HEXACHLOROBUTADIENE						
HEXACHLOROCYCLOPENTADIENE						
HEXACHLOROETHANE						
INDENO(1,2,3-CD)PYRENE						
ISOPHORONE						
N-NITROSO-DI-N-PROPYLAMINE						
N-NITROSODIPHENYLAMINE						
NAPHTHALENE						
NITROBENZENE						
PENTACHLOROPHENOL						
PHENANTHRENE						
PHENOL						
PYRENE						
Pesticides/PCBs (ug/kg)						
4,4'-DDD						
4,4'-DDE						
4,4'-DDT						
ALDRIN						
ALPHA-BHC						
ALPHA-CHLORDANE						
AROCLOR-1016						
AROCLOR-1221						
AROCLOR-1232						
AROCLOR-1242						
AROCLOR-1248						
AROCLOR-1254						
AROCLOR-1260						
BETA-BHC						

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS015	CF15SS015	CF15SS015	CF15SS018	CF15SS020
SAMPLE NUMBER	CF15SS007 [06/21/96]	CF15SS015-12.5 [06/21/96]	CF15SS015-25 [06/21/96]	CF15SS015-50 [06/21/96]	CF15SS018 [06/21/96]	CF15SS020 [06/21/96]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
DELTA-BHC						
DIELDRIN						
ENDOSULFAN I						
ENDOSULFAN II						
ENDOSULFAN SULFATE						
ENDRIN						
ENDRIN ALDEHYDE						
ENDRIN KETONE						
GAMMA-BHC (LINDANE)						
GAMMA-CHLORDANE						
HEPTACHLOR						
HEPTACHLOR EPOXIDE						
METHOXYCHLOR						
TOXAPHENE						
Petroleum Hydrocarbons (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS						
Inorganics (mg/kg)						
ALUMINUM	51.4	24.9 J	104	168 J	64	62.1
ANTIMONY	4.6 U	4.6 U	4.6 U	35.4 U	4.6 U	4.6 U
ARSENIC	2.5	1.1 J	1.9 J	5.8 J	0.6 U	1.2 J
BARIUM	9.8 J	1.1 J	0.89 J	3.1 U	1 J	1.3 J
BERYLLIUM	0.4 U	0.4 U	0.4 U	3.1 U	0.4 U	0.4 U
CADMIUM	2.4	0.6 U	0.6 U	4.6 U	0.6 U	0.6 U
CALCIUM	1060	777 J	770 J	1100 J	1180	910 J
CHROMIUM	0.49 J	0.4 U	0.4 U	3.1 U	0.4 U	0.45 J
COBALT	1.4 U	1.4 U	1.8 J	10.8 U	1.4 U	1.4 U
COPPER	4.2 J	4.1 J	3.3 J	6.2 U	2 J	3.2 J
IRON	70.1	68.8	94.2	171	57.5	69.2
LEAD	83.3	122	249	746	5.2	41.6
MAGNESIUM	188 J	179 J	180 J	308 J	154 J	241 J
MANGANESE	3.9	2.4 J	1.8 J	3.2 J	3.7	4.5
MERCURY	0.05 U	0.05 U	0.05 U		0.05 U	0.09 J
NICKEL	2.6 U	2.6 U	2.6 U	20 U	2.6 U	2.6 U
POTASSIUM	1340 J	998 J	1120 J	2130 J	1250 J	1480 J
SELENIUM	1.2	1.5	1.4	6.2 U	0.88 J	1.3
SILVER	0.6 U	0.61 J	0.77 J	5.3 J	0.6 U	0.6 U
SODIUM	656 J	881 J	706 J	1370 J	621 J	722 J
THALLIUM	0.45 J	0.4 U	0.4 U	3.1 U	0.4 U	0.4 U

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS007 (Con)	CF15SS015	CF15SS015	CF15SS015	CF15SS018	CF15SS020
SAMPLE NUMBER	CF15SS007 [06/21/96]	CF15SS015-12.5 [06/21/96]	CF15SS015-25 [06/21/96]	CF15SS015-50 [06/21/96]	CF15SS018 [06/21/96]	CF15SS020 [06/21/96]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996	6/21/1996
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
VANADIUM	0.6 U	0.77 J	0.67 J	4.6 U	0.6 U	0.6 U
ZINC	29.9	28.3	24.6	57.5	20.3	24.2
Miscellaneous Parameters (mg/kg)						
CYANIDE						

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CEFBSS07 [07/20/93]	CF15SS048 [06/21/96]
DEPTH	0-1	0-1
SAMPLE DATE	7/20/1993	6/21/1996
SAMPLE CODE	NORMAL	NORMAL
Volatile Organics (ug/kg)		
1,1,1-TRICHLOROETHANE	5 U	
1,1,2,2-TETRACHLOROETHANE	5 U	
1,1,2-TRICHLOROETHANE	5 U	
1,1-DICHLOROETHANE	5 U	
1,1-DICHLOROETHENE	5 U	
1,2-DICHLOROETHANE	5 U	
1,2-DICHLOROPROPANE	5 U	
2-BUTANONE	11 U	
2-HEXANONE	11 U	
4-METHYL-2-PENTANONE	11 U	
ACETONE	5 U	
BENZENE	5 U	
BROMODICHLOROMETHANE	5 U	
BROMOFORM	5 U	
BROMOMETHANE	11 U	
CARBON DISULFIDE	5 U	
CARBON TETRACHLORIDE	5 U	
CHLOROBENZENE	5 U	
CHLORODIBROMOMETHANE	5 U	
CHLOROETHANE	11 U	
CHLOROFORM	5 U	
CHLOROMETHANE	11 U	
CIS-1,3-DICHLOROPROPENE	5 U	
ETHYLBENZENE	5 U	
METHYLENE CHLORIDE	5 U	
STYRENE	5 U	
TETRACHLOROETHENE	5 U	
TOLUENE	5 U	
TOTAL 1,2-DICHLOROETHENE	5 U	
TOTAL XYLENES	5 U	
TRANS-1,3-DICHLOROPROPENE	5 U	
TRICHLOROETHENE	5 U	
VINYL CHLORIDE	11 U	
Semivolatile Organics (ug/kg)		
1,2,4-TRICHLOROBENZENE	360 U	
1,2-DICHLOROBENZENE	360 U	
1,3-DICHLOROBENZENE	360 U	

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CEFBSS07 [07/20/93]	CF15SS048 [06/21/96]
DEPTH	0-1	0-1
SAMPLE DATE	7/20/1993	6/21/1996
SAMPLE CODE	NORMAL	NORMAL
1,4-DICHLOROBENZENE	360 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U	
2,4,5-TRICHLOROPHENOL	870 U	
2,4,6-TRICHLOROPHENOL	360 U	
2,4-DICHLOROPHENOL	360 U	
2,4-DIMETHYLPHENOL	360 U	
2,4-DINITROPHENOL	870 U	
2,4-DINITROTOLUENE	360 U	
2,6-DINITROTOLUENE	360 U	
2-CHLORONAPHTHALENE	360 U	
2-CHLOROPHENOL	360 U	
2-METHYLNAPHTHALENE	360 U	
2-METHYLPHENOL	360 U	
2-NITROANILINE	870 U	
2-NITROPHENOL	360 U	
3,3'-DICHLOROBENZIDINE	360 U	
3-NITROANILINE	870 U	
4,6-DINITRO-2-METHYLPHENOL	870 U	
4-BROMOPHENYL PHENYL ETHER	360 U	
4-CHLORO-3-METHYLPHENOL	360 U	
4-CHLOROANILINE	360 U	
4-CHLOROPHENYL PHENYL ETHER	360 U	
4-METHYLPHENOL	360 U	
4-NITROANILINE	870 U	
4-NITROPHENOL	870 U	
ACENAPHTHENE	360 U	
ACENAPHTHYLENE	360 U	
ANTHRACENE	360 U	
BENZO(A)ANTHRACENE	360 U	
BENZO(A)PYRENE	360 U	
BENZO(B)FLUORANTHENE	360 U	
BENZO(G,H,I)PERYLENE	360 U	
BENZO(K)FLUORANTHENE	360 U	
BIS(2-CHLOROETHOXY)METHANE	360 U	
BIS(2-CHLOROETHYL)ETHER	360 U	
BIS(2-ETHYLHEXYL)PHTHALATE	48 J	
BUTYL BENZYL PHTHALATE	360 U	
CARBAZOLE	360 U	

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CEFBSS07 [07/20/93]	CF15SS048 [06/21/96]
DEPTH	0-1	0-1
SAMPLE DATE	7/20/1993	6/21/1996
SAMPLE CODE	NORMAL	NORMAL
CHRYSENE	360 U	
DI-N-BUTYL PHTHALATE	360 U	
DI-N-OCTYL PHTHALATE	360 U	
DIBENZO(A,H)ANTHRACENE	360 U	
DIBENZOFURAN	360 U	
DIETHYL PHTHALATE	360 U	
DIMETHYL PHTHALATE	360 U	
FLUORANTHENE	360 U	
FLUORENE	360 U	
HEXACHLOROBENZENE	360 U	
HEXACHLOROBUTADIENE	360 U	
HEXACHLOROCYCLOPENTADIENE	360 U	
HEXACHLOROETHANE	360 U	
INDENO(1,2,3-CD)PYRENE	360 U	
ISOPHORONE	360 U	
N-NITROSO-DI-N-PROPYLAMINE	360 U	
N-NITROSODIPHENYLAMINE	360 U	
NAPHTHALENE	360 U	
NITROBENZENE	360 U	
PENTACHLOROPHENOL	870 U	
PHENANTHRENE	360 U	
PHENOL	360 U	
PYRENE	360 U	
Pesticides/PCBs (ug/kg)		
4,4'-DDD	3.6 U	
4,4'-DDE	3.6 U	
4,4'-DDT	3.6 U	
ALDRIN	1.8 U	
ALPHA-BHC	1.8 U	
ALPHA-CHLORDANE	1.8 U	
AROCLOR-1016	36 U	
AROCLOR-1221	72 U	
AROCLOR-1232	36 U	
AROCLOR-1242	36 U	
AROCLOR-1248	36 U	
AROCLOR-1254	36 U	
AROCLOR-1260	36 U	
BETA-BHC	1.8 U	

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CEFBSS07 [07/20/93]	CF15SS048 [06/21/96]
DEPTH	0-1	0-1
SAMPLE DATE	7/20/1993	6/21/1996
SAMPLE CODE	NORMAL	NORMAL
DELTA-BHC	1.8 U	
DIELDRIN	3.6 U	
ENDOSULFAN I	1.8 U	
ENDOSULFAN II	3.6 U	
ENDOSULFAN SULFATE	3.6 U	
ENDRIN	3.6 U	
ENDRIN ALDEHYDE	0.4 U	
ENDRIN KETONE	3.6 U	
GAMMA-BHC (LINDANE)	1.8 U	
GAMMA-CHLORDANE	1.8 U	
HEPTACHLOR	1.8 U	
HEPTACHLOR EPOXIDE	1.8 U	
METHOXYCHLOR	18 U	
TOXAPHENE	180 U	
Petroleum Hydrocarbons (mg/kg)		
TOTAL PETROLEUM HYDROCARBONS	13	
Inorganics (mg/kg)		
ALUMINUM	284	14.4 J
ANTIMONY	3.3 U	4.6 U
ARSENIC	0.22 U	0.6 U
BARIUM	1.7 U	0.4 U
BERYLLIUM	0.22 U	0.4 U
CADMIUM	0.88 U	0.6 U
CALCIUM	119 U	667 J
CHROMIUM	1.8 U	0.4 U
COBALT	1.3 U	1.5 J
COPPER	2.3 U	2.3 J
IRON	136	67.2
LEAD	2.1 U	0.4 U
MAGNESIUM	17.2 U	145 J
MANGANESE	3.6	2.2 J
MERCURY	0.1 U	0.05 U
NICKEL	1.5 U	2.6 U
POTASSIUM	13.8 U	899 J
SELENIUM	0.22 U	1.3
SILVER	0.88 U	0.6 U
SODIUM	209 U	784 J
THALLIUM	0.44 U	0.4 U

APPENDIX C-6.1

TOXICITY SOIL ANALYTIC RESULTS (JUNE 1996)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS048 (Con)	CF15SS048 (Con)
SAMPLE NUMBER	CEFBSS07 [07/20/93]	CF15SS048 [06/21/96]
DEPTH	0-1	0-1
SAMPLE DATE	7/20/1993	6/21/1996
SAMPLE CODE	NORMAL	NORMAL
VANADIUM	1.3 J	0.6 U
ZINC	3.6 U	21
Miscellaneous Parameters (mg/kg)		
CYANIDE	0.53 U	

E-6.2: SIEVE AND LEAD SOIL ANALYTICAL RESULTS

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS060	CF15SS060	CF15SS082	CF15SS082	CF15SS082	CF15SS082	CF15SS082	CF15SS082	CF15SS082	CF15SS082	CF15SS094
SAMPLE NUMBER	CF15SS6012A	CF15SS6012B	CF15SS8203A	CF15SS8203B	CF15SS8236A	CF15SS8236B	CF15SS8269A	CF15SS8269B	CF15SS82912A	CF15SS82912B	CF15SS9403A
DEPTH	0-1	0-1	0-0.25	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75	0.75-1	0.75-1	0-0.25
SAMPLE DATE	2/4/1997	2/6/1997	2/4/1997	2/6/1997	2/4/1997	2/6/1997	2/4/1997	2/6/1997	2/4/1997	2/6/1997	2/4/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)											
LEAD	531	487	1270	1310	2430	2110	521	418	126	133	9920
TCLP Inorganics (ug/L)											
LEAD	3500	3100	1300	1300	6400	5800	2000	1700	1100	1000	7000

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS094	CF15SS094	CF15SS094	CF15SS094	CF15SS094	CF15SS094	CF15SS094	CF15SS095	CF15SS095	CF15SS097
SAMPLE NUMBER	CF15SS9403B	CF15SS9436A	CF15SS9436B	CF15SS9469A	CF15SS9469B	CF15SS94912A	CF15SS94912B	CF15SS95012A	CF15SS95012B	CF15SS97012A
DEPTH	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75	0.75-1	0.75-1	0-1	0-1	0-1
SAMPLE DATE	2/7/1997	2/4/1997	2/6/1997	2/4/1997	2/6/1997	2/4/1997	2/7/1997	2/4/1997	2/5/1997	2/4/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)										
LEAD	9080	3860	3540	746	666	1370	1170	1820	1910	2050
TCLP Inorganics (ug/L)										
LEAD	9200	39400	20600	7600	3800	18400	8300	21000	10700	11000

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS097	CF15SS136	CF15SS136	CF15SS136	CF15SS136	CF15SS136	CF15SS136	CF15SS136
SAMPLE NUMBER	CF15SS97012B	CF15SS13603A [02/04/97]	CF15SS13603B [02/06/97]	CF15SS13603C [02/21/97]	CF15SS13636A	CF15SS13636B	CF15SS13669A	CF15SS13669B
DEPTH	0-1	0-0.25	0-0.25	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75
SAMPLE DATE	2/7/1997	2/4/1997	2/6/1997	2/21/1997	2/4/1997	2/6/1997	2/4/1997	2/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)								
LEAD	2150	6580	6090	5480	667	589	412	344
TCLP Inorganics (ug/L)								
LEAD	10500	22000	15700		1500	1000	1300	910

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS136	CF15SS136	CF15SS145	CF15SS145	CF15SS165	CF15SS165	CF15SS192	CF15SS192
SAMPLE NUMBER	CF15SS136912A	CF15SS136912B	CF15SS145012A	CF15SS145012B	CF15SS165012A	CF15SS165012B	CF15SS192012A [02/04/97]	CF15SS192012B [02/05/97]
DEPTH	0.75-1	0.75-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	2/4/1997	2/6/1997	2/4/1997	2/5/1997	2/4/1997	2/7/1997	2/4/1997	2/5/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)								
LEAD	163	207	1680	894	2620	1800	42.7	32.6
TCLP Inorganics (ug/L)								
LEAD	700	560	7500	7300	7800	8800		

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS202	CF15SS202	CF15SS202	CF15SS202	CF15SS202	CF15SS202
SAMPLE NUMBER	CF15SS20203A [02/04/97]	CF15SS20203B [02/07/97]	CF15SS20236A [02/04/97]	CF15SS20236B [02/07/97]	CF15SS20269A [02/04/97]	CF15SS20269B [02/07/97]
DEPTH	0-0.25	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75
SAMPLE DATE	2/4/1997	2/7/1997	2/4/1997	2/7/1997	2/4/1997	2/7/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)						
LEAD	60.4	35.7	11.3 U	10.2 U	10.9 U	10.2 U
TCLP Inorganics (ug/L)						
LEAD						

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS202	CF15SS202	CF15SS213	CF15SS213	CF15SS213	CF15SS213	CF15SS213	CF15SS213	CF15SS213
SAMPLE NUMBER	CF15SS202912A [02/04/97]	CF15SS202912B [02/05/97]	CF15SS21303A	CF15SS21303B	CF15SS21303C	CF15SS21336A	CF15SS21336B	CF15SS21369A	CF15SS21369B
DEPTH	0.75-1	0.75-1	0-0.25	0-0.25	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75
SAMPLE DATE	2/4/1997	2/5/1997	2/4/1997	2/7/1997	2/21/1997	2/4/1997	2/7/1997	2/4/1997	2/7/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)									
LEAD	10.8 U	10.2 U	59600	6020	3050	1800	1500	920	815
TCLP Inorganics (ug/L)									
LEAD			25900	21500		29400	16400	12100	10200

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS213	CF15SS213	CF15SS218	CF15SS218	CF15SS218	CF15SS218	CF15SS218	CF15SS218	CF15SS285	CF15SS285
SAMPLE NUMBER	CF15SS213912A	CF15SS213912B	CF15SS21803A	CF15SS21836A	CF15SS21836B	CF15SS21869A	CF15SS21869B	CF15SS21869C	CF15SS28503A	CF15SS28503B
DEPTH	0.75-1	0.75-1	0-0.25	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75	0.5-0.75	0-0.25	0-0.25
SAMPLE DATE	2/4/1997	2/7/1997	2/4/1997	2/4/1997	2/7/1997	2/4/1997	2/6/1997	2/20/1997	2/4/1997	2/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)										
LEAD	335	287	18300	21800	16300	5440	4820	2850	15600	12000
TCLP Inorganics (ug/L)										
LEAD	3800	4000	4500	19100	17800	8300	8200		22700	22800

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS285	CF15SS285	CF15SS285	CF15SS285	CF15SS285	CF15SS285	CF15SS285	CF15SS285
SAMPLE NUMBER	CF15SS28503C [02/21/97]	CF15SS28536A	CF15SS28536B	CF15SS28536C [02/21/97]	CF15SS28569A	CF15SS28569B	CF15SS285912A	CF15SS285912B
DEPTH	0-0.25	0.25-0.5	0.25-0.5	0.25-0.5	0.5-0.75	0.5-0.75	0.75-1	0.75-1
SAMPLE DATE	2/21/1997	2/4/1997	2/6/1997	2/21/1997	2/4/1997	2/7/1997	2/4/1997	2/6/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)								
LEAD	9570	4450	3890	2830	684	577	947	867
TCLP Inorganics (ug/L)								
LEAD		7100	7800		590	670	2700	3000

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS287	CF15SS287	CF15SS287	CF15SS287	CF15SS301	CF15SS301	CF15SS301
SAMPLE NUMBER	CF15SS287012A	CF15SS287012B	CF15SS287012C [02/24/97]	CF15SS287012D [02/24/97]	CF15SS301012A	CF15SS301012B	CF15SS301012C [02/24/97]
DEPTH	0-1	0-1	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	2/4/1997	2/7/1997	2/24/1997	2/24/1997	2/4/1997	2/6/1997	2/24/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)							
LEAD	7370	5700	1710	3600	3170	2630	3040
TCLP Inorganics (ug/L)							
LEAD	32200	24400			2700	4800	

APPENDIX C-6.2

SIEVE AND LEAD SOIL ANALYTIC RESULTS (FEBRUARY 1997)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CF15SS332	CF15SS332	CF15SS378	CF15SS378
SAMPLE NUMBER	CF15SS332012A	CF15SS332012B	CF15SS378012A	CF15SS378012B
DEPTH	0-1	0-1	0-1	0-1
SAMPLE DATE	2/4/1997	2/6/1997	2/4/1997	2/7/1997
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL
Inorganics (mg/kg)				
LEAD	1360	939	682	450
TCLP Inorganics (ug/L)				
LEAD	2200	2400	1000	1300

E-6.3: SPLP SOIL ANALYTICAL RESULTS

APPENDIX C-6.3

SPLP SOIL ANALYTIC RESULTS (FEBRUARY 2000)
SITE 15 FEASIBILITY STUDY REPORT
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

LOCATION	CEF-015-SS-560	CF15SS054	CF15SS060	CF15SS060	CF15SS127
SAMPLE NUMBER	CEF-15-SS-701-01	CEF-15-SS-702-01	CEF-15-SS-703-01	CEF-15-SS-703-01-D	CEF-15-SS-704-01
DEPTH	0-1	0-1	0-1	0-1	0-1
SAMPLE DATE	2/17/2000	2/17/2000	2/17/2000	2/17/2000	2/17/2000
SAMPLE CODE	NORMAL	NORMAL	ORIG	DUP	NORMAL
Semivolatile Organics (ug/kg)					
1-METHYLNAPHTHALENE	410	168000	94300 J	53200 J	13500
2-METHYLNAPHTHALENE	417	204000	108000 J	61800 J	14100
ACENAPHTHENE	723	162000	90800	64700	11500
ACENAPHTHYLENE	99 U	17000	16000 J	6420 J	2370
ANTHRACENE	110	63200	31100	18800	3120
BENZO(A)ANTHRACENE	796	193000	129000 J	71600 J	22200
BENZO(A)PYRENE	857	120000	89600	67600	23100
BENZO(B)FLUORANTHENE	904	130000	96800	62600	24100
BENZO(G,H,I)PERYLENE	462	4260	22000	15100	7160
BENZO(K)FLUORANTHENE	147	63000	45000	29300	10200
CHRYSENE	797	155000	123000 J	62200 J	24500
DIBENZO(A,H)ANTHRACENE	27.1	6520	6580	5010	1830
FLUORANTHENE	2240	505000	312000 J	173000 J	48400
FLUORENE	99 U	15000	9910 J	2560 J	1400 U
INDENO(1,2,3-CD)PYRENE	970	42500	38400	29500	12600
NAPHTHALENE	99 U	12200	7040 J	4090 J	1930
PHENANTHRENE	516	155000	102000 J	47900 J	11200
PYRENE	1080	319000	207000 J	109000 J	35100
SPLP Semivolatiles (ug/L)					
1-METHYLNAPHTHALENE		1	1 U	1 U	1.5
2-METHYLNAPHTHALENE		2.2	1.7	1.6	1 U
ACENAPHTHENE		2.3	1.2	1.5	1 U
ACENAPHTHYLENE		1 U	1 U	1 U	1 U
ANTHRACENE		1.1	1 U	1 U	1 U
BENZO(A)ANTHRACENE		1.3	0.63	0.69	0.21 U
BENZO(A)PYRENE		1.8	0.8 J	0.58 J	0.21 U
BENZO(B)FLUORANTHENE		2	0.89	0.91	0.21 U
BENZO(G,H,I)PERYLENE		1.4	0.8	0.68	0.21 U
BENZO(K)FLUORANTHENE		0.73	0.34	0.38	0.21 U
CHRYSENE		1.8	0.93	0.93	0.21
DIBENZO(A,H)ANTHRACENE		0.21 U	0.2 U	0.2 U	0.21 U
FLUORANTHENE		5.9	4.6	5	1
FLUORENE		1 U	1 U	1 U	1 U
INDENO(1,2,3-CD)PYRENE		1.3	0.65	0.66	0.21 U
NAPHTHALENE		2	1 U	1 U	1.4
PHENANTHRENE		5.8	2.3	2.6	1 U
PYRENE		5	2.5	2.6	0.6

APPENDIX F

PRG DEVELOPMENT FOR HUMAN HEALTH

F.1 SCTL DEVELOPMENT FOR COPCs

F.2 95% CALCULATION FOR ADULT EXPOSURE TO LEAD

F.3 UNIVERSITY OF FLORIDA LETTER REGARDING ACUTE TOXICITY FOR LEAD

F.1 SCTL DEVELOPMENT FOR COPCs

Development of SCTL for Arsenic

SCTL = [(TR) (BW) (AT)] / { (EF) (ED) (FC) [((SFo) (IRo) (10E-06 kg/mg)) + ((SFd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((SFi) (IRi) (1/VF + 1/PEF))] }

TR	1.00E-06		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	25550	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

SFO	1.5		Oral cancer slope factor	
SFD	1.579		Dermal cancer slope factor	FDEP GI absorption factor of 0.5
DA	0.001		Dermal absorption factor	
SFI	15		Inhalation cancer slope factor	
VF			Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	0.00089425		GENERAL TERM	[(TR)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.000075		ORAL TERM	(SFo)(IRo)(1E-06)
C	3.3159E-07		DERMAL TERM	(SFd)(SA)(AF)(DA)(1E-06)
D	0.00E+00		INHALATION TERM	(SFi)(IRi)(1/VF + 1/PEF)

SCTL **1.19E+01 mg/kg** A / (B + C + D)

1.19E+04 ug/kg

Development of SCTL for Antimony

SCTL = [(THI) (BW) (AT)] / { (EF) (ED) (FC) [((1/RfDo) (IRo) (10E-06 kg/mg)) + ((1/RfDd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((1/RfDI) (IRi) (1/VF + 1/PEF))] }

THI	1.00E+00		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	7300	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

RfDo	0.0004		Oral reference dose	
RfDd	0.000004		Dermal reference dose	
DA	0.001		Dermal absorption factor	
RfDi	0.000004		Inhalation reference dose	
VF			Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	255.5		GENERAL TERM	[(THI)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.125		ORAL TERM	(1/RfDo)(IRo)(1E-06)
C	0.0525		DERMAL TERM	(1/RfDd)(SA)(AF)(DA)(1E-06)
D	0.00E+00		INHALATION TERM	(1/RfDi)(IRi)(1/VF + 1/PEF)

SCTL **1.44E+03 mg/kg** A / (B + C + D)

1.44E+06 ug/kg

Development of SCTL for 1-Methylnaphthalene

SCTL = [(THI) (BW) (AT)] / { (EF) (ED) (FC) [((1/RfDo) (IRo) (10E-06 kg/mg)) + ((1/RfDd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((1/RfDi) (IRi) (1/VF + 1/PEF))] }

THI	1.00E+00		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	7300	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

RfDo	0.02		Oral reference dose	
RfDd	0.02		Dermal reference dose	
DA	0.01		Dermal absorption factor	
RfDi	8.57E-04		Inhalation reference dose	
VF	1.19E+05		Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	255.5		GENERAL TERM	[(THI)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.0025		ORAL TERM	(1/RfDo)(IRo)(1E-06)
C	0.000105		DERMAL TERM	(1/RfDd)(SA)(AF)(DA)(1E-06)
D	1.47E-01		INHALATION TERM	(1/RfDi)(IRi)(1/VF + 1/PEF)

SCTL 1.71E+03 mg/kg A / (B + C + D)

1.71E+06 ug/kg

Development of SCTL for 2-Methylnaphthalene

SCTL = [(THI) (BW) (AT)] / { (EF) (ED) (FC) [((1/RfDo) (IRo) (10E-06 kg/mg)) + ((1/RfDd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((1/RfDi) (IRi) (1/VF + 1/PEF))] }

THI	1.00E+00		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	7300	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

RfDo	0.02		Oral reference dose	
RfDd	0.02		Dermal reference dose	
DA	0.01		Dermal absorption factor	
RfDi	8.57E-04		Inhalation reference dose	
VF	1.42E+05		Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	255.5		GENERAL TERM	[(THI)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.0025		ORAL TERM	(1/RfDo)(IRo)(1E-06)
C	0.000105		DERMAL TERM	(1/RfDd)(SA)(AF)(DA)(1E-06)
D	1.24E-01		INHALATION TERM	(1/RfDi)(IRi)(1/VF + 1/PEF)

SCTL 2.03E+03 mg/kg A / (B + C + D)

2.03E+06 ug/kg

Development of SCTL for TPH

SCTL = [(THI) (BW) (AT)] / { (EF) (ED) (FC) [((1/RfDo) (IRo) (10E-06 kg/mg)) + ((1/RfDd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((1/RfDi) (IRi) (1/VF + 1/PEF))] }

THI	1.00E+00		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	7300	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

RfDo	0.04		Oral reference dose	
RfDd	0.2		Dermal reference dose	
DA	0.01		Dermal absorption factor	
RfDi	5.71E-02		Inhalation reference dose	
VF	9.57E+03		Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	255.5		GENERAL TERM	[(THI)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.00125		ORAL TERM	(1/RfDo)(IRo)(1E-06)
C	0.0000105		DERMAL TERM	(1/RfDd)(SA)(AF)(DA)(1E-06)
D	2.74E-02		INHALATION TERM	(1/RfDi)(IRi)(1/VF + 1/PEF)

SCTL **8.90E+03 mg/kg** A / (B + C + D)

8.90E+06 ug/kg

Development of SCTL for Carcinogenic PAHs (BaPEq)

SCTL = [(TR) (BW) (AT)] / { (EF) (ED) (FC) [((SFo) (IRo) (10E-06 kg/mg)) + ((SFd) (SA) (AF) (DA) (10E-06 kg/mg)) + ((SFi) (IRi) (1/VF + 1/PE

TR	1.00E-06		Target Risk	FDEP target
BW	35	kg	Body weight	ADULT RECREATIONAL USER
AT	25550	d	Averaging time	DEFAULT
EF	50	d	Exposure frequency	1 day/wk; 50 wks/yr compromise from cattle dip vat program
ED	20	y	Exposure duration	compromise from cattle dip vat program
FC	1		Fraction from source	fraction from contaminated source
IRo	50	mg/day	Ingestion rate	default worker state
SA	3000	cm2	Surface area	default worker state (compromise value)
AF	0.07	mg/cm2	Adherance factor	adult residential EPA dermal guidance (1997)
IRI	15	m3/day	Inhalation rate	default worker state

SFO	7.3		Oral cancer slope factor	
SFD	14.6		Dermal cancer slope factor	FDEP GI absorption factor of 0.5
DA	0.01		Dermal absorption factor	
SFI	3.1		Inhalation cancer slope factor	
VF	2.96E+07		Volatilization factor	
PEF	1.24E+09		Particulate emission factor	

A	0.00089425		GENERAL TERM	[(TR)(BW)(AT)] / [(EF)(ED)(FC)]
B	0.000365		ORAL TERM	(SFo)(IRo)(1E-06)
C	0.00003066		DERMAL TERM	(SFd)(SA)(AF)(DA)(1E-06)
D	1.61E-06		INHALATION TERM	(SFi)(IRi)(1/VF + 1/PEF)

SCTL **2.25E+00 mg/kg** A / (B + C + D)

2.25E+03 ug/kg

F.2 95% CALCULATION FOR ADULT EXPOSURE TO LEAD

Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: **NAS CECIL FIELD**
LOCATION: **SITE 15**
RECEPTOR: **RECREATIONAL EXPOSURE**
DATE: **JUNE 6, 2001**

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil, December 1996).

RELEVANT EQUATIONS:

$$PbB_{fetal,\,GM} = R_{fetal/maternal} \times [PbB_{adult,\,0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT]$$

and

$$PbB_{fetal,\,0.95} = PbB_{fetal,\,GM} \times GSD_{i,\,adult}^{1.645}$$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\,0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\,0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	1157	1157	1157	1157
BKSF	Biokinetic slope factor (ug/dL per ug/day))	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.050	0.050	0.050	0.050
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	50	50	50	50
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\,adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\,central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	2.08	2.08	2.58	2.58
$PbB_{fetal,\,GM}$	Central estimate of blood lead concentration (ug/dL) for fetuses carried by women who have site exposures to soil lead at concentration, PbS.	1.87	1.87	2.32	2.32
	Probability that PbB_{fetal} exceeds 10 ug/dL	0.22%	1.20%	0.65%	2.45%
$PbB_{fetal,\,0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	4.92	6.35	6.11	7.87
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg)	7680	4802	6160	3281

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

F.3 UNIVERSITY OF FLORIDA LETTER REGARDING ACUTE TOXICITY FOR LEAD

UNIVERSITY OF FLORIDA

Center for Environmental & Human Toxicology

P.O. Box 110885
Gainesville, Florida 32611-0885
Tel.: (352) 392-4700, ext. 5500
Fax: (352) 392-4707

December 2, 2002

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

In the context of assessing potential risks to human health from lead in soils at Site 15, Cecil Field, the question arose as to what constitutes an acceptable soil lead concentration limit based on acute contact by a small child. This question is important because it may define the effective not-to-exceed value for lead in areas where small children might come in contact with soil. We conducted an analysis to determine the upper limit for lead concentration in soil such that acute exposure, in the form of a soil pica episode [single dose], would not result in a blood lead concentration associated with acute lead toxicity in children. This analysis was conducted in collaboration with Dr. Joel Pounds of Battelle Northwest Laboratories and Dr. Ted Simon of U.S. EPA Region 4. The details of that analysis have been provided to you previously. We intend to publish this analysis in a peer-reviewed journal, but this will take several months. In the meantime, so as not to further delay management decisions concerning Site 15, we would like to convey to you that the results indicate protection from acute exposure of children at a soil lead concentration of 6,500 mg/kg or less.

If you have any questions regarding this analysis or its implications in terms of risk strategies at Site 15, Cecil Field, we would be happy to provide additional information.

Sincerely,

Stephen M. Roberts, Ph.D.

Bernard K. Gadagbui, Ph.D.

A Soil Concentration Limit for Lead Based on Risk from Acute Exposure for a Small Child

Bernard K.-M. Gadagbui[1], Joel G. Pounds[2], Ted S. Simon[3], and Stephen M. Roberts[1]

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[2]Battelle Pacific Northwest Division, Richland, WA; and

[3]United States Environmental Protection Agency, Region 4, Atlanta, GA.

December, 2002

INTRODUCTION

Lead is a common contaminant of soils in both industrial and residential settings. Historical use of lead in gasoline has resulted in elevated soil concentrations near roadways, and very high concentrations of lead may remain in soils and slag near smelter operations and in tailings from mining operations (Eckel et al., 2002). Improper disposal of lead-containing waste, such as incinerator ash and lead battery cores, have created hazards at numerous waste sites in the U.S. Prior to 1978, lead comprised as much as 50% of some house paints. The weathering,

chipping, and peeling of lead-based paints are an important source of lead contamination of soils in residential settings, and this remains an important source of lead exposure for children in many urban areas (CDC, 1997).

Children are particularly vulnerable to lead contamination in soil for several reasons. Small children tend to have a much higher soil incidental ingestion rate of soils than adults, due to extensive contact with soil while at play and frequent mouthing behavior (Stanek et al., 1998). Thus, intake of lead [and other contaminants] by ingestion from soil is generally higher on an absolute basis in small children than in older children or adults. On a per unit body weight basis, the differences in lead dose from soil are even larger due to the smaller body weight of young children. The gastrointestinal absorption of lead is greater in children than adults (Ziegler et al., 1978; Alexander et al., 1974), further accentuating the differences in effective lead dose resulting from exposure to soil lead contamination. Finally, the developing nervous systems of children appear to be especially sensitive to neurotoxic effects of lead (Schwartz, 1994).

To develop concentration limits for lead in soil protective for small children, the U.S. Environmental Protection Agency (EPA) uses a probabilistic model to predict blood lead concentrations in children exposed to lead in soil at a specified concentration — the Integrated Exposure Uptake Biokinetic (IEUBK) Model (EPA, 1994a). With this model, a soil lead concentration limit can be derived such that a target blood lead concentration is not exceeded. Because the model is probabilistic and accounts for variability in lead toxicokinetics among individuals, the output is a distribution of blood lead concentrations that would arise in a population of children exposed to lead in soil at a specified concentration. Currently, the target blood lead concentration is $\leq$ 10 μg/dL to prevent neurobehavioral effects, per Centers for Disease Control and Prevention (CDC) recommendation (CDC, 1991). Typically, a soil concentration limit is selected such that only a small percentage (e.g., $\leq$ 5%) of exposed children would be predicted to have a blood concentration above this value (EPA, 1994b).

The IEUBK model and soil lead concentration limits derived from it are based on chronic exposure. As a regulatory tool, limits based on chronic exposure are appropriate in that the vast majority of situations in which risks to children from soil lead contamination are contemplated involve at least the potential for repeated contact. There are some circumstances, however, where consideration of risks from acute exposure to soil is warranted. For example, an acute exposure scenario could be relevant for a park or recreational area where an individual child might play, but only on one or a few occasions.

A soil lead concentration limit based on acute exposure can also be useful for sites where chronic exposure is anticipated. Soil concentration limits based on chronic exposure are often compared with the average contaminant concentration over the exposure area, since this is thought to best offer the best representation of the concentration to which an individual is exposed over time. In this situation, soils with concentrations above the limit are allowed to remain in place in some areas as long as other areas contacted by the child have offsetting lower concentrations. An acute exposure limit, used as a not-to-exceed value for all areas of the site, would help to insure that even a single exposure event with soils above the chronic exposure limit is safe.

Developing an acute exposure limit for lead in soils is more complicated than simply adjusting the exposure frequency assumptions in the IEUBK model. First, it is important to recognize that the amount of soil ingested acutely by a small child can be substantially different from the average daily incidental soil ingestion rate used to assess chronic intake. Unfortunately, there is little documentation of the frequency of these soil pica events or the amounts of soil ingested. Using data from their soil ingestion studies in children, Stanek and Calabrese (1995) estimated that 42% of small children ingest > 5 g of soil on one or two days a year, and 33% ingest > 10 g. These occasional soil doses are up to 70-fold or more higher than the default average daily soil ingestion rate assumption currently recommended for use with the IEUBK model (135 mg soil per day; EPA, 1994a). Second, the target blood lead concentration limit for chronic exposure (10 μg/dL) may not be applicable for acute exposure because it is based on neurobehavioral effects in chronically exposed individuals. The deficits observed in studies of these individuals likely require more than transient elevations in blood lead, as would occur with an acute lead dose. An assessment of the consequences of acute exposure requires endpoints relevant specifically to acute toxicity. Third, the computer model used to predict blood concentrations resulting from exposure to lead in soils must be capable of simulating a single acute dose. Many of the models currently available, including the IEUBK, do not provide this capability.

We report here the results of an analysis to develop a risk-based soil concentration limit for lead protective of small children for situations of acute exposure. For the purposes of this analysis, an acute exposure was defined as ingestion of soil containing lead on a single occasion. In order to produce a soil concentration limit that is broadly protective, the circumstance regarded as most likely to result in the highest soil lead dose was addressed — a soil pica episode by a small (2-year old) child. The overall approach was as follows. Clinical information regarding acute lead poisoning in children was assessed, and a blood lead concentration limit was selected. From the blood lead concentration limit, a corresponding dose limit from soil was calculated using biokinetic modeling. The dose limit was the dose from soil producing a peak blood lead concentration equal to the blood lead concentration limit. Finally, a soil lead concentration limit was calculated from the soil dose limit with an assumption regarding the volume of soil ingested during a pica episode.

SELECTION OF A BLOOD LEAD CONCENTRATION LIMIT

The clinical literature contains numerous reports of lead poisoning in children, and from these a reasonably complete picture of the signs and symptoms of acute lead intoxication can be obtained. The most serious manifestation of acute lead toxicity in children is acute encephalopathy. Signs and symptoms of acute encephalopathy include apathy, bizarre behavior, frequent and persistent vomiting, loss of coordination, intractable seizures, and coma. Acute encephalopathy is usually associated with blood lead concentrations over 100 μg/dL, although it has been observed with blood lead concentrations as low as 70 μg/dL (Piomelli et al., 1984). Peripheral neuropathy, common in lead poisoning in adults, is rare in children. Gastrointestinal effects such as colic - characterized by abdominal pain, constipation, cramps, nausea, vomiting, anorexia, and weight loss - have been observed as one of the early symptoms in acute exposures at blood lead concentrations of ≥ 60 μg/dL in children and adults (ATSDR 1999; NAS 1972). Acute lead intoxication can also produce renal effects, including a Fanconi-like syndrome, a triad

of hypophosphatemia, aminoaciduria, and glycosuria (Chisholm, 1962). While nephropathy can occur as a consequence of acute lead toxicity in children, it is more common in adult lead poisoning, and is typically found in workers with blood lead concentrations > 60 μg/dL (Henretig, 2002).

Lead produces anemia, both through an inhibition of hemoglobin synthesis and diminished erythrocyte survival (Henretig, 2002). Lead impairs hemoglobin synthesis by interfering with the critical phases of the dehydration of aminolevulinic acid (catalyzed by the cytosolic enzyme, δ-aminolevulinic acid dehydratase, ALAD) and the incorporation of iron into the protoporphyrin molecule. Although effects on ALAD activity can be detected at low blood lead concentrations (> 10 μg/dL), the clinical manifestation of anemia in children is associated with much higher concentrations, ca. > 80 μg/dL.

The CDC has defined a blood lead concentration of > 10 μg/dL in children as an intervention level. This definition is based on evidence that blood lead concentrations above 10 μg/dL are associated with neurobehavioral effects and deficits in cognitive performance. There are no data to indicate how long a blood lead concentration must be elevated for these effects to occur, but the studies showing subtle neurological effects of lead in children used populations that likely had repeated exposures (such as to lead-containing paint chips, house dust, or soil). As a result, the 10 μg/dL blood lead concentration as a threshold for concern is based on a persistent elevation, rather than a transient spike in blood lead as would be expected from an acute lead dose. The endpoint — subtle neurological deficits — is relevant to acute exposure, and these effects may occur as sequelae to a severe, acute intoxication episode. However, the use of 10 μg/dL as a blood concentration limit to protect against this effect from a single *acute* lead exposure is arguably not appropriate.

Most cases of acute symptomatic lead poisoning in children are associated with blood lead concentrations greater than 100 μg/dL (NAS, 1972). The EPA has identified a 60-100 μg/dL lead in blood as a lowest observable adverse effect level (LOAEL) for acute toxicity in children (EPA, 1986), and from the discussion above, clinical signs and symptoms of lead poisoning are associated with concentrations at or above 60 μg/dL. For the purposes of this analysis, a concentration of 60 μg/dL was selected as the target limit for the peak blood lead concentration after an ingested soil dose.

BIOKINETIC MODELING

Assessment of the hazards associated with lead in environmental media is unusual in that assessment is based on blood lead concentration as the toxicological endpoint. In some situations, empirical measurements of blood lead concentration are available for the exposed population, and the assessment of hazard is relatively straightforward. More often, however, blood lead concentrations must be modeled for exposed populations, as well as for populations that might become exposed in the future. Several PBPK or biokinetic models have been developed to predict blood lead concentrations resulting from environmental lead exposures (see EPA, 2001 for a review). Some of these models have the ability to evaluate intake of lead from a variety of sources, including ingestion of lead in food, water, and soil, and inhalation of lead in

particulates. The distribution of lead to various compartments in the body over time is considered with varying degrees of complexity among the models, but all have the ability to predict the blood concentration achieved with chronic exposure to lead under defined exposure circumstances.

Model selection

The IEUBK model used by the EPA has undergone extensive calibration and use and is judged to perform well in predicting blood lead concentration distributions for children 0 to 7 years of age. Although the model performs well in assessing chronic exposure, it is not capable, in its current configuration, of simulating blood lead concentrations arising from a single dose. This limitation makes the IEUBK model unsuitable for developing a soil lead concentration limit for acute exposure.

Other biokinetic models were evaluated as candidates for use in this analysis. The Rabinowitz model (Rabinowitz et al., 1976) is relatively simple and was developed to predict blood lead concentrations associated with long-term lead intake in adults. The Rabinowitz model is not scaled for children, which greatly limits its utility for this analysis. The same limitation applies to the Bert model (Bert et al., 1989), which is a more complex version of the Rabinowitz model. The California model (EPA, 2001) has been developed to predict blood lead concentrations from environmental exposure in both children and adults. However, like the IEUBK model, it is not capable of predicting the blood lead concentration profile resulting from a single dose. The Stern model (Stern, 1994) was developed to predict incremental changes in the steady-state blood lead concentration resulting from exposures to lead in soil, and therefore is useful only for situations of chronic lead exposure. The O'Flaherty model (O'Flaherty et al., 1995) is a true physiologically-based pharmacokinetic model. It is capable of simulating blood lead concentrations for ages 0 through adulthood, and for both short- and long-term exposures. There are indications that the model does not perform well when lead is ingested at very high concentrations (ATSDR, 1999), which could represent a problem when assessing acute exposures. Moreover, the C++ version does not allow the user to change the bioavailability from the default value.

The Leggett model (Leggett, 1993), developed by the Oak Ridge National Laboratories, is scaled for children and is capable of generating a blood concentration versus time profile for a single lead dose. Additionally, the Leggett model gives the user the option of simulating lead uptake by red blood cells as either a linear or non-linear process. These are features that many of the other models do not have. The model has been shown to perform well for a wide variety of exposure situations (EPA, 2001) and is the biokinetic core for the EPA's All-Ages Lead Model (AALM). From the comparison of model capabilities and attributes, the Leggett model was considered to be the most suitable for this acute exposure analysis.

Model inputs

Age-specific inputs for the Leggett model were chosen based on a 2-year old. This was considered to be the approximate age when a soil pica event while at play is most likely. The baseline blood lead concentration was assumed to be 4.1 μg/dL, which is the arithmetic mean

concentration for 1-2 year olds reported in the Third National Health and Nutritional Examination Survey, Phase 2 (NHANES III) (Pirkle et al., 1998). The default bioavailability assumptions for the Leggett model are age-specific, with 45 percent for birth to 1 year, and 30 percent for ages 1 to 5 years. Consequently, for a 2-year old, the default bioavailability factor would be 0.30. The EPA currently recommends a value of 0.30 (30%) for the absolute bioavailability of lead from soil for the IEUBK model (EPA, 1994a) when assessing chronic lead exposure. This assumption is derived in part from dietary absorption studies indicating that the absolute bioavailability of soluble lead from food and water in children is about 0.50 (50%; Alexander et al., 1974; Ziegler et al., 1978). Based on studies of the relative bioavailability of lead from soil versus water, an additional reduction factor of 0.6 is applied, leading to the combined absorption factor of 0.30 (i.e., 0.5 x 0.6 = 0.3). The potential applicability of this bioavailability factor (0.30) to an acute exposure scenario was evaluated as part of this analysis.

The gastrointestinal absorption of ingested lead is well documented to decrease with increasing lead dose. Aungst and Fung (1981) investigated lead absorption across the gut lumen *in vitro* in everted rat intestines and demonstrated that lead uptake involves two distinct processes: a passive diffusion process that is independent of gut concentration, and a capacity-limited active or facilitated diffusion process. At low lead concentrations, lead transport is effected almost exclusively through the active route. At higher concentrations, the lead transport mechanism becomes saturated, and the relative contribution of passive diffusion is increased. Passive diffusion of lead in the gut is poor, and as the contribution of passive diffusion increases, the fraction of ingested lead absorbed is diminished. This concentration-dependent uptake of lead from the gut may explain at least in part the non-linear relationship between lead intake and blood lead concentrations observed in children (Sherlock and Quinn, 1986; see below). It also indicates strongly the need to incorporate dose-dependent absorption when modeling blood lead concentrations from acute lead exposure.

Three studies were identified that provide information of potential value on the dose-dependent uptake of lead from the gut. Sherlock and Quinn (1986) conducted a duplicate diet study in which bottle-fed infants were exposed to lead in water and in formula mixed with contaminated water for one week in the 13th week after the infant's birth. Dietary lead intakes, believed to constitute almost all ingested lead, ranged from 0.04 to 3.4 mg/week. The authors observed a curvilinear relationship between the blood lead concentration and lead intake, with higher lead doses producing less-than-proportional increases in blood lead concentration. Reichlmayr-Lais et al (1988) investigated the effect of dietary lead intake on lead retention in adult rats. Rats were exposed to lead concentrations ranging from 0.02 to 800 μg lead per kg diet for 29 days. Absorption of lead, as inferred from lead retention, was similar for lead concentrations in diet up to 1 μg lead per kg feed, but was nearly 10-fold lower at higher dietary lead concentrations. In a study by Mallon (1983), lead absorption was examined in infant and juvenile baboons. Infant (6-7 months of age; 3 kg average body weight) baboons were administered lead acetate in gelatin capsules at doses of 100, 200, or 1000 μg lead per kg body weight per day for 4.6 – 6 months. Juvenile baboons (22-23 months of age; 5 kg body weight) received doses of 100 or 500 μg per kg body weight per day for 3.5 – 6 months. Controls received no lead acetate, and their only lead intake was 12 μg lead per kg body weight per day from standard diet. As the daily lead dose increased from 12 to 1000 μg/kg for the infant

baboons, and from 12 to 500 μg/kg for the juvenile animals, the fraction of the lead dose absorbed decreased from 0.24 to 0.02 in infants and from 0.12 to 0.01 in juvenile animals.

For the IEUBK model, the EPA used data from the Sherlock and Quinn study to address the dose-related bioavailability of lead (see EPA, 1994a). Total lead uptake from the gut was treated as the sum of saturable and non-saturable components. The data were fit to a nonlinear regression model in a form comparable to the Michaelis-Menten equation used to describe the *in vitro* results observed by Aungst and Fung (1981):

$$PbB = \frac{B + A \times Pb_{intake} + P \times Pb_{intake}}{(1 + Pb_{intake}/M)}$$

where:

B is the baseline blood lead concentration (10.85 μg/dL was used)

A and P are coefficients describing, respectively, nonlinear (active) and linear (passive) lead intake, between PbB and dietary lead intake; and

M is the Michaelis-Menten type (nonlinearity) parameter — the daily dietary intake rate at which the facilitated component of lead uptake is half saturated (Gary Diamond, personal communication).

Intake data from infant and juvenile baboons in the Mallon study were also fit to a similar model. Based on a goodness-of-fit comparison for these data sets, the EPA selected the Sherlock and Quinn data to represent the nonlinear absorption of lead in children, with the Mallon study cited as providing supporting data. From the Sherlock and Quinn data, the lead intake at which absorption is greatly reduced was estimated to be 90 μg/day.

We also evaluated the Sherlock and Quinn data to determine their suitability for use in defining the bioavailability of ingested lead. Lead uptake curves from this study were approximated by extracting the blood lead concentration versus weekly lead intake rate for the grouped data [from Figure 2 of Sherlock and Quinn, 1986] to SlideWrite v.5, and converting the dose to μg/day. The blood lead concentration versus lead intake data were then fit to the nonlinear regression model used by the EPA (see equation above). The data fit the Michaelis-Menten type equation well (Figure 1; r^2=0.98), as observed by the EPA, although the fit statistics revealed large standard errors for the estimated parameters A and P. The large errors for the parameter estimates are due to the availability of only seven data points to estimate three parameters (A, P, and M). Although this equation was a good fit to the observed data (Fig. 2), extrapolation to much higher doses (up to 5000 μg/day) did not produce plausible increases in blood lead concentration. Because the dose-blood concentration relationship produced implausible results at lead doses relevant to acute lead exposure, the use of these data and this equation was rejected. This data set was also fit to several empirical nonlinear equations with similar poor extrapolation to high doses (not shown).

The data from infant and juvenile baboons by Mallon (1983) were also evaluated. Although not obtained in humans, these data were derived in a primate at a relevant age. There is a close resemblance between hematological, blood lead responses, and patterns of lead

distribution and retention in baboons and humans (Mallon, 1983). This data set has the advantage of direct measurement of lead absorption, rather than indirect measurements, e.g. blood lead concentration, from which absorption must be inferred, as with the Sherlock and Quinn study. Additionally, the Mallon study utilized higher doses, extending the range over which dose-dependent absorption information is provided. Lead uptake data from the Mallon study were fit to nonlinear, exponential, and power function equations (Figure 3). The three equations fit the observed data reasonably well, with $r^2>0.98$. However, the extrapolated bioavailability at higher lead doses were markedly different (Figure 4). The power function model predicted negligible uptake of lead above doses of approximately 15,000 μg/day. The nonlinear and exponential models predicted a fairly constant uptake of approximately 1 and 3 percent, respectively, for lead doses up to 80,000 μg/day.

While all treatments of the Sherlock and Quinn and Mallon data predicted low uptake of lead at high doses, there is considerable uncertainty in establishing the precise value at intakes well beyond the observed data. From the two data sets, uptakes ranging from essentially zero to 3% were obtained for lead doses greater than about 10,000 μg/day. While these differences are small, it is important to recognize that blood lead concentrations are a function of [1- uptake]. As a consequence, the difference between choosing 0.5% and 3% uptake is a 6-fold difference in the predicted blood lead concentration. That difference is a considerable margin of uncertainty. As a practical measure, we chose not to extrapolate beyond the observation range, and selected for modeling the uptake value from the highest dose tested in the Mallon study — 0.02 (2%). This uptake represents a conservative choice in that the actual uptake of lead is likely to be lower at lead doses of interest for acute exposure.

A second issue regarding bioavailability is the extent to which absorption of ingested lead is diminished when it is present in soil rather than in the form of soluble lead as in the Sherlock and Quinn and Mallon studies. The relative bioavailability of lead from soil as compared with water has been measured for several soil samples from hazardous waste sites using the swine model (Ruby et al. 1999). Among these samples, the relative bioavailability was found to vary from less than 0.10 to 0.90). The EPA has chosen a value near the middle of this range, 0.60 (60%) as the default for the IEUBK model (EPA, 1994a). For the purpose of setting a soil concentration limit for acute exposure, an argument can be made for choosing a relative bioavailability value from the upper end of the range of observed values. For example, if a relative bioavailability of 0.60 is assumed, but the actual relative bioavailability of lead in a soil sample is 1.0, a soil lead concentration predicted to yield a peak blood lead concentration of 60 μg/dL (the blood lead limit chosen for this analysis) might actually result in a peak concentration of 100 μg/dL. As discussed in "Selection of a Blood Concentration Limit," the latter concentration is capable of producing clinical acute lead poisoning. In view of this small margin for error, a relative bioavailability of 1.0 was selected for the analysis; i.e., the bioavailability of lead in soil is the same as in water. It is acknowledged that other relative bioavailability values might be used to derive a soil concentration limit for acute exposure on a site-specific basis, provided that this information can be obtained with high confidence.

ESTIMATING THE SOIL CONCENTRATION LIMIT

Soil dose corresponding to the blood concentration limit

With the input assumptions described above, the soil dose producing a peak blood concentration at the specified limit (60 μg/dL) was determined through an iterative process. Simulations were performed assuming either linear or nonlinear partitioning of lead into erythrocytes. As shown in Figure 5, the 60 μg/dL blood concentration limit is reached with a soil dose of 74,500 μg of lead if non-linear partitioning to erythrocytes is assumed, and with a soil dose of 65,000 μg lead assuming linear partitioning.

Soil concentration limit

The amount of Pb ingested depends on the soil lead concentration and the amount of soil ingested. Data on the soil mass ingested during pica episodes are extremely limited. Vermeer and Frate (1979) found that the incidence of soil pica among children in a rural black community was 16 percent, and estimated the average amount of soil ingested to be 50 g/day. In a study by Calabrese et al. (1991), one child (among 64 examined) repeatedly ingested soil at rates ranging from 74 mg to 13.6 g/day over a two-week period. Wong (1988) found that six of 52 children studied exhibited soil pica behavior. Five of these children had normal mental capacity, and the amounts of soil ingested ranged from 0 to 10.3 g/day. One mentally retarded child ingested up to 60 g of soil per day. The EPA Child-Specific Exposure Factors Handbook (EPA, 2000) recommends a value of 10 g for soil pica. Using this value, the soil concentration corresponding to soil dose limit of 74,500 μg lead under conditions of nonlinear partitioning would be 7,450 mg/kg. The dose limit of 65,000 μg assuming linear partitioning would result from ingestion of 10 g of soil at a concentration of 6,500 mg/kg.

The biological mechanisms or processes underlying the nonlinear accumulation of lead in blood or red blood cells with increasing dose are not clear. While nonlinear partitioning is often assumed when predicting PbB concentrations from chronic exposure, its applicability to a single acute dose is uncertain. Given the choice between two soil lead concentration limits (7,500 mg/kg, assuming nonlinear partitioning, and 6,500 mg/kg assuming linear partitioning), and uncertainty as to which is more correct, the regulatory approach is usually to choose the more conservative of the values. On this basis, a soil concentration limit for lead based on acute toxicity in children of 6,500 mg/kg would be recommended.

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR). (1999). Toxicological Profile for Lead (Update). Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA.

Alexander FW, Clayton BE, and Delves HT (1974). Mineral and trace-metal balances in children receiving normal and synthetic diets. *Q. J. Med.* 43 (169): 89-111.

Aungst BJ and Fung H-L (1981). Kinetic characterization of in vitro lead transport across the rat small intestine. Mechanism of intestinal lead transport. *Toxicol. Appl. Pharmacol.* 61: 39-47.

Bert JL, Van Dusen LJ, and Grace JR (1989) A generalized model for the prediction of lead body burdens. *Environ. Res.* 48:117-127.

Calabrese EJ, Stanek EJ, and Gilbert CE. (1991). Evidence of soil-pica behavior and quantification of soil ingested. *Hum. Exp. Toxicol.* 10:245-249.

Centers for Disease Control and Prevention (CDC). (1991). *Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control.* Public Health Service, Centers for Disease Control and Prevention, Atlanata, GA: U.S. Department of Health and Human Services, October.

Centers for Disease Control and Prevention (CDC) (1997). Update: Blood lead levels. *MMWR* 46:141-146.

Chisholm JJ. (1962) Aminoaciduria as a manifestation of renal tubular injury in lead intoxication and a comparison with patterns of aminoaciduria seen in other diseases. *J. Pediatrics* 60:1-17.

Eckel WP, Rabinowitz MB, and Foster GD. (2002). Investigation of unrecognized former secondary lead smelting sites: confirmation of historical sources and elemental ratios in soil. *Environ. Pollution.* 117: 273-279.

Environmental Protection Agency (EPA) 1986). *Air quality criteria for lead.* Office of Research and Development, Environmental Criteria and Assessment Office. EPA 600/8-83-028F.

Environmental Protection Agency (EPA) (1994a). *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.* U.S. Environmental Protection Agency, EPA/540-R-93/081, PB93-963510.

Environmental Protection Agency (EPA) 1994b). Revised Interim Soil Lead Guidance for CERCLA Site and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12.

Environmental Protection Agency (EPA) (2000). *Child-Specific Exposure Factors Handbook.* NCEA-W-0853.

Environmental Protection Agency (EPA) (2001). *Review of Adult Lead Models. Evaluation of Models for Assessing Human Health Risks Associated with Lead Exposures at Non-Residential Areas of Superfund and Other Hazardous Waste Sites.* Office of Emergency and Remedial Response. EPA 9285.7-46.

Henretig FM (2002). Lead. In, Goldfrank's Toxicologic Emergencies, Seventh Edition (Goldfrank LR, Flomenbaum NE, Lewin NA, Howland MA, Hoffman RS, and Nelson LS, Eds), McGraw Hill, New York, NY, pp. 1200-1227.

Leggett RW (1993). An age-specific kinetic model of lead metabolism in humans. *Environ. Health Perspect.* 101: 598-616.

Mallon RP (1983). A metabolic model of lead kinetics based upon measured organ burdens during chronic exposure experiments with infant and juvenile baboons. Ph.D. Thesis, Department of Biology, New York University Medical Center, New York, NY.

National Academy of Sciences (NAS) (1972). Lead: Airborne lead in perspective: Biologic effects of atmospheric pollutants. Washington, DC: National Academy of Sciences, pp. 71-177, 281-313.

O'Flaherty EJ (1995) Physiologically based models for bone-seeking elements. V. Lead absorption and disposition in childhood. *Toxicol. Appl. Pharmacol.* 131:297-308.

Piomelli S, Rosen JF, Chisholm JJ and Graef JW. (1984) Management of childhood lead poisoning. *J.Pediatrics* 105:523-532.

Pirkle JL, Kaufmann RB, Brody DJ, Hickman T, Gunter EW, and Paschal DC (1998). Exposure of the U.S. population to lead, 1991-1994. *Environ. Health Perspect.* 106:745-750.

Rabinowitz MB, Wetherill GW, Kopple JD (1976). Kinetic analysis of lead metabolism in healthy humans. *J Clin Invest.* 58:260–70.

Reichlmayr-Lais AM, Stockl KN, and Kirchgebner M. (1988). Effect of dietary lead intake on lead retention in adult rats. *Trace Elem. Electrolytes Health Dis.* 2:153-155.

Ruby MV, Schoof R, Brattin W, Goldade M, Post G, Harnois M, Mosby DE, Casteel SW, Berti W, Carpenter M, Edwards D, Cragin D, and Chappel W. (1999) Advances in evaluating the oral bioavailability of inorganics in soil for use in human health risk assessment. *Env. Sci. Technol.* 33:3697-3705.

Schwartz J. (1994). Low-level lead exposure and children's IQ: A meta-analysis and search for a threshold. *Environ. Res.* 65:42-55.

Sherlock JC and Quinn MJ (1986). Relationship between blood lead concentrations and dietary lead intake in infants: The Glasgow duplicate diet study 1979-1980. *Food Additives and Contaminants.* 3: 167-176.

Stanek EJ and Calabrese EJ. (1995). Daily estimates of soil ingestion in children. *Environ. Health Perspect.* 103:276-285.

Stanek EJ, Calabrese EJ, Mundt K, Pekow P, Yeatts KB (1998). Prevalence of soil mouthing/ingestion among healthy children aged 1 to 6. J. Soil Contam. 7:227-242.

Stern AH (1994). Derivation of a target concentration of Pb in soil based on elevation of adult blood pressure. *Risk Anal.* 16:201-210.

Vermeer DE and Frate DA (1979). Geophagia in rural Mississippi: environmental and cultural contexts and nutritional implications. *Am. J. Clin. Nutr.* 32:2129-2135.

Wong MS (1988) The Role of Environmental and Host Behavioural Factors in Determining Exposures to Infection with Ascaris lumbricoldes and Trichuris trichlura. Ph.D. Thesis, Faculty of Natural Sciences, University of the West Indies.

Ziegler EE, Edwards BB, Jensen RL, Mahaffey KR, and Fomon SJ. (1978). Absorption and retention of lead by infants. *Pediatr. Res.* 12: 29-34.

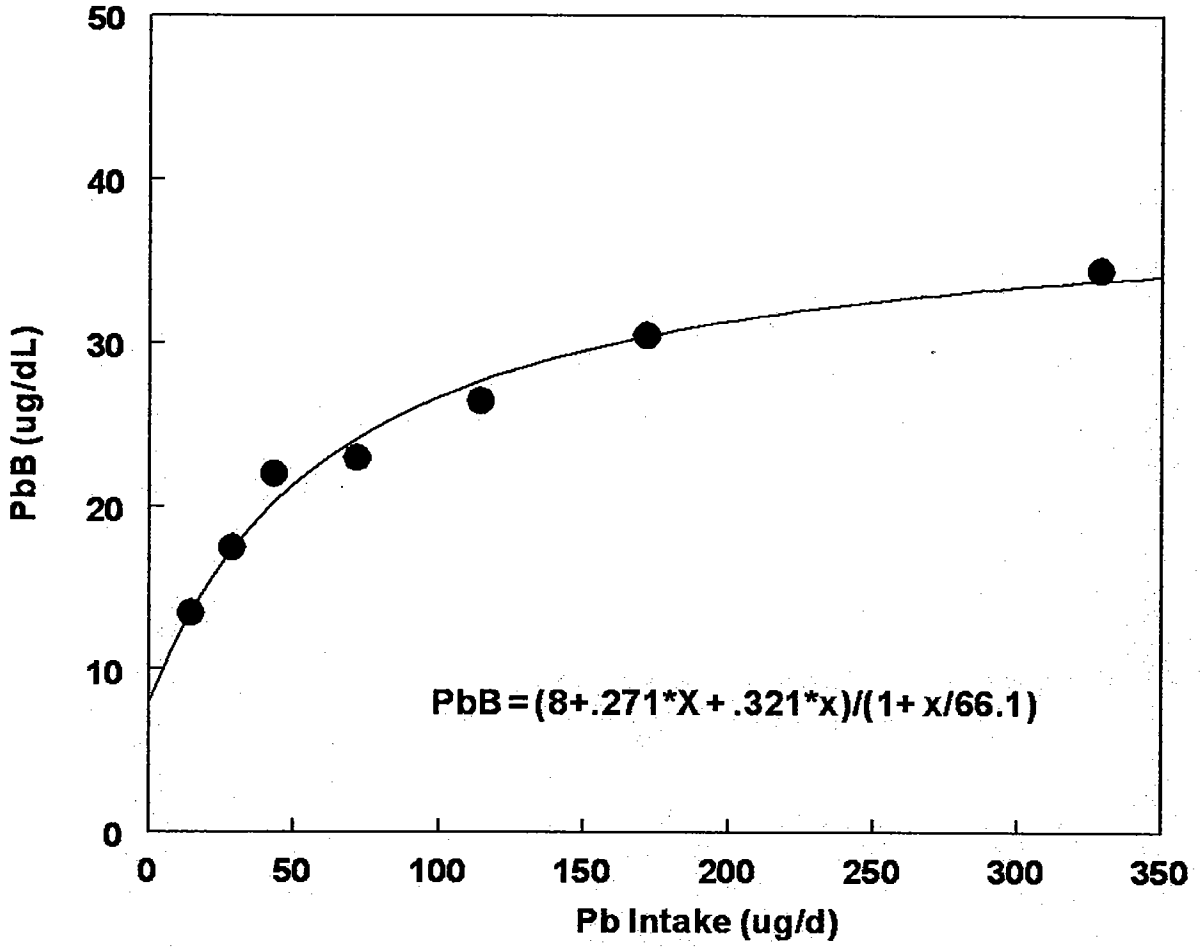

Figure 1. Nonlinear Regression of Lead Intake versus Blood Lead Concentration Data from Sherlock and Quinn

Lead intake and blood lead concentration data from Sherlock and Quinn (1986) were fit to a Michaelis-Menton-type equation as described in the section on "Model Inputs." A baseline blood lead concentration (B) was fixed at 8 μg/dL, based on the y-intercept of data presented in Figure 2 of the Sherlock and Quinn report. Parameters A, P, and M were optimized to provide the best fit of the data.

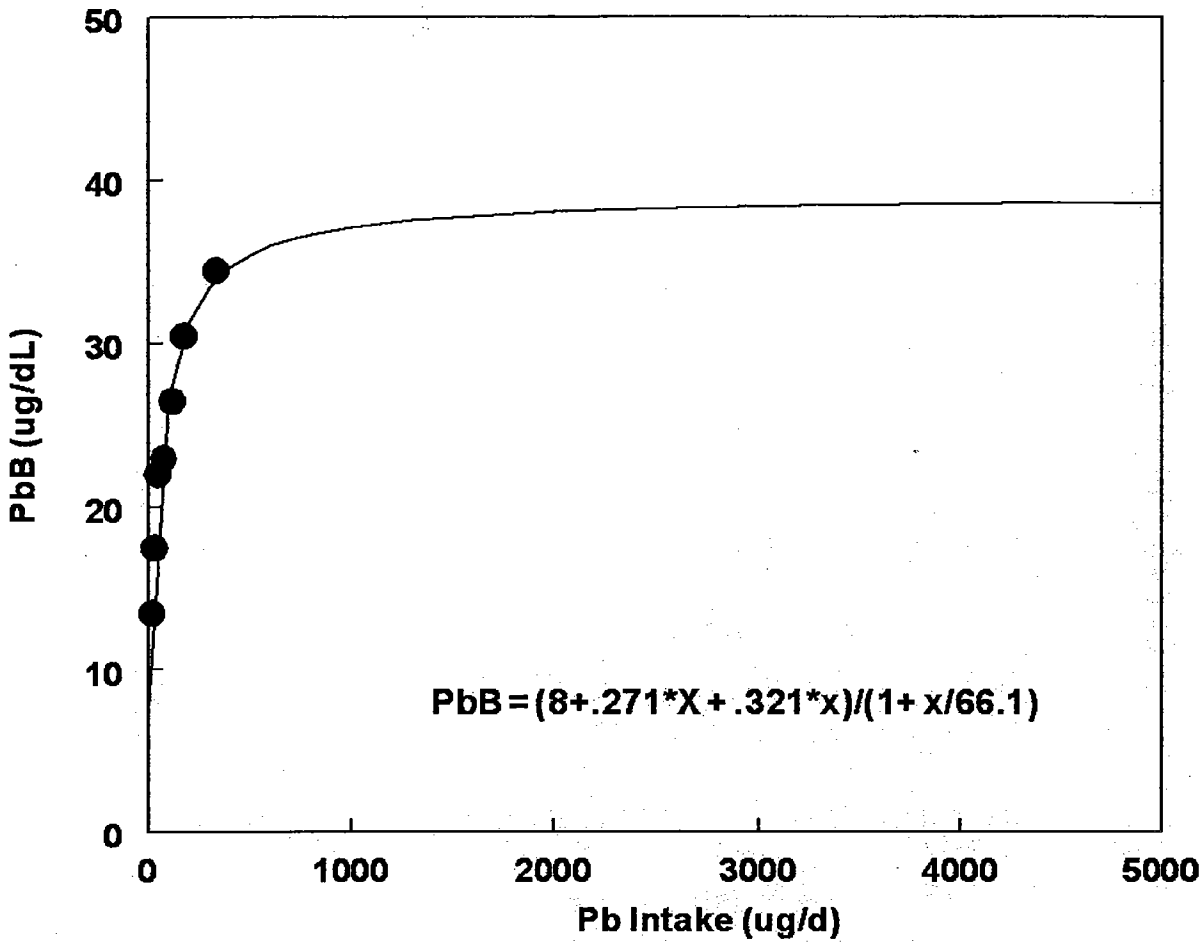

Figure 2. Extrapolation of Nonlinear Regression of Sherlock and Quinn Data to Higher Lead Intakes

Lead intake and blood lead concentration data from Sherlock and Quinn (1986) were fit to a Michaelis-Menton-type equation as in Figure 1. Using parameters (A, P, and M) providing the best fit of the data, the prediction of PbB was extrapolation to an intake of 5,000 μg Pb/day.

QuickTime™ and a
TIFF (PackBits) decompressor
are needed to see this picture.

Figure 4. Extrapolation of Curve Fits for Mallon Data to Higher Lead Intakes

Lead intake and blood lead concentration data from Mallon (1983) were fit to a nonlinear, exponential, and power functions as in Figure 3. Using parameters providing the best fit of the data, the prediction of PbB was extrapolated to an uptake of 80,000 μg Pb/d.

QuickTime™ and a
TIFF (PackBits) decompressor
are needed to see this picture.

Figure 3. Regression of Lead Uptake versus Lead Intake from the Mallon Study Using Nonlinear, Power, and Exponential Models.

Lead uptake and lead intake data were obtained from Mallon (1983). The data set was fit separately to a non-linear, an exponential, and a power function. All fits had r^2 values $\geq$ 0.98.

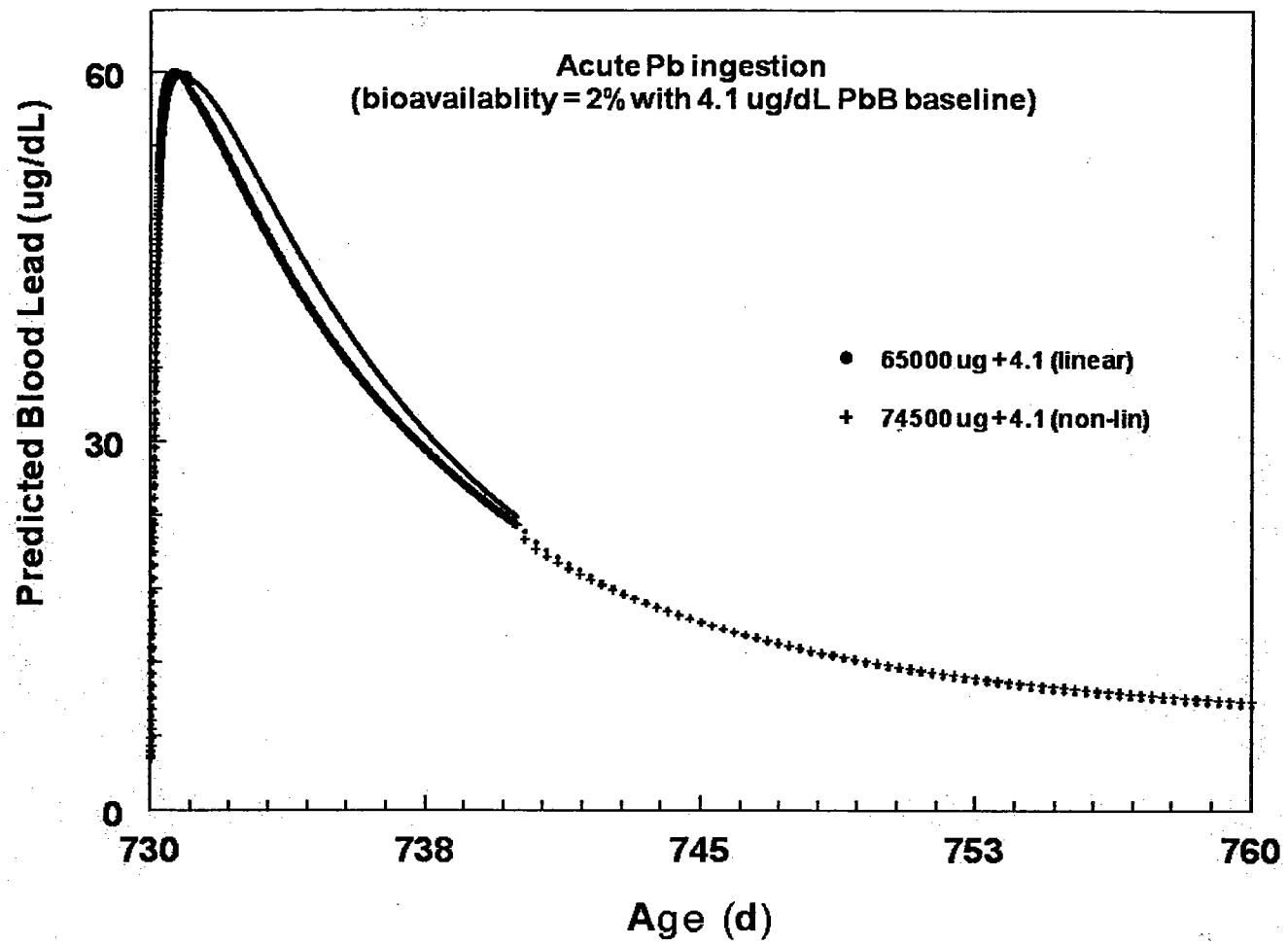

Figure 5. Predicted Blood Lead Concentrations from Ingestion of a Single Dose of Lead from Soil

Blood lead concentrations were predicted using the Leggett model scaled for a 2-year old child. The baseline blood lead concentration was assumed to be 4.1 μg/dL, and the absolute bioavailability of the lead dose from soil was assumed to be 0.02. The blood concentration versus time profiles shown are for a lead dose of 65,000 μg assuming linear partitioning of lead to erythrocytes, and 74,500 μg assuming non-linear partitioning. Both produce a peak blood lead concentration equal to the target limit of 60 μg/dL.

Department of Environmental Protection

Jeb Bush
Governor

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David B. Struhs
Secretary

June 16, 2003

Commanding Officer
Attn: Mr. Mark Davidson, Code ES33
SOUTHNAVFACENGCOM
Post Office Box 190010
North Charleston, SC 29419-9010

RE: Site 15 Determination of Site-Specific SCTLs, Naval Air Station Cecil Field, Florida.

Dear Mr. Davidson:

The Department has completed its review of the report titled Site 15 Determination of Site-Specific SCTLs, Naval Air Station Cecil Field, received by the Department on January 21, 2003, prepared and submitted by Tetra Tech NUS, Inc. Various discussions have ensued since the submittal of this document. You may recall that a decision was previously made between the Navy, EPA and FDEP that the soil cleanup target levels for this site would be based upon a "Restricted II" exposure scenario. This recreational exposure scenario was first developed in Woodward-Clyde Consultants' January 1995 Final Report: Cattle Dip Vat Assessment Program, A Summary Report, prepared for the Florida Department of Environmental Protection. The "Restricted II" recreational exposure scenario was originally developed by the Department to calculate risks posed by remote cattle dip vat sites. The Department has since modified the "Restricted II" recreational exposure assumptions from those contained in the Woodward-Clyde report.

The Department's contracted risk assessors with the University of Florida's Center for Environmental & Human Toxicology have looked at the document and have been involved in responding to the various proposals that have been suggested since the submittal of the document. In their February 21, 2003 letter, they initially took issue with Tetra Tech's modification of the body weight exposure assumption from the "Restricted II" scenario, increasing it from 35 kg to 70 kg so as to reflect an adult recreational user of the site. They argued that since there are not expected to be any institutional or engineering controls that would prevent access by adolescents and children, that the 70 kg body weight assumption would not be especially

protective in cases of exposure of children and adolescents to the site. Using the 35 kg body weight assumption, they calculated "Restricted II" site-specific SCTLs for benzo(a)pyrene equivalents (BAPeq) of 2.25 mg/kg, assuming adolescents would frequent the site, and 1.5 mg/kg, assuming small children would frequent the site. The Department at that time made a risk management decision based upon our knowledge of the characteristics of Site 15. It is felt that adolescents were by far more likely to visit the site than small children and that small children were highly unlikely to visit the site unsupervised by an adult. Upon that basis, the Department has accepted a site-specific SCTL of 2.25 mg/kg for BAPeq.

In response to the Department's risk assessors' February 21, 2003 letter, Tetra Tech challenged the use of the 35 kg body weight assumption and has proposed alternately to use 58 kg as a reasonable body weight assumption. This body weight was calculate based upon the assumption that recreational exposure would begin at around age 6. Based upon this assumption, Tetra Tech recalculated a new SCTL for BAPeq. In response, the Department accepted this rationale, but because the Department's risk assessors sensed an interest in re-evaluating the applicability of the "Restricted II" exposure assumptions, they pointed out in a May 5, 2003 letter that the incidental soil ingestion assumption of 50 mg/day is not particularly conservative and its appropriateness is questionable. They proposed using the 100 mg/day soil ingestion assumption that is in the table for the "Resticted II" scenario in recalculating a new SCTL for BAPeq for this site.

In response to the Department's risk assessors' May 5, 2003 letter, Tetra Tech requested the scientific basis for using the 100 mg/day incidential soil ingestion rate number. While our risk assessors could not respond with a specific scientific basis for the higher ingestion rate number, in a June 4, 2003 letter they explain their rationale in proposing this number.

In conclusion, I propose that Navy either accept the proposed site-specific SCTL of 2.25 mg/kg for BAPeq or have Tetra Tech (or other Navy risk assessor) recalculate the SCTL using the 58 kg body weight assumption and 100 mg/day incidental soil ingestion rate assumption. I believe the Department could accept the recalculated number.

I have attached the Department risk assessors' letter to this letter for your reference. If you have any concerns regarding this letter, please contact me at (850) 245-8997.

Sincerely,

David P. Grabka, P.G.
Remedial Project Manager

CC: Satish Kastury, FDEPA
Debbie Vaughn-Wright, USEP, Atlanta
John Flowe, City of Jacksonville
Jeff Meyers, SOUTHNAVFACENGCOM
Mark Speranza, TtNUS, Pittsburgh
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TJB JJC For ESN

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February 21, 2003

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
Room 471A, Twin Towers Office Building
2600 Blair Stone Rd.
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

At your request, we have reviewed the Site 15 Determination of Site Specific SCTLs for NAS Cecil Field, Jacksonville, Florida. This document proposes cleanup goals for lead and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil at the 85-acre Site 15. Cleanup goals for lead have been developed with the objective of eliminating significant exposures to mammalian and avian receptors, as well as to children and adults visiting the site. For cPAHs, the goal is to reduce exposure to bring cancer risks below the goal of 1.0E-06.

Based on our review, we have the following comments:

1. The document explains that cPAH concentrations should be assessed as total benzo(a)pyrene equivalents (BaPEq) rather than developing SCTLs for individual cPAHs. We agree with this approach — it is consistent with current FDEP procedures for addressing cPAH contamination in soils.

2. The proposed SCTL for carcinogenic PAHs (4.5 mg/kg) is based on the FDEP "Restricted II" scenario. This scenario was originally developed by FDEP to calculate risks posed by remote cattle dip vat sites. Some of the exposure assumptions have been modified for Site 15 — most notably, body weight. The body weight assumption was increased from 35 kg to 70 kg so as to reflect an adult recreational user. This begs the question why only adults are expected to visit Site 15, since no institutional/engineering controls are planned that would prevent access by adolescents and children. Presumably, at least some adults using the site for recreational purposes (e.g., hiking, biking, trail riding) will bring their children. Also, adolescents have sufficient mobility that they could visit the site by themselves. Since children and adolescents receive greater doses

of contaminants from soils than adults on a per unit body weight basis, a cleanup goal for cPAHs based strictly on adult exposure is not necessarily protective in the case of exposure of children and adolescents. One approach to address this would be to use the original body weight assumption from the Restricted II scenario, 35 kg, which includes exposure while an adolescent. This would reduce the cPAH SCTL to 2.25 mg/kg. This would cover the most likely age group, other than adults, that might visit the site on a regular basis. Alternatively, if the possibility of repeated visits by small children is considered, a lower SCTL would be needed. One could be derived simply by modifying the FDEP aggregate resident scenario to limit the exposure frequency to 50 days and the exposure duration to 20 years. This would result in a cPAH SCTL of about 1.5 mg/kg.[1]

3. This SCTL is intended to be the acceptable upper limit for the average (or more precisely, the 95%UCL of the mean) concentration over an exposure unit. Currently, the entire 85-acre site is assumed to constitute a single exposure unit. In reality, contact with this large site is unlikely to be random, but instead more frequent near roads, trails, and access points. In part to address uncertainty about true randomness of contact within an exposure unit, FDEP requires that that the highest post-remediation concentrations not exceed three times the SCTL. This means that the not-to-exceed concentration for cPAHs would be 13.5 mg/kg if the SCTL proposed in the document is used, and 6.75 mg/kg if an SCTL is used that doesn't limit exposure to adults (see comment 2, above). Both of these concentrations are substantially below the estimated pick-up level for cPAHs needed to achieve an SCTL of 4.5 mg/kg presented in the report. Also, with respect to non-random exposure, it would be helpful to remove structures at the site which might attract visitors (especially children) to areas with elevated cPAH concentrations, such as the burn areas.

4. Two SCTLs for lead are presented for protection of human health. One is based on acute exposure for a small child. We participated in the development of this acute lead SCTL of 6,500 mg/kg, and agree that its use is appropriate for this site. Because it is based on acute exposure, it is used as a not-to-exceed value. A second SCTL, 3,281 mg/kg, was developed for chronic exposure using the same assumptions as for cPAHs. As with cPAHs, it is not clear why the assessment of chronic exposure doesn't include older children or adolescents. In the case of lead, however, the question is probably moot. If the prediction of post-remediation concentrations in the report is accurate, cleanup of the site to satisfy the acute lead SCTL will leave a site-wide average lead concentration of 577 mg/kg. This concentration is only about 50% higher than the residential lead SCTL, and consequently should be protective for chronic lead exposure for children and adolescents at this undeveloped site.

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[1] This is an approximate value based on changing only exposure duration and exposure frequency. Technically, all of the age-weighted inputs for the aggregate resident scenario (e.g. soil ingestion, body weight, etc.) should be re-derived for an age interval of 1 to 21 years instead of 1 to 31 years.

5. We are in agreement with the remedial goals selected for lead based on protection of mammalian and avian species (1,149 mg/kg site-wide average for avian species; 2,512 mg/kg average over 2-acre parcels for mammalian species; Table 5). We also agree that cleaning the site to lead and cPAH levels protective of human health will also result in concentrations safe for ecological receptors.

6. Regarding the section on determining the extent of remediation, we have received the concentration data for both B[a]PEq and lead in a spreadsheet format. We note that a single location is represented by several samples, and that some sample values are averages, presumably of discrete samples. It is not clear which samples are being included in the iterative processes used to determine the extent of remediation. For example, for B[a]PEq, the spreadsheet contains 515 observations that decrease to 472 if we exclude average values, whereas 430 of these are surface samples (starting at 0 depth). However, the number of distinct locations is only 325. The calculation sheet included in the pdf document states that 385 samples are considered. We are unable to sort this out, and consequently unable to check the calculation of projected post-remediation concentrations. It would be very helpful to have a clearer articulation of the concentrations assigned to specific sampling locations and their basis.

We hope these comments are helpful. Please do not hesitate to contact us if you need further assistance regarding the evaluation of this site.

Sincerely,

Hugo G. Ochoa, DVM, Ph.D.

Stephen M. Roberts, Ph.D.

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May 5, 2003

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
Room 471A, Twin Towers Office Building
2600 Blair Stone Rd.
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

Tetra Tech has proposed basing the Soil Cleanup Target Level for benzo(a)pyrene (BaP) at Site 15 on a body weight of 58 kg. You may recall it has been decided that SCTLs for chronic exposure at this site will be developed using a recreational scenario, with the assumptions taken from the FDEP "Restricted II" scenario. The body weight assumption associated with this scenario is 35 kg. A 20-year exposure duration was chosen as a site-specific assumption for this site, and Tetra Tech maintains that the most accurate average body weight for a 20-year period that begins as an older child (i.e., from age 6 to 26) is 58 kg. This value was calculated from data on body weights over this interval found in the EPA *Exposure Factors Handbook.*

Since BaP is a carcinogen, the dose used to estimate risks is derived from the full exposure period — in this case, 20 years. If there is agreement that recreational exposure at this site in fact begins at age 6, then 58 kg would be a reasonable body weight assumption. If chronic exposure is assumed to begin at an earlier age, then a lesser value (perhaps closer to 35 kg) would be more appropriate. [Note: A body weight assumption of 35 kg would also be appropriate for chronic exposure to a non-carcinogen beginning at age 6. However, this is not an issue at this particular site, since the only chemical of concern other than BaP is lead. The cleanup levels for lead are driven by acute toxicity and ecological concerns.]

Since there seems to be interest in re-evaluation of the applicability of Restricted II exposure assumptions for this site, we would like to point out that the incidental soil ingestion assumption of 50 mg is not particularly conservative. This is a value typically used in adult exposure scenarios in which there is little direct contact with soil. Since the exposure scenario for Site 15 includes an adolescent at play or otherwise engaged in recreation, the appropriateness of a 50 mg/day soil ingestion rate is questionable. There is no explicit guidance from EPA

regarding the incidental soil ingestion rate to be used for an adolescent recreator, or an adolescent trespasser, which would presumably have similar soil contact. However, in our experience, a soil ingestion rate of 100 mg/day is most commonly used in risk assessments for an adolescent trespasser or recreator. In view of this, we recommend that the re-examination of exposure assumptions for this site by FDEP and the U.S. EPA include incidental soil ingestion.

Sincerely,

Shukla Roy, Ph.D.

Stephen M. Roberts, Ph.D

cc: David Grabka, FDEP

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June 4, 2003

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

Tetra Tech has proposed basing the Soil Cleanup Target Level (SCTL) for benzo(a)pyrene (BaP) at Site 15 on a body weight of 58 kg. You may recall it has been decided that SCTLs for chronic exposure at this site will be developed using a recreational scenario, with the assumptions taken from the FDEP "Restricted II" scenario. The body weight assumption associated with this scenario is 35 kg and the exposure duration is 20 years. Tetra Tech maintains that the most accurate average body weight for a 20-year period that begins as an older child (i.e., from age 6 to 26) is 58 kg. They derived this value from data on body weights for ages 6 through 26 found in the EPA *Exposure Factors Handbook.*

Since BaP is a carcinogen, the dose used to estimate risks is derived from the full exposure period — in this case, 20 years. If there is agreement that recreational exposure at this site in fact begins at age 6, then 58 kg would be a reasonable body weight assumption. If chronic exposure is assumed to begin at an earlier age, then a lesser value (perhaps closer to 35 kg) would be more appropriate.

Since there seems to be interest in re-evaluation of the applicability of exposure assumptions selected for this site, I would like to point out that the incidental soil ingestion assumption of 50 mg/day used by Tetra Tech to calculate a BaP SCTL is not particularly conservative. This value is typically used in adult commercial/industrial exposure scenarios in which there is little direct contact with soil. When there is direct contact with soil outdoors, such with an adult resident, a higher soil ingestion value of 100 mg/kg is used. A 100 mg/day assumption is not just relevant for residential settings. For example, U.S. EPA Region 9 has recently changed their default incidental ingestion assumption for adult occupational exposure from 50 mg/day to 100 mg/day when outdoor soil exposure is involved. The common risk assessment scenario that is probably most like the adolescent recreator, which is the basis for the BaP SCTLs at Site 15, is the adolescent trespasser. Both involve receptors in the same age range, with presumably the same opportunities for outdoor direct soil contact. Although there is no explicit guidance from the U.S. EPA regarding a default soil ingestion value for the adolescent trespasser,

the most typical value used, in my experience, is 100 mg/day. Use of a lesser value such as 50 mg/day at Site 15 would require some compelling justification, in my opinion. Unless there is a reason why the adolescent recreators at this particular site will have almost no direct soil contact, a soil ingestion rate assumption of 100 mg/kg would be much more defensible in creating site-specific SCTLs.

Sincerely,

Stephen M. Roberts, Ph.D.

UNIVERSITY OF FLORIDA

Center for Environmental & Human Toxicology

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December 2, 2002

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

In the context of assessing potential risks to human health from lead in soils at Site 15, Cecil Field, the question arose as to what constitutes an acceptable soil lead concentration limit based on acute contact by a small child. This question is important because it may define the effective not-to-exceed value for lead in areas where small children might come in contact with soil. We conducted an analysis to determine the upper limit for lead concentration in soil such that acute exposure, in the form of a soil pica episode [single dose], would not result in a blood lead concentration associated with acute lead toxicity in children. This analysis was conducted in collaboration with Dr. Joel Pounds of Battelle Northwest Laboratories and Dr. Ted Simon of U.S. EPA Region 4. The details of that analysis have been provided to you previously. We intend to publish this analysis in a peer-reviewed journal, but this will take several months. In the meantime, so as not to further delay management decisions concerning Site 15, we would like to convey to you that the results indicate protection from acute exposure of children at a soil lead concentration of 6,500 mg/kg or less.

If you have any questions regarding this analysis or its implications in terms of risk strategies at Site 15, Cecil Field, we would be happy to provide additional information.

Sincerely,

Stephen M. Roberts, Ph.D.

Bernard K. Gadagbui, Ph.D.

A Soil Concentration Limit for Lead Based on Risk from Acute Exposure for a Small Child

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INTRODUCTION

Lead is a common contaminant of soils in both industrial and residential settings. Historical use of lead in gasoline has resulted in elevated soil concentrations near roadways, and very high concentrations of lead may remain in soils and slag near smelter operations and in tailings from mining operations (Eckel et al., 2002). Improper disposal of lead-containing waste, such as incinerator ash and lead battery cores, have created hazards at numerous waste sites in the U.S. Prior to 1978, lead comprised as much as 50% of some house paints. The weathering,

chipping, and peeling of lead-based paints are an important source of lead contamination of soils in residential settings, and this remains an important source of lead exposure for children in many urban areas (CDC, 1997).

Children are particularly vulnerable to lead contamination in soil for several reasons. Small children tend to have a much higher soil incidental ingestion rate of soils than adults, due to extensive contact with soil while at play and frequent mouthing behavior (Stanek et al., 1998). Thus, intake of lead [and other contaminants] by ingestion from soil is generally higher on an absolute basis in small children than in older children or adults. On a per unit body weight basis, the differences in lead dose from soil are even larger due to the smaller body weight of young children. The gastrointestinal absorption of lead is greater in children than adults (Ziegler et al., 1978; Alexander et al., 1974), further accentuating the differences in effective lead dose resulting from exposure to soil lead contamination. Finally, the developing nervous systems of children appear to be especially sensitive to neurotoxic effects of lead (Schwartz, 1994).

To develop concentration limits for lead in soil protective for small children, the U.S. Environmental Protection Agency (EPA) uses a probabilistic model to predict blood lead concentrations in children exposed to lead in soil at a specified concentration — the Integrated Exposure Uptake Biokinetic (IEUBK) Model (EPA, 1994a). With this model, a soil lead concentration limit can be derived such that a target blood lead concentration is not exceeded. Because the model is probabilistic and accounts for variability in lead toxicokinetics among individuals, the output is a distribution of blood lead concentrations that would arise in a population of children exposed to lead in soil at a specified concentration. Currently, the target blood lead concentration is $\leq$ 10 μg/dL to prevent neurobehavioral effects, per Centers for Disease Control and Prevention (CDC) recommendation (CDC, 1991). Typically, a soil concentration limit is selected such that only a small percentage (e.g., $\leq$ 5%) of exposed children would be predicted to have a blood concentration above this value (EPA, 1994b).

The IEUBK model and soil lead concentration limits derived from it are based on chronic exposure. As a regulatory tool, limits based on chronic exposure are appropriate in that the vast majority of situations in which risks to children from soil lead contamination are contemplated involve at least the potential for repeated contact. There are some circumstances, however, where consideration of risks from acute exposure to soil is warranted. For example, an acute exposure scenario could be relevant for a park or recreational area where an individual child might play, but only on one or a few occasions.

A soil lead concentration limit based on acute exposure can also be useful for sites where chronic exposure is anticipated. Soil concentration limits based on chronic exposure are often compared with the average contaminant concentration over the exposure area, since this is thought to best offer the best representation of the concentration to which an individual is exposed over time. In this situation, soils with concentrations above the limit are allowed to remain in place in some areas as long as other areas contacted by the child have offsetting lower concentrations. An acute exposure limit, used as a not-to-exceed value for all areas of the site, would help to insure that even a single exposure event with soils above the chronic exposure limit is safe.

Developing an acute exposure limit for lead in soils is more complicated than simply adjusting the exposure frequency assumptions in the IEUBK model. First, it is important to recognize that the amount of soil ingested acutely by a small child can be substantially different from the average daily incidental soil ingestion rate used to assess chronic intake. Unfortunately, there is little documentation of the frequency of these soil pica events or the amounts of soil ingested. Using data from their soil ingestion studies in children, Stanek and Calabrese (1995) estimated that 42% of small children ingest > 5 g of soil on one or two days a year, and 33% ingest > 10 g. These occasional soil doses are up to 70-fold or more higher than the default average daily soil ingestion rate assumption currently recommended for use with the IEUBK model (135 mg soil per day; EPA, 1994a). Second, the target blood lead concentration limit for chronic exposure (10 μg/dL) may not be applicable for acute exposure because it is based on neurobehavioral effects in chronically exposed individuals. The deficits observed in studies of these individuals likely require more than transient elevations in blood lead, as would occur with an acute lead dose. An assessment of the consequences of acute exposure requires endpoints relevant specifically to acute toxicity. Third, the computer model used to predict blood concentrations resulting from exposure to lead in soils must be capable of simulating a single acute dose. Many of the models currently available, including the IEUBK, do not provide this capability.

We report here the results of an analysis to develop a risk-based soil concentration limit for lead protective of small children for situations of acute exposure. For the purposes of this analysis, an acute exposure was defined as ingestion of soil containing lead on a single occasion. In order to produce a soil concentration limit that is broadly protective, the circumstance regarded as most likely to result in the highest soil lead dose was addressed — a soil pica episode by a small (2-year old) child. The overall approach was as follows. Clinical information regarding acute lead poisoning in children was assessed, and a blood lead concentration limit was selected. From the blood lead concentration limit, a corresponding dose limit from soil was calculated using biokinetic modeling. The dose limit was the dose from soil producing a peak blood lead concentration equal to the blood lead concentration limit. Finally, a soil lead concentration limit was calculated from the soil dose limit with an assumption regarding the volume of soil ingested during a pica episode.

SELECTION OF A BLOOD LEAD CONCENTRATION LIMIT

The clinical literature contains numerous reports of lead poisoning in children, and from these a reasonably complete picture of the signs and symptoms of acute lead intoxication can be obtained. The most serious manifestation of acute lead toxicity in children is acute encephalopathy. Signs and symptoms of acute encephalopathy include apathy, bizarre behavior, frequent and persistent vomiting, loss of coordination, intractable seizures, and coma. Acute encephalopathy is usually associated with blood lead concentrations over 100 μg/dL, although it has been observed with blood lead concentrations as low as 70 μg/dL (Piomelli et al., 1984). Peripheral neuropathy, common in lead poisoning in adults, is rare in children. Gastrointestinal effects such as colic - characterized by abdominal pain, constipation, cramps, nausea, vomiting, anorexia, and weight loss - have been observed as one of the early symptoms in acute exposures at blood lead concentrations of ≥ 60 μg/dL in children and adults (ATSDR 1999; NAS 1972). Acute lead intoxication can also produce renal effects, including a Fanconi-like syndrome, a triad

of hypophosphatemia, aminoaciduria, and glycosuria (Chisholm, 1962). While nephropathy can occur as a consequence of acute lead toxicity in children, it is more common in adult lead poisoning, and is typically found in workers with blood lead concentrations > 60 μg/dL (Henretig, 2002).

Lead produces anemia, both through an inhibition of hemoglobin synthesis and diminished erythrocyte survival (Henretig, 2002). Lead impairs hemoglobin synthesis by interfering with the critical phases of the dehydration of aminolevulinic acid (catalyzed by the cytosolic enzyme, δ-aminolevulinic acid dehydratase, ALAD) and the incorporation of iron into the protoporphyrin molecule. Although effects on ALAD activity can be detected at low blood lead concentrations (> 10 μg/dL), the clinical manifestation of anemia in children is associated with much higher concentrations, ca. > 80 μg/dL.

The CDC has defined a blood lead concentration of > 10 μg/dL in children as an intervention level. This definition is based on evidence that blood lead concentrations above 10 μg/dL are associated with neurobehavioral effects and deficits in cognitive performance. There are no data to indicate how long a blood lead concentration must be elevated for these effects to occur, but the studies showing subtle neurological effects of lead in children used populations that likely had repeated exposures (such as to lead-containing paint chips, house dust, or soil). As a result, the 10 μg/dL blood lead concentration as a threshold for concern is based on a persistent elevation, rather than a transient spike in blood lead as would be expected from an acute lead dose. The endpoint — subtle neurological deficits — is relevant to acute exposure, and these effects may occur as sequelae to a severe, acute intoxication episode. However, the use of 10 μg/dL as a blood concentration limit to protect against this effect from a single *acute* lead exposure is arguably not appropriate.

Most cases of acute symptomatic lead poisoning in children are associated with blood lead concentrations greater than 100 μg/dL (NAS, 1972). The EPA has identified a 60-100 μg/dL lead in blood as a lowest observable adverse effect level (LOAEL) for acute toxicity in children (EPA, 1986), and from the discussion above, clinical signs and symptoms of lead poisoning are associated with concentrations at or above 60 μg/dL. For the purposes of this analysis, a concentration of 60 μg/dL was selected as the target limit for the peak blood lead concentration after an ingested soil dose.

BIOKINETIC MODELING

Assessment of the hazards associated with lead in environmental media is unusual in that assessment is based on blood lead concentration as the toxicological endpoint. In some situations, empirical measurements of blood lead concentration are available for the exposed population, and the assessment of hazard is relatively straightforward. More often, however, blood lead concentrations must be modeled for exposed populations, as well as for populations that might become exposed in the future. Several PBPK or biokinetic models have been developed to predict blood lead concentrations resulting from environmental lead exposures (see EPA, 2001 for a review). Some of these models have the ability to evaluate intake of lead from a variety of sources, including ingestion of lead in food, water, and soil, and inhalation of lead in

particulates. The distribution of lead to various compartments in the body over time is considered with varying degrees of complexity among the models, but all have the ability to predict the blood concentration achieved with chronic exposure to lead under defined exposure circumstances.

Model selection

The IEUBK model used by the EPA has undergone extensive calibration and use and is judged to perform well in predicting blood lead concentration distributions for children 0 to 7 years of age. Although the model performs well in assessing chronic exposure, it is not capable, in its current configuration, of simulating blood lead concentrations arising from a single dose. This limitation makes the IEUBK model unsuitable for developing a soil lead concentration limit for acute exposure.

Other biokinetic models were evaluated as candidates for use in this analysis. The Rabinowitz model (Rabinowitz et al., 1976) is relatively simple and was developed to predict blood lead concentrations associated with long-term lead intake in adults. The Rabinowitz model is not scaled for children, which greatly limits its utility for this analysis. The same limitation applies to the Bert model (Bert et al., 1989), which is a more complex version of the Rabinowitz model. The California model (EPA, 2001) has been developed to predict blood lead concentrations from environmental exposure in both children and adults. However, like the IEUBK model, it is not capable of predicting the blood lead concentration profile resulting from a single dose. The Stern model (Stern, 1994) was developed to predict incremental changes in the steady-state blood lead concentration resulting from exposures to lead in soil, and therefore is useful only for situations of chronic lead exposure. The O'Flaherty model (O'Flaherty et al., 1995) is a true physiologically-based pharmacokinetic model. It is capable of simulating blood lead concentrations for ages 0 through adulthood, and for both short- and long-term exposures. There are indications that the model does not perform well when lead is ingested at very high concentrations (ATSDR, 1999), which could represent a problem when assessing acute exposures. Moreover, the C++ version does not allow the user to change the bioavailability from the default value.

The Leggett model (Leggett, 1993), developed by the Oak Ridge National Laboratories, is scaled for children and is capable of generating a blood concentration versus time profile for a single lead dose. Additionally, the Leggett model gives the user the option of simulating lead uptake by red blood cells as either a linear or non-linear process. These are features that many of the other models do not have. The model has been shown to perform well for a wide variety of exposure situations (EPA, 2001) and is the biokinetic core for the EPA's All-Ages Lead Model (AALM). From the comparison of model capabilities and attributes, the Leggett model was considered to be the most suitable for this acute exposure analysis.

Model inputs

Age-specific inputs for the Leggett model were chosen based on a 2-year old. This was considered to be the approximate age when a soil pica event while at play is most likely. The baseline blood lead concentration was assumed to be 4.1 μg/dL, which is the arithmetic mean

concentration for 1-2 year olds reported in the Third National Health and Nutritional Examination Survey, Phase 2 (NHANES III) (Pirkle et al., 1998). The default bioavailability assumptions for the Leggett model are age-specific, with 45 percent for birth to 1 year, and 30 percent for ages 1 to 5 years. Consequently, for a 2-year old, the default bioavailability factor would be 0.30. The EPA currently recommends a value of 0.30 (30%) for the absolute bioavailability of lead from soil for the IEUBK model (EPA, 1994a) when assessing chronic lead exposure. This assumption is derived in part from dietary absorption studies indicating that the absolute bioavailability of soluble lead from food and water in children is about 0.50 (50%; Alexander et al., 1974; Ziegler et al., 1978). Based on studies of the relative bioavailability of lead from soil versus water, an additional reduction factor of 0.6 is applied, leading to the combined absorption factor of 0.30 (i.e., 0.5 x 0.6 = 0.3). The potential applicability of this bioavailability factor (0.30) to an acute exposure scenario was evaluated as part of this analysis.

The gastrointestinal absorption of ingested lead is well documented to decrease with increasing lead dose. Aungst and Fung (1981) investigated lead absorption across the gut lumen *in vitro* in everted rat intestines and demonstrated that lead uptake involves two distinct processes: a passive diffusion process that is independent of gut concentration, and a capacity-limited active or facilitated diffusion process. At low lead concentrations, lead transport is effected almost exclusively through the active route. At higher concentrations, the lead transport mechanism becomes saturated, and the relative contribution of passive diffusion is increased. Passive diffusion of lead in the gut is poor, and as the contribution of passive diffusion increases, the fraction of ingested lead absorbed is diminished. This concentration-dependent uptake of lead from the gut may explain at least in part the non-linear relationship between lead intake and blood lead concentrations observed in children (Sherlock and Quinn, 1986; see below). It also indicates strongly the need to incorporate dose-dependent absorption when modeling blood lead concentrations from acute lead exposure.

Three studies were identified that provide information of potential value on the dose-dependent uptake of lead from the gut. Sherlock and Quinn (1986) conducted a duplicate diet study in which bottle-fed infants were exposed to lead in water and in formula mixed with contaminated water for one week in the 13th week after the infant's birth. Dietary lead intakes, believed to constitute almost all ingested lead, ranged from 0.04 to 3.4 mg/week. The authors observed a curvilinear relationship between the blood lead concentration and lead intake, with higher lead doses producing less-than-proportional increases in blood lead concentration. Reichlmayr-Lais et al (1988) investigated the effect of dietary lead intake on lead retention in adult rats. Rats were exposed to lead concentrations ranging from 0.02 to 800 μg lead per kg diet for 29 days. Absorption of lead, as inferred from lead retention, was similar for lead concentrations in diet up to 1 μg lead per kg feed, but was nearly 10-fold lower at higher dietary lead concentrations. In a study by Mallon (1983), lead absorption was examined in infant and juvenile baboons. Infant (6-7 months of age; 3 kg average body weight) baboons were administered lead acetate in gelatin capsules at doses of 100, 200, or 1000 μg lead per kg body weight per day for 4.6 – 6 months. Juvenile baboons (22-23 months of age; 5 kg body weight) received doses of 100 or 500 μg per kg body weight per day for 3.5 – 6 months. Controls received no lead acetate, and their only lead intake was 12 μg lead per kg body weight per day from standard diet. As the daily lead dose increased from 12 to 1000 μg/kg for the infant

baboons, and from 12 to 500 μg/kg for the juvenile animals, the fraction of the lead dose absorbed decreased from 0.24 to 0.02 in infants and from 0.12 to 0.01 in juvenile animals.

For the IEUBK model, the EPA used data from the Sherlock and Quinn study to address the dose-related bioavailability of lead (see EPA, 1994a). Total lead uptake from the gut was treated as the sum of saturable and non-saturable components. The data were fit to a nonlinear regression model in a form comparable to the Michaelis-Menten equation used to describe the *in vitro* results observed by Aungst and Fung (1981):

$$PbB = \frac{B + A \times Pb_{intake} + P \times Pb_{intake}}{\left(1 + Pb_{intake}/M\right)}$$

where:

B is the baseline blood lead concentration (10.85 μg/dL was used)

A and P are coefficients describing, respectively, nonlinear (active) and linear (passive) lead intake, between PbB and dietary lead intake; and

M is the Michaelis-Menten type (nonlinearity) parameter — the daily dietary intake rate at which the facilitated component of lead uptake is half saturated (Gary Diamond, personal communication).

Intake data from infant and juvenile baboons in the Mallon study were also fit to a similar model. Based on a goodness-of-fit comparison for these data sets, the EPA selected the Sherlock and Quinn data to represent the nonlinear absorption of lead in children, with the Mallon study cited as providing supporting data. From the Sherlock and Quinn data, the lead intake at which absorption is greatly reduced was estimated to be 90 μg/day.

We also evaluated the Sherlock and Quinn data to determine their suitability for use in defining the bioavailability of ingested lead. Lead uptake curves from this study were approximated by extracting the blood lead concentration versus weekly lead intake rate for the grouped data [from Figure 2 of Sherlock and Quinn, 1986] to SlideWrite v.5, and converting the dose to μg/day. The blood lead concentration versus lead intake data were then fit to the nonlinear regression model used by the EPA (see equation above). The data fit the Michaelis-Menten type equation well (Figure 1; r^2=0.98), as observed by the EPA, although the fit statistics revealed large standard errors for the estimated parameters A and P. The large errors for the parameter estimates are due to the availability of only seven data points to estimate three parameters (A, P, and M). Although this equation was a good fit to the observed data (Fig. 2), extrapolation to much higher doses (up to 5000 μg/day) did not produce plausible increases in blood lead concentration. Because the dose-blood concentration relationship produced implausible results at lead doses relevant to acute lead exposure, the use of these data and this equation was rejected. This data set was also fit to several empirical nonlinear equations with similar poor extrapolation to high doses (not shown).

The data from infant and juvenile baboons by Mallon (1983) were also evaluated. Although not obtained in humans, these data were derived in a primate at a relevant age. There is a close resemblance between hematological, blood lead responses, and patterns of lead

distribution and retention in baboons and humans (Mallon, 1983). This data set has the advantage of direct measurement of lead absorption, rather than indirect measurements, e.g. blood lead concentration, from which absorption must be inferred, as with the Sherlock and Quinn study. Additionally, the Mallon study utilized higher doses, extending the range over which dose-dependent absorption information is provided. Lead uptake data from the Mallon study were fit to nonlinear, exponential, and power function equations (Figure 3). The three equations fit the observed data reasonably well, with $r^2>0.98$. However, the extrapolated bioavailability at higher lead doses were markedly different (Figure 4). The power function model predicted negligible uptake of lead above doses of approximately 15,000 μg/day. The nonlinear and exponential models predicted a fairly constant uptake of approximately 1 and 3 percent, respectively, for lead doses up to 80,000 μg/day.

While all treatments of the Sherlock and Quinn and Mallon data predicted low uptake of lead at high doses, there is considerable uncertainty in establishing the precise value at intakes well beyond the observed data. From the two data sets, uptakes ranging from essentially zero to 3% were obtained for lead doses greater than about 10,000 μg/day. While these differences are small, it is important to recognize that blood lead concentrations are a function of [1- uptake]. As a consequence, the difference between choosing 0.5% and 3% uptake is a 6-fold difference in the predicted blood lead concentration. That difference is a considerable margin of uncertainty. As a practical measure, we chose not to extrapolate beyond the observation range, and selected for modeling the uptake value from the highest dose tested in the Mallon study — 0.02 (2%). This uptake represents a conservative choice in that the actual uptake of lead is likely to be lower at lead doses of interest for acute exposure.

A second issue regarding bioavailability is the extent to which absorption of ingested lead is diminished when it is present in soil rather than in the form of soluble lead as in the Sherlock and Quinn and Mallon studies. The relative bioavailability of lead from soil as compared with water has been measured for several soil samples from hazardous waste sites using the swine model (Ruby et al. 1999). Among these samples, the relative bioavailability was found to vary from less than 0.10 to 0.90). The EPA has chosen a value near the middle of this range, 0.60 (60%) as the default for the IEUBK model (EPA, 1994a). For the purpose of setting a soil concentration limit for acute exposure, an argument can be made for choosing a relative bioavailability value from the upper end of the range of observed values. For example, if a relative bioavailability of 0.60 is assumed, but the actual relative bioavailability of lead in a soil sample is 1.0, a soil lead concentration predicted to yield a peak blood lead concentration of 60 μg/dL (the blood lead limit chosen for this analysis) might actually result in a peak concentration of 100 μg/dL. As discussed in "Selection of a Blood Concentration Limit," the latter concentration is capable of producing clinical acute lead poisoning. In view of this small margin for error, a relative bioavailability of 1.0 was selected for the analysis; i.e., the bioavailability of lead in soil is the same as in water. It is acknowledged that other relative bioavailability values might be used to derive a soil concentration limit for acute exposure on a site-specific basis, provided that this information can be obtained with high confidence.

ESTIMATING THE SOIL CONCENTRATION LIMIT

Soil dose corresponding to the blood concentration limit

With the input assumptions described above, the soil dose producing a peak blood concentration at the specified limit (60 μg/dL) was determined through an iterative process. Simulations were performed assuming either linear or nonlinear partitioning of lead into erythrocytes. As shown in Figure 5, the 60 μg/dL blood concentration limit is reached with a soil dose of 74,500 μg of lead if non-linear partitioning to erythrocytes is assumed, and with a soil dose of 65,000 μg lead assuming linear partitioning.

Soil concentration limit

The amount of Pb ingested depends on the soil lead concentration and the amount of soil ingested. Data on the soil mass ingested during pica episodes are extremely limited. Vermeer and Frate (1979) found that the incidence of soil pica among children in a rural black community was 16 percent, and estimated the average amount of soil ingested to be 50 g/day. In a study by Calabrese et al. (1991), one child (among 64 examined) repeatedly ingested soil at rates ranging from 74 mg to 13.6 g/day over a two-week period. Wong (1988) found that six of 52 children studied exhibited soil pica behavior. Five of these children had normal mental capacity, and the amounts of soil ingested ranged from 0 to 10.3 g/day. One mentally retarded child ingested up to 60 g of soil per day. The EPA Child-Specific Exposure Factors Handbook (EPA, 2000) recommends a value of 10 g for soil pica. Using this value, the soil concentration corresponding to soil dose limit of 74,500 μg lead under conditions of nonlinear partitioning would be 7,450 mg/kg. The dose limit of 65,000 μg assuming linear partitioning would result from ingestion of 10 g of soil at a concentration of 6,500 mg/kg.

The biological mechanisms or processes underlying the nonlinear accumulation of lead in blood or red blood cells with increasing dose are not clear. While nonlinear partitioning is often assumed when predicting PbB concentrations from chronic exposure, its applicability to a single acute dose is uncertain. Given the choice between two soil lead concentration limits (7,500 mg/kg, assuming nonlinear partitioning, and 6,500 mg/kg assuming linear partitioning), and uncertainty as to which is more correct, the regulatory approach is usually to choose the more conservative of the values. On this basis, a soil concentration limit for lead based on acute toxicity in children of 6,500 mg/kg would be recommended.

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR). (1999). Toxicological Profile for Lead (Update). Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA.

Alexander FW, Clayton BE, and Delves HT (1974). Mineral and trace-metal balances in children receiving normal and synthetic diets. *Q. J. Med.* 43 (169): 89-111.

Aungst BJ and Fung H-L (1981). Kinetic characterization of in vitro lead transport across the rat small intestine. Mechanism of intestinal lead transport. *Toxicol. Appl. Pharmacol.* 61: 39-47.

Bert JL, Van Dusen LJ, and Grace JR (1989) A generalized model for the prediction of lead body burdens. *Environ. Res.* 48:117-127.

Calabrese EJ, Stanek EJ, and Gilbert CE. (1991). Evidence of soil-pica behavior and quantification of soil ingested. *Hum. Exp. Toxicol.* 10:245-249.

Centers for Disease Control and Prevention (CDC). (1991). *Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control.* Public Health Service, Centers for Disease Control and Prevention, Atlanata, GA: U.S. Department of Health and Human Services, October.

Centers for Disease Control and Prevention (CDC) (1997). Update: Blood lead levels. *MMWR* 46:141-146.

Chisholm JJ. (1962) Aminoaciduria as a manifestation of renal tubular injury in lead intoxication and a comparison with patterns of aminoaciduria seen in other diseases. *J. Pediatrics* 60:1-17.

Eckel WP, Rabinowitz MB, and Foster GD. (2002). Investigation of unrecognized former secondary lead smelting sites: confirmation of historical sources and elemental ratios in soil. *Environ. Pollution.* 117: 273-279.

Environmental Protection Agency (EPA) 1986). *Air quality criteria for lead.* Office of Research and Development, Environmental Criteria and Assessment Office. EPA 600/8-83-028F.

Environmental Protection Agency (EPA) (1994a). *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.* U.S. Environmental Protection Agency, EPA/540-R-93/081, PB93-963510.

Environmental Protection Agency (EPA) 1994b). Revised Interim Soil Lead Guidance for CERCLA Site and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12.

Environmental Protection Agency (EPA) (2000). *Child-Specific Exposure Factors Handbook.* NCEA-W-0853.

Environmental Protection Agency (EPA) (2001). *Review of Adult Lead Models. Evaluation of Models for Assessing Human Health Risks Associated with Lead Exposures at Non-Residential Areas of Superfund and Other Hazardous Waste Sites.* Office of Emergency and Remedial Response. EPA 9285.7-46.

Henretig FM (2002). Lead. In, Goldfrank's Toxicologic Emergencies, Seventh Edition (Goldfrank LR, Flomenbaum NE, Lewin NA, Howland MA, Hoffman RS, and Nelson LS, Eds), McGraw Hill, New York, NY, pp. 1200-1227.

Leggett RW (1993). An age-specific kinetic model of lead metabolism in humans. *Environ. Health Perspect.* 101: 598-616.

Mallon RP (1983). A metabolic model of lead kinetics based upon measured organ burdens during chronic exposure experiments with infant and juvenile baboons. Ph.D. Thesis, Department of Biology, New York University Medical Center, New York, NY.

National Academy of Sciences (NAS) (1972). Lead: Airborne lead in perspective: Biologic effects of atmospheric pollutants. Washington, DC: National Academy of Sciences, pp. 71-177, 281-313.

O'Flaherty EJ (1995) Physiologically based models for bone-seeking elements. V. Lead absorption and disposition in childhood. *Toxicol. Appl. Pharmacol.* 131:297-308.

Piomelli S, Rosen JF, Chisholm JJ and Graef JW. (1984) Management of childhood lead poisoning. *J.Pediatrics* 105:523-532.

Pirkle JL, Kaufmann RB, Brody DJ, Hickman T, Gunter EW, and Paschal DC (1998). Exposure of the U.S. population to lead, 1991-1994. *Environ. Health Perspect.* 106:745-750.

Rabinowitz MB, Wetherill GW, Kopple JD (1976). Kinetic analysis of lead metabolism in healthy humans. *J Clin Invest.* 58:260–70.

Reichlmayr-Lais AM, Stockl KN, and Kirchgebner M. (1988). Effect of dietary lead intake on lead retention in adult rats. *Trace Elem. Electrolytes Health Dis.* 2:153-155.

Ruby MV, Schoof R, Brattin W, Goldade M, Post G, Harnois M, Mosby DE, Casteel SW, Berti W, Carpenter M, Edwards D, Cragin D, and Chappel W. (1999) Advances in evaluating the oral bioavailability of inorganics in soil for use in human health risk assessment. *Env. Sci. Technol.* 33:3697-3705.

Schwartz J. (1994). Low-level lead exposure and children's IQ: A meta-analysis and search for a threshold. *Environ. Res.* 65:42-55.

Sherlock JC and Quinn MJ (1986). Relationship between blood lead concentrations and dietary lead intake in infants: The Glasgow duplicate diet study 1979-1980. *Food Additives and Contaminants.* 3: 167-176.

Stanek EJ and Calabrese EJ. (1995). Daily estimates of soil ingestion in children. *Environ. Health Perspect.* 103:276-285.

Stanek EJ, Calabrese EJ, Mundt K, Pekow P, Yeatts KB (1998). Prevalence of soil mouthing/ingestion among healthy children aged 1 to 6. J. Soil Contam. 7:227-242.

Stern AH (1994). Derivation of a target concentration of Pb in soil based on elevation of adult blood pressure. *Risk Anal.* 16:201-210.

Vermeer DE and Frate DA (1979). Geophagia in rural Mississippi: environmental and cultural contexts and nutritional implications. *Am. J. Clin. Nutr.* 32:2129-2135.

Wong MS (1988) The Role of Environmental and Host Behavioural Factors in Determining Exposures to Infection with Ascaris lumbricoldes and Trichuris trichlura. Ph.D. Thesis, Faculty of Natural Sciences, University of the West Indies.

Ziegler EE, Edwards BB, Jensen RL, Mahaffey KR, and Fomon SJ. (1978). Absorption and retention of lead by infants. *Pediatr. Res.* 12: 29-34.

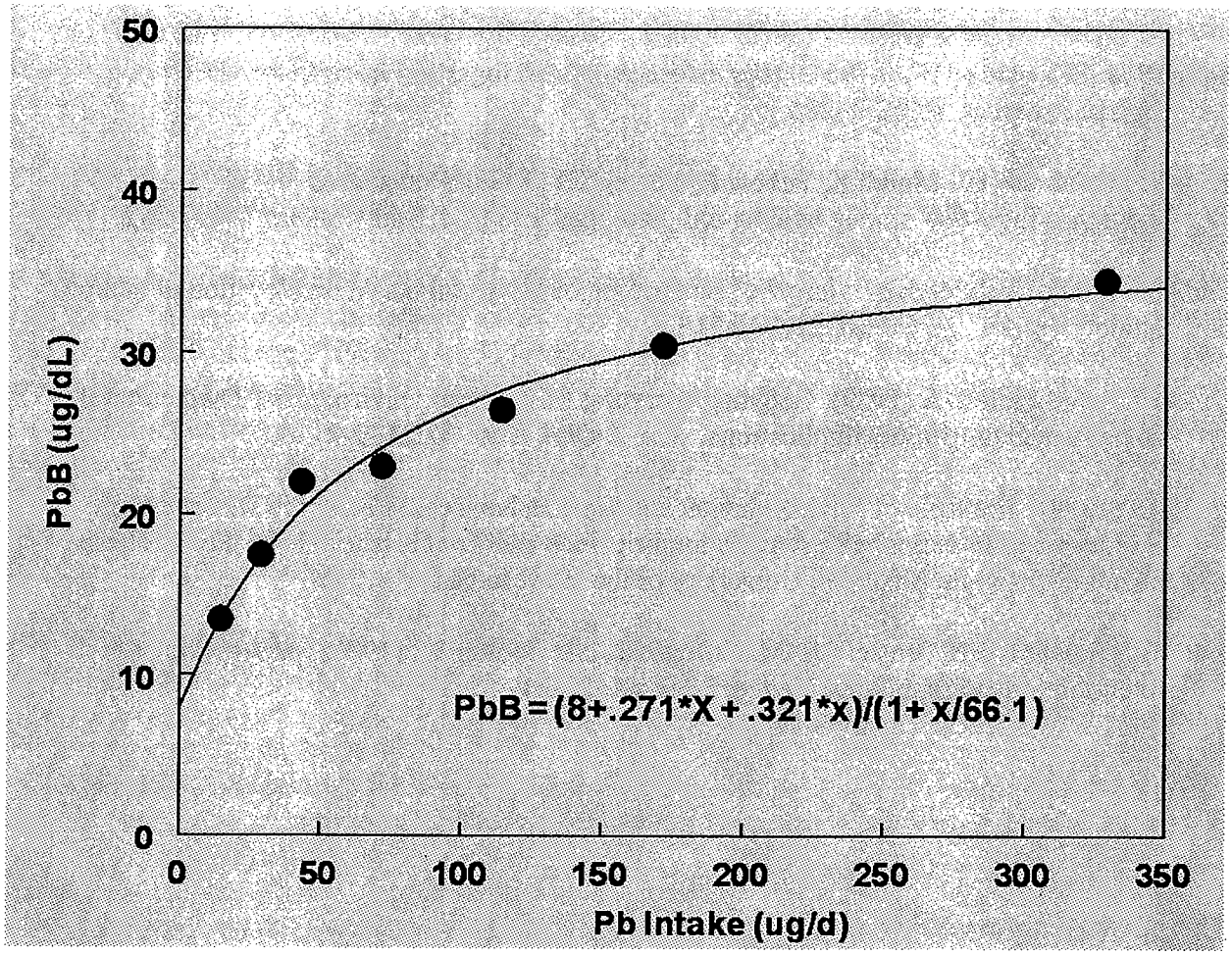

Figure 1. Nonlinear Regression of Lead Intake versus Blood Lead Concentration Data from Sherlock and Quinn

Lead intake and blood lead concentration data from Sherlock and Quinn (1986) were fit to a Michaelis-Menton-type equation as described in the section on "Model Inputs." A baseline blood lead concentration (B) was fixed at 8 μg/dL, based on the y-intercept of data presented in Figure 2 of the Sherlock and Quinn report. Parameters A, P, and M were optimized to provide the best fit of the data.

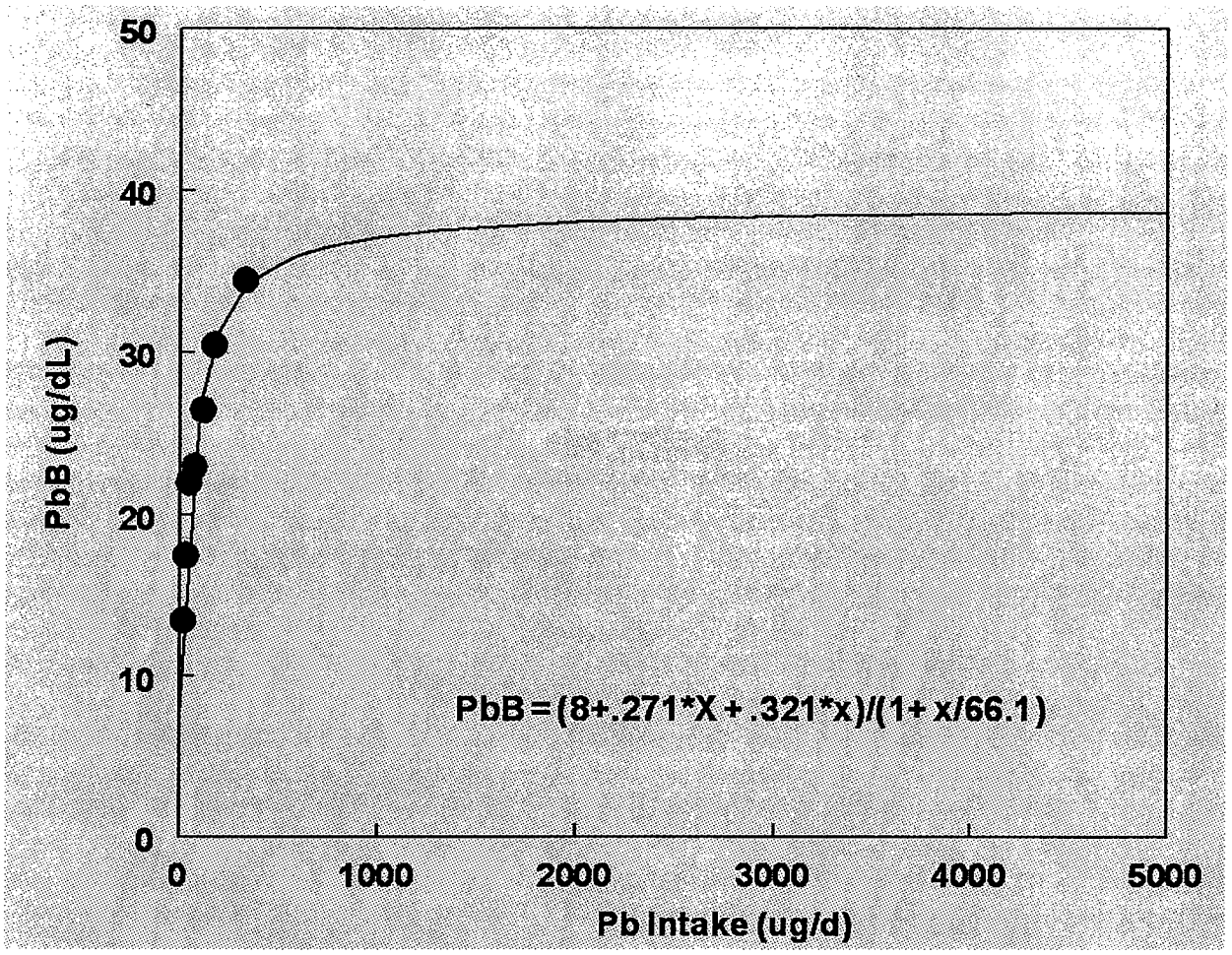

Figure 2. Extrapolation of Nonlinear Regression of Sherlock and Quinn Data to Higher Lead Intakes

Lead intake and blood lead concentration data from Sherlock and Quinn (1986) were fit to a Michaelis-Menton-type equation as in Figure 1. Using parameters (A, P, and M) providing the best fit of the data, the prediction of PbB was extrapolation to an intake of 5,000 μg Pb/day.

QuickTime™ and a
TIFF (PackBits) decompressor
are needed to see this picture.

Figure 3. Regression of Lead Uptake versus Lead Intake from the Mallon Study Using Nonlinear, Power, and Exponential Models.

Lead uptake and lead intake data were obtained from Mallon (1983). The data set was fit separately to a non-linear, an exponential, and a power function. All fits had r^2 values $\geq$ 0.98.

QuickTime™ and a
TIFF (PackBits) decompressor
are needed to see this picture.

Figure 4. Extrapolation of Curve Fits for Mallon Data to Higher Lead Intakes

Lead intake and blood lead concentration data from Mallon (1983) were fit to a nonlinear, exponential, and power functions as in Figure 3. Using parameters providing the best fit of the data, the prediction of PbB was extrapolated to an uptake of 80,000 μg Pb/d.

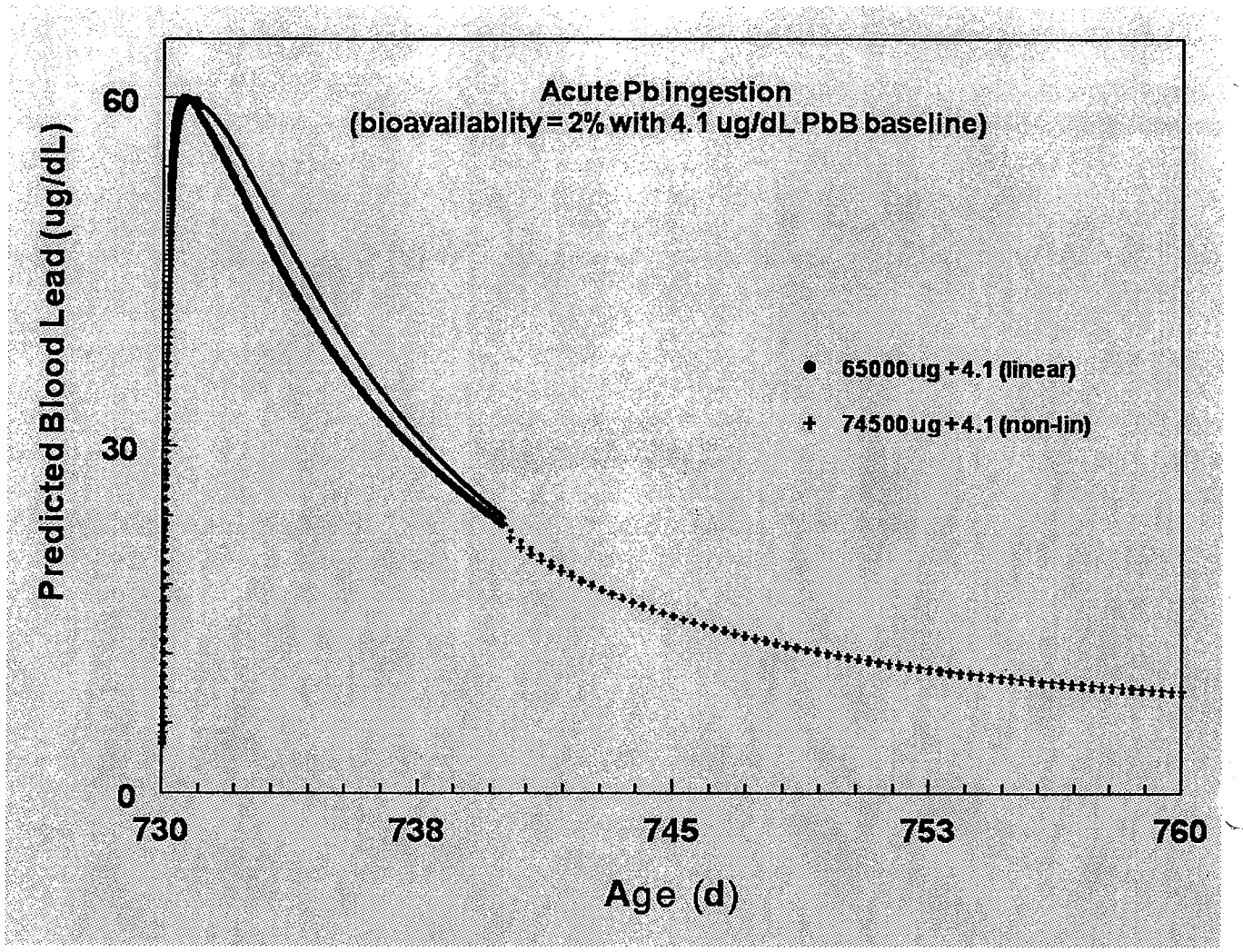

Figure 5. Predicted Blood Lead Concentrations from Ingestion of a Single Dose of Lead from Soil

Blood lead concentrations were predicted using the Leggett model scaled for a 2-year old child. The baseline blood lead concentration was assumed to be 4.1 μg/dL, and the absolute bioavailability of the lead dose from soil was assumed to be 0.02. The blood concentration versus time profiles shown are for a lead dose of 65,000 μg assuming linear partitioning of lead to erythrocytes, and 74,500 μg assuming non-linear partitioning. Both produce a peak blood lead concentration equal to the target limit of 60 μg/dL.

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February 25, 2002

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
Room 471A, Twin Towers Office Building
2600 Blair Stone Rd.
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

In previous meetings and communications we have expressed concern regarding the protectiveness of some of the PRGs proposed by Tetra Tech NUS (TTN) to be used at Site 15, Cecil Field. We have presented our opinion that available information does not warrant departure from the default bioavailability assumption for lead, that the rates of soil ingestion proposed by TTN are too low, and that care must be taken when choosing a bioaccumulation factor (BAF) protective of receptors with small home ranges.

In an effort to help the decision process move forward, we think that compromises can be reached on some of the input assumptions and still achieve PRGs protective of the environment. Specifically, within the range of soil ingestion values proposed, we would consider an intermediate soil ingestion rate assumption of 5% for both the mammal and bird to be acceptable. Also, for the mammal, we would agree that a BAF of 0.04 (wet weight) is reasonable. This value was derived from the slope of the insect versus soil lead concentration relationship observed at the site, and its use for calculating a PRG is consistent with the work plan. Also, although not the highest BAF observed at the site, it is within a factor of two of the maximum making it unlikely that intake of lead from diet would be seriously underestimated for any portion of the site. As we indicated previously, a BAF of 0.014 (wet weight) would be appropriate for species with site-wide exposure, such as the bird.

It remains our opinion that a relative bioavailability adjustment is not warranted for lead because there is no indication that dietary lead intake in this case would be significantly different from that observed in the critical study, which was also based on lead incorporated in the feed.

The table below presents the PRGs for birds and mammals that would result from these assumptions. Given the relative precision of such values, the PRGs for lead could be rounded to about 1,000 mg/kg or so for the bird and 2,500 mg/kg for mammals. The change for the bird from the PRG proposed by TTN is not very large. For the mammal, a much lower PRG is calculated. In our opinion, this lower PRG has stronger scientific support. As we discussed in a letter of October 16, 2001, a study involving collection of shrews inhabiting a skeet range has shown a soil-to-kidney BAF of 0.02, which

appeared to be consistent over a broad lead concentration range (Stansley and Roscoe, Arch. Enviorn. Contam. Toxicol. 30:220-226, 1996). Observations from several studies have shown critical renal lead levels for mammals ranging from 25 to 40 µg/g based on the appearance of kidney intranuclear inclusion bodies (Ma, Ecotoxicology of Soil Organisms, Lewis Publishers, 1994). Using the less conservative, upper end of this range, a PRG of 2,000 mg/kg lead can be calculated. Since toxicity studies find that no-effect doses for renal changes are similar to no-effect levels for reproductive and other toxicities, a PRG in this range is needed to address the assessment endpoint in the ecological risk assessment — reproduction in shrews. While this type of information may not be sufficient alone to establish a PRG for the site, it nonetheless indicates that a PRG closer to 2,500 mg/kg is needed.

	TTN (Wet Weight)		Proposed Values (Dry Weight)	
	Mammal (Shrew)	Bird (Mockingbird)	Mammal (Shrew)	Bird (Mockingbird)
LOAEL, mg/kg-d	80	11.3	80	11.3
Body Weight, g	5.5	49	5.5	49
Food Ingestion, g	3.3	23.2	0.957	6.728
Soil Ingestion, %FI	1.50%	2.00%	5.00%	5.00%
Diet Invert Fraction, %FI	100%	50%	100%	75%
BAF	0.014	0.014	0.14 (0.04 ww)	0.05 (0.014 ww)
Relative Bioavailability, %	72%	72%	100%	100%
PRG, mg/kg	**6386**	**1228**	**2446**	**955**

The issue of a not-to-exceed value also came up in discussion at our recent meeting at Cecil Field. Preliminary information presented there indicated that use of the TTN-proposed PRGs could result in soils remaining on site with as much as 39,000 mg/kg lead. We consider that concentration to be too high, based on concern for potential acute toxicity. Unfortunately, information with which to set a non-to-exceed concentration that will avoid acute toxicity is limited. Earthworm mortality studies conducted using soils from this site showed complete mortality at some concentrations, but are compromised by the lack of a coherent dose-response relationship. Insects abundance in soil showed no relationship with lead concentration up to the highest concentration included in the study, 5,780 mg/kg. However, there are no data available that show that insects, which are important prey items for both mammals and birds, are not affected by higher concentrations. In the absence of such data, a protective approach would be to select a concentration of about 5,000 mg/kg lead as a not-to-exceed concentration for the site.

With respect to protection of human health, the PRG will of course be dependent upon the exposure scenario considered. Right now, the only PRG proposed involves extremely limited contact with the site by adults only. It is not clear to us how such limited contact restricted to adults can be

confidently assured. Even if the site is not actively developed for commerce or recreation, a variety of types of contact with the site could occur, conceivably resulting in different levels of risk. Further discussion of this is warranted, in our opinion. Also, as we discussed during our meeting at Cecil Field, the risk management strategy for this site will have to recognize that site contact is not likely to be random, at least if the site remains in its current configuration. Contact with the site will most frequently occur along existing roads and trails. Further, some portions of the site may serve as attractants, particularly for children and adolescents, also leading to non-random contact.

Finally, the question was raised during our meeting whether soil samples in the incinerator areas had been tested for dioxins. Apparently, they have not. This is an oversight that should be corrected before final remedial decisions are made.

Sincerely,

Hugo G. Ochoa, D.V.M., Ph.D.

Stephen M. Roberts, Ph.D.

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October 15, 2001

Ligia Mora-Applegate
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Florida Department of Environmental Protection
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2600 Blair Stone Rd.
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

In a letter to you dated June 28, 2001, we commented on the *Draft Memorandum for No Further Action, Potential Source of Contamination 44 Ditch from DRMO to Wastewater Treatment Plant* prepared by Tetra Tech NUS, Inc. (TTN). We have received an electronic copy of slides from a presentation by TTN responding to our comments. Although a narrative response would be preferable in terms of clarity, we have tried to interpret the responses from these slides as best we can. We also reviewed an e-mail message from Mike Whitten of TTN, which provides additional explanation for their assumption that incidental soil ingestion constitutes 3% of a shrew's food consumption.

The following summarizes our thoughts on the TTN responses to comments.

Response to Comment 1: Our comment expressed concern regarding the choice of the green heron for modeling exposure of piscivorous birds. This species is not included in the Wildlife Exposure Handbook, and a rather large home range size (100 Ha) had to be estimated by TTN using an allometric relationship for raptors. Other piscivorous birds with much smaller home ranges may utilize the site, and modeling based on the green heron is therefore not very conservative. We recommended instead using information for the Belted kingfisher as representative of avian piscivores. It is a similar-sized bird, but its home range is less than 1/10 of that used by TTN. The response to our comment states that habitat is not conducive of kingfishers, and that "Home range is not an issue because fish in the drainage ditch would only comprise a small portion of either birds

total diet." Under present site conditions, the habitat may not be conducive to kingfishers, but the point is that the home range area chosen for piscivorous birds is too large to be protective for all members of this guild that may use the site. For comparison, recent efforts by the Kennedy Space Center Ecological Risk Assessment Partnering Team has identified a home range of 8.4 Ha based on the much larger Great blue heron. Also, we do not understand the contention that home range area is not important. It is implied that an area use factor will be applied in calculating risks, which requires an estimate of the home range and site size. If some other approach will be used, this should be explained.

Response to Comments 2: In our comment, we suggested using an incidental soil ingestion rate of 10% of diet based work by Beyer et al. (1993) rather than 3%, as originally proposed by TTN. Mike Whitten has received verbal information regarding a study supporting the 3% assumption, apparently based on the stomach contents analysis of wild shrews. We would like to see a write up of this study, but have reservations about its value. Our experience evaluating food habit studies suggest that this approach may be unreliable because of the many factors that influence an animal's gut content at any given time, and because of significant variation among individuals. An analysis of ash residues from scats might yield more representative data, but we are aware of no data published for shrews using this approach.

Our concern that a 3% incidental ingestion rate is too low comes from calculations of soil intake through ingestion of earthworms. Dalby et al. (Soil Biol. Biochem., 28:685-87, 1996) measured soil gut content of four earthworm species by leaving them on wet filter paper for 72 h and then weighing the casts of soil they defecated. From these data, we calculate that the earthworms had 6.98% plus/minus 3.42% (dry-wt/dry-wt) soil in their gut. This is probably a low estimate. Beyer et al. (J.Wildl.Manage., 58:375-82, 1994) state that "Wildlife preying on soil invertebrates or aquatic organisms associated with sediments may ingest much soil or sediment. Earthworms are typically 20-30% soil. Acid-insoluble ash contents of earthworms have been measured as 13 and 24% (this study) and 5-41% (Stafford and McGrath 1986). Soil contents have been estimated at 30% (Beyer et al. 1993) and about 20% (Hendriksen 1991)". Clearly, a shrew diet consisting entirely of earthworms would include more than 3% soil. It could be argued that the shrew diet may not be 100% earthworms, and that consumption of other prey probably involves less incidental soil ingestion. Given the observations by Beyer et al., using a 10% incidental soil ingestion assumption would allow for this to a considerable extent (i.e., it would assume in effect that the diet is no more than about one-third to one-half earthworms, based on a soil content of 20-30%). This is probably as refined an estimate as can be made without a study to determine

dietary composition for animals at the site. Even a 10% incidental soil ingestion estimate is not particularly conservative, since it is based on incidental soil exposure through the diet only, and doesn't consider intake from other activities such as grooming.

Response to Comments 3, 4 & 5 : As best we can determine from the slides, the TTN explanations and proposed adjustments in response to these comments are adequate and sufficient.

We hope these comments are helpful. Should you have any questions, please do not hesitate to contact us.

Sincerely,

Hugo G. Ochoa, D.V.M., Ph.D.

Stephen M. Roberts, Ph.D.

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April 17, 2001

Ligia Mora-Applegate
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Florida Department of Environmental Protection
Room 471A, Twin Towers Office Building
2600 Blair Stone Rd.
Tallahassee, FL 32399

Dear Ms. Mora-Applegate:

We have reviewed at your request the March 30, 2001 report "Development of Ecologically-based Remediation Goals for Lead and PAHs in Soil Site 15, Blue 10 Ordinance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida" prepared by Tetra Tech NUS. The document presents revised assessment and measurement endpoints, and a working plan for the field activities proposed for Site 15. Briefly, the document proposes generating Preliminary Remediation Goals (PRGs) for lead and PAHs based on the results of 14-day earthworm toxicity tests, and on the calculation of soil lead concentrations protective of birds and mammals. The document also proposes to measure diversity and abundance of soil invertebrates along gradients of lead and PAH concentrations. We have also received response to our comments sent to you in January 29, 2001, and to comments made by the USEPA Environmental Response Team.

In a January 29, 2001 letter we expressed concern about the uncertainty associated with developing PRGs for soil invertebrates based only on earthworm mortality. At that time, we suggested including community endpoints in order to determine directly a concentration with little or no adverse effect on diversity and abundance of soil invertebrates at Site 15. The document under review now proposes to evaluate potential effects to soil invertebrates through earthworm acute toxicity tests, and also by measuring soil invertebrate diversity and abundance. We are pleased that community endpoints have been added, but are unclear how the information will be used. In their response to U.S. EPA comments on the preceding plan, TetraTech states that the community endpoints will be used as part of a "lines of evidence approach" to assess risks. Apparently that doesn't extend to using this information for development of PRGs. According to the revised plan, PRGs protective of soil invertebrates will be based exclusively on the No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) calculated from the 14-day earthworm survival tests. This begs the question of what will be done if PRGs from the 14-day earthworm study conflict with results from community endpoint

assessment? That is, what will happen if the concentrations at the PRG appear to produce community effects? We suggest that under these circumstances, community endpoint data should be considered for PRG development. This is based on our previously expressed concern for the relevance of earthworm toxicity tests at this particular site. In making this recommendation, we acknowledge that deriving PRGs from population and community studies may in some cases not be possible due to the inherent large variability of these systems. On the other hand, the closeness of the sampling sites suggests that only microhabitat characteristics may be expected to be of significance. To allow for the possibility of generating PRGs from community endpoints, the site sampling procedure must be extended to record habitat variables such as vegetative cover, amount of duff, soil pH, etc. The data should be formally analyzed by generating three indices: abundance, or total number of individuals; diversity, or total number of genera represented; and biomass, or mass of the invertebrate sample collected. Then, these data can be analyzed in a manner similar to that proposed for the earthworm data, using the habitat variables as independent variables in a stepwise regression analysis.

The previous document considered plants as assessment endpoints, while the current version does not. We found no explanation for this change in the present document. In responses to comments, TetraTech states that Section 2.4.1 would be modified to explain why plants were dropped as an assessment endpoint. This change has not been made. The only discussion of plants in this section is as a pathway of exposure for herbivorous organisms, which is a different subject. If a management decision has been made to exclude an assessment of potential phytotoxicity from the risk assessment, this needs to be clearly addressed up front in the document, not in a section on exposure pathways.

Other points:

1. The document states that soil samples to be used in the earthworm tests and the invertebrate studies will include the first three inches of soil and the lower one-inch of duff. This procedure differs from the one used in the collection of soil samples to delineate lead levels at the site, which were based on soil only. Will PRGs developed from these toxicity tests be expressed based on concentrations in the soil portion of the sample or soil and duff combined? This has important implications in terms of comparing PRGs back to concentration data that currently exist for mineral soil only.

2. As mentioned in previous communications, the use of acute mortality may not be the most sensitive endpoint for lead toxicity to earthworms. The use of other earthworm tests that measure more relevant endpoints, such as growth, would likely minimize the uncertainty of using earthworm tests for this site.

3. The document repeatedly states that if soil samples have less than 197 mg/kg lead, no further analysis will be conducted. We agree with this decision. However, we think that, in order to ensure that the full range of concentrations is assessed for

bioassays, the reference site should be selected to have soil lead concentration within the background range (i.e., below 197 mg/kg).

4. Invertebrate surveys should identify invertebrates to the level of genera. We suggest using a smaller mesh size (1/8 inch) to collect insects such as ants, which are expected to be abundant and are known to be preyed upon by mockingbirds and other wildlife.

5. We do not agree with the adjustment made to the soil ingestion rate of the woodcock to be used for the mockingbird. This procedure assumes that the only route of soil ingestion is through eating earthworms. A look at soil ingestion estimates of non-vermivorous species clearly shows this is not the case. For example, data presented in Beyer *et al.* (1994) show that soil ingestion for wild turkeys is 9.4%. Although much larger, the wild turkey lives on a habitat similar to that of Site 15, and forages like the mockingbird, by visually locating prey in the soil litter and then capturing it with its beak.

We look forward to continue assisting you in this project. Please do not hesitate to contact us if you have any questions.

Sincerely,

Hugo G. Ochoa, D.V.M., Ph.D.

Stephen M. Roberts, Ph.D.

APPENDIX G

COST ESTIMATE

G.1 ASSUMPTIONS AND CALCULATIONS
G.2 ALTERNATIVE 2
G.3 ALTERNATIVE 3A
G.4 ALTERNATIVE 3B
G.5 ALTERNATIVE 3C
G.6 ALTERNATIVE 4A
G.7 ALTERNATIVE 4B

G.1 ASSUMPTIONS AND CALCULATIONS

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

Assumptions & Calculations

All Alternatives

#1 Demo/Removal of Incinerator & Rocket Firing Pad
Use demo crew for one day (Means B-13)
Haul metal for disposal, assume 3 tons with no salvage
Foundations (concrete), assume 15 tons

#2 Tortoise Survey
One person inspection of site @ Engineer III

Hours	8	inspection
	10	travel
	8	report
	26	hours at rate of $37.07 per hour
	$964	labor

Hotel & per diem	$200	
Vehicle	$175	
Additional cost for reports & misc	$300	
	$675	materials

Alternative # 2 Soil Cover (30" thick)

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 3 pieces of equipment 1) dozer, 2) excavator/loader, 3) tree removal equipment

#2 Supervision/oversight - say 1 person per week
40 hours * $36.96/hr = about $1,478 per week

#3 PPE cost included with indirect cost

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Cover areas with 30" soil to allow for settlement/erosion.
Area: 7.2 acres = 313,632 sf = 34,848 sy
Volume 30" * 313,632 sf = 784,080 cf = 29,040 cy

#6 Recreational Tree/ Brush Removal
Trees cut flush to ground. Timber to remain on-site. No stump removal or chipping.
Areas with trees for removal 4.4 acres
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 880 trees
Brush clearing for removal 2.8 acres: assume medium density
Time to cut & stockpile tree is about 100 trees per day = 9 days

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
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Assume duff (pine straw) remains in place.

#7 Revegetation:

Wetland areas recreation (0.17 acres)	7,405 sf	or	74 csf
Remaining areas	7.2 ac	or	313,632 sf
			34,848 sy
			314 msf

#8 Inspect and repair cover 4 times in year 1.

Inspection: 2 people for 5 days
80 hours * $36.98/hr = $2,958.40 per inspection or $11,834 per year
Vehicle, reports, etc. = about $1,000 per inspection or $4,000 per year
Repair: 300 sf for 1st inspection
200 sf for 2nd inspection
100 sf for 3rd inspection
100 sf for 4th inspection
700 sf * 30" = 1750 cf
700 sf = 78 sy = 0.8 msf or 65 cy
Labor: 2 labors @ $9.00/hr * 8 hr/day = $144.00/day
1 operator @ $11.80/hr * 8 hr/day = $94.40/day
assume 2 days for 1st & 2nd inspections & 1 day for 3rd & 4th inspections
$ 144.00
$ 94.40
$ 238.40 * 6 = $ 1,430 per year
Equipment: 1 skid loader @ $375.00/day = $2,250 per year
(includes mob/demob)

#9 Annual Inspection and Repairs (years 2-30)
For inspection: assume 4 people for 5 days. 160 hours * $84.00/hr = about $13,440
Vehicle, reports, etc. = about $1,000
For repair: assume soil, seed, etc. = about $4,500

#10 Time to Complete Site Work

	Work Days			
Mob	5			
Clear trees & shrubs	5			
Cover & backfill	75			
Site Restoration	5			
Demob	5			
Work Days	95	or	19	Weeks

Assume cover placement to begin 5 days after start of clearing.
Assume site restoration will start during cover placement and continues for 5 days after.

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
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General Assumptions for all #3 Alternatives

The estimates assume the initial soil volumes requiring excavation, transportation, and disposal are 8,093 cy (12,140 tons) of non-hazardous contaminated soil and 3,760 cy (5,640 tons) of hazardous contaminated soil for a total of 11,853 cy (17,780 tons).

The estimates assume 1 cy of soil weighs 1.5 tons.

Alternative # 3A: Excavation (Recreational), Off-site Treatment and Disposal

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 5 pieces of equipment 1) dozer, 2) excavator, 3) loader, 4) tree removal equipment, 5) revegetation equipment

#2 Supervision/oversight - say 2 persons per week
2 people * 50 hours * $36.96/hr = about $3,696 per week

#3 PPE cost included with indirect cost

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Recreational Tree/ Brush Removal
Trees cut to 1 foot above ground surface. Small trees & branches to be mulch and left on site.
Timber to remain on-site.
Areas with trees for removal 4.4 acres.
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 880 trees & stumps
Time to cut & stockpile tree is about 100 trees per day or 9 days or 2 weeks
Stumps to be chipped & disposed with non-hazardous soil.
Brush clearing for removal 2.8 acres: assume medium density
Time to clear brush is about 1.5 acres per day or 2 days or 0.5 weeks
Assume brush & duff (pine straw) added no volume or weight for disposal.

#6 Excavation, Transportation & Disposal
Allow 10 days of site preparation for trees & soil prior to transport & disposal.

Trees	4.4	ac
Brush	2.8	ac
	7.2	ac

Excavation volume	320,031 cf	or	11,853 cy
assume 3,760 cy is haz & sent to subtitle C landfill	3,760 cy	or	5,640 tons
the remaining to subtitle D landfill	8,093 cy	or	12,140 tons

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
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Haz truck time: 20 trucks per day with 25 tons per load = 500 tons/day
5,640 tons / 500 = 11 days
Non-haz truck time: 35 trucks per day with 25 tons per load = 875 tons/day
12,140 tons / 875 = 14 days
Total time to excavate/haul/dispose: 10 + 11 + 14 = 35 days = 7 weeks

#7 Backfill

Backfill to pre-excavation grade.
11,853 cy fill needed.
Time to backfill: assume 50 trucks/day with 16 cy or 800 cy/day.
11,853 cy/day / 800 cy = 14.8 days or 15 days.

#8 Revegetation:

Wetland areas (0.17 acres)	7,405 sf	or	74 csf
All remaining areas	7.2 ac or		
	313,632 sf		
-Wetland areas	7,405 sf		
	306,227 sf	or	34,025 sy
			306 msf

#9 Annual Inspection (years 1-30)
For inspection: assume 2 people for 1 day. 16 hours *84.00/hr = about $1,344
Vehicle, reports, etc. = about $500

#10 Time to Complete Site Work

	Work Days		Work Weeks	
Mob	5		1	
Clear trees & shrubs	5		1	
Excavation Startup	10		2	
Excavation T&D	35		7	
Backfill	15		3	
Site Restoration	10		2	
Demob	5		1	
Work Days	85	or	17	Weeks

Assume excavation to begin 5 days after start of clearing
Assume site restoration will start during excavation and continues for 10 days after.

Alternative # 3B: Excavation (Recreational), On-site Treatment

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 9 pieces of equipment 1) dozer, 2) excavator, 3) 2 loaders,
4) tree removal equipment, 5) 2 trucks, 6) screen plant, 7) revegetation equipment

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
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BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

#2 Supervision/oversight - say 2 persons per week
2 people * 50 hours * $36.96/hr = about $3,696 per week

#3 PPE cost included with indirect cost

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Equipment Pad for Soil Washing Equipment
Assume 200' * 200' asphalt pad
Place pad in area following excavation of contaminated soil.
No additional cost for tree/shrub removal.
Add cost to fine grade & place 6" gravel with 3" asphalt
Pad to remain after site work is completed

#6 Unrestricted Tree/Duff/Brush Removal
Trees cut to 1 foot above ground surface. Small trees & branches to be mulch and left on site.
Timber to remain on-site.
Areas with trees for removal 4.4 acres.
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 880 trees & stumps
Time to cut & stockpile tree is about 100 trees per day or 9 days or 2 weeks
Stumps to be chipped & disposed as non-hazardous material.
Assume 1 stump = 3 cf, Stump Volume 3 cf * 880 = 2,640 cf = 98 cy
Brush clearing for removal 2.8 acres: assume medium density
Time to clear brush is about 1.5 acres per day or 2 days or 0.5 weeks
Assume brush adds 1" to surface requiring disposal as non-hazardous material.
2.8 acres = 121,968 sf * 1" =10,164 cf or 376 cy
Assume duff (pine straw) adds 4" to surface requiring disposal as non-hazardous material.
4.4 acres = 191,664 sf * 4" = 63,888 cf or 2,366 cy
Total stumps + brush + duff for disposal
98 + 376 + 2,366 = 2,840 cy
Assume each truck load can haul 30 cy per load and is billed at 25 tons per load.
2,840 / 30 cy per load = 95 loads * 25 tons per load =2,375 tons

#7 Excavation & Transportation to Treatment
Time to excavate controlled by soil washing treatment plus 10 days.
Screen excavated soil at excavation area. Assume large screened material 593 cy (5% of 11,853 cy) or 890 tons dispose as non-haz material.
Assume 7% of the screened and washed excavated material is disposed off-site as wet filter cake.
Volume : 11,260 cy * 7% = 788 cy or 1,182 tons dry or as filter cake (1.35 ton /cy)
1,596 tons. Disposal as haz & send to subtitle C landfill.
Soil from treatment 11,853 cy - 593 cy - 788 cy = 10,472 cy or 15,708 tons

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

#8 Soil Washing
Costing based on 10/20/03 memo with Brice Environmental.
Cost is about $100 per ton with treatment rate about 50 tons per hour.
Daily Rate: 50 tons per hour = 400 tons per day
11,260 cy or 16,890 ton / 400 = 42.2 days or 45 days

#9 Backfill/Site Restoration
Return washed soil to excavation areas. Additional 1,381 cy clean fill needed to be purchased to supplement treatment soil.
Revegetation:

Wetland areas (0.17 acres)	7,405 sf	or	74 csf
All remaining areas	7.2 ac or		
	313,632 sf		
-Wetland areas	7,405 sf		
	306,227 sf	or	34,025 sy
			306 msf

#10 Time to Complete Site Work

	Work Days		Work Weeks
Mob	5		1
Clear Trees & Shrubs	5		1
Excavation Startup	10		2
Excavation, Soil Washing, & Backfill	45		9
Site Restoration	10		2
Demob	10		2
Total	85	or	17

Assume excavation to begin 5 days after start of clearing
Assume backfill occurs during excavation/washing
Assume site restoration will start during excavation/washing and continues for 10 days after.

#11 Annual Inspection (years 1-30)
For inspection: assume 2 people for 1 day. 16 hours * $84.00/hr = about $1,344
Vehicle, reports, etc. = about $500

Alternative # 3C: Excavation (Recreational), On-site Solidification/Stabilization, Off-site Treatment and Disposal

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 9 pieces of equipment 1) dozer, 2) excavator, 3) 2 loaders,
4) tree removal equipment, 5) 2 trucks, 6) treatment equipment, 7) revegetation equipment

#2 Supervision/oversight - say 2 persons per week
2 people * 50 hours * $36.96/hr = about $3,696 per week

#3 PPE cost included with indirect cost

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Unrestricted Tree/Duff/Brush Removal
Trees cut to 1 foot above ground surface. Small trees & branches to be mulch and left on site.
Timber to remain on-site.
Areas with trees for removal 4.4 acres.
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 880 trees & stumps
Time to cut & stockpile tree is about 100 trees per day or 9 days or 2 weeks
Stumps to be chipped & disposed as non-hazardous material.
Assume 1 stump = 3 cf, Stump Volume 3 cf * 880 = 2,640 cf = 98 cy
Brush clearing for removal 2.8 acres: assume medium density
Time to clear brush is about 1.5 acres per day or 2 days or 0.5 weeks
Assume brush adds 1" to surface requiring disposal as non-hazardous material.
2.8 acres = 121,968 sf * 1" =10,164 cf or 376 cy
Assume duff (pine straw) adds 4" to surface requiring disposal as non-hazardous material.
4.4 acres = 191,664 sf * 4" = 63,888 cf or 2,366 cy
Total stumps + brush + duff for disposal
98 + 376 + 2,366 = 2,840 cy
Assume each truck load can haul 30 cy per load and is billed at 25 tons per load.
2,840 / 30 cy per load = 95 loads * 25 tons per load =2,375 tons

#6 Bench Scale Testing and Soil Stabilization
RAC Assumed Scope of Services
Lead Stabilization Bench Scale Testing - Screening-level batch ("jar") tests will be conducted in the laboratory to evaluate the effectiveness of solidification/stabilization (S/S) for treatment of lead-contaminated soil from Site 15. Effectiveness will be judged as reduction of lead in TCLP leachate to a concentration less than the action level. Different S/S reagents and doses (reagent/soil mix ratios) will be tested with the intent of identifying cost-effective treatment parameters. Because of the numerous possible reagents and combinations, and in an attempt to control cost, the study will be conducted in phases starting with simple S/S options, proceeding with more complicated options if necessary, and finishing with confirmation testing of a selected "best" option. Lump sum cost of $17,778.

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
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On-Site Lead Stabilization - S/S is a well-established technology used to treat waste materials to reduce contaminant solubility and mobility. S/S processes involve the addition of additives to a waste to encapsulate, solidify, and/or chemically modify hazardous materials to reduce their leachability. S/S is used to reduce the leachability of a hazardous constituent to levels below the TCLP action level, thereby allowing a waste to be disposed on as a non-hazardous material. A wide variety of additives have been used for S/S of metals-containing wastes, including Portland cement (PC), fly ash, lime, cement kiln dust, lime kiln dust, phosphate compounds, sulfide compounds, silicate compounds, and proprietary reagents. This estimate assumes that 845 tons of PC (15% by volume) will be used to accomplish the S/S treatment of the lead contaminated soil Cost to complete: 6,485 tons (5,640 tons + 845 tons of PC) @ $53.45 per ton for a total of $346,623, assuming 25 days for excavation and treatment.

#7 Transportation and Disposal of Contaminated Media

RAC Assumed Scope of Services

This task includes the transportation and disposal of all contaminated soil following S/S treatment. Based on an 80% success rate of the S/S treatment, 8,093 cy (12,140 tons) non-hazardous contaminated soil, 3,010 cy (4,515 tons) of the 3,760 cy (5,640 tons) of hazardous contaminated soil treated to the universal treatment/TCLP standards, and 677 tons of treatment media will be transported as non-hazardous contaminated soil to a permitted subtitle D disposal facility. The remaining 750 cy (1,125 tons) of hazardous contaminated soil and 168 tons of treatment media will be transported and disposed as hazardous soil to a permitted subtitle C disposal facility. Estimated time to complete is 20 days. Cost to complete: Non-Hazardous T&D: 17,140 tons (12,140 + 4,515 + 677) @ $28.75 per ton for a total of $498,295. Hazardous T&D: 1,293 tons (1,125 + 268) @ $262.40 per ton for a total of $339,283.

Sampling of Treated Soil - Following treatment and stabilization, treated soil will be segregated in 300-ton stockpiles in preparation for confirmation sampling. One representative sample from each stockpile will be collected and submitted to an approved laboratory for the analyses of TCLP Metals by EPA Method 1311/6010A. Each stockpile must meet the TCLP action level of 5.0 mg/L, as specified in 40 CFR 261.24 to be managed as non-hazardous waste. Cost to complete: 25 samples @ $175.00 per sample for a total of $4,375.

#8 Backfill

Backfill to pre-excavation grade.
11,853 cy fill needed.
Time to backfill: assume 50 trucks/day with 16 cy or 800 cy/day.
11,853 cy/day / 800 cy = 14.8 days or 15 days.

#9 Revegetation:

Wetland areas (0.17 acres)		7,405 sf	or	74 csf
All remaining areas		7.2 ac or		
		313,632 sf		
	-Wetland areas	7,405 sf		
		306,227 sf	or	34,025 sy
				306 msf

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

#10 Time to Complete Site Work

	Work Days		Work Weeks	
Mob	5		1	
Clear trees, duff, & shrubs	10		2	
In-situ treatment	25		5	
Excavation T&D	20		4	
Backfill	15		3	
Site Restoration	10		2	
Demob	5		1	
Work Days	90	or	18	Weeks

Assume site restoration will start during excavation and continues for 10 days after.

#11 Annual Inspection (years 1-30)
For inspection: assume 2 people for 1 day. 16 hours * $84.00/hr = about $1,344
Vehicle, reports, etc. = about $500

Alternative # 4A: Excavation (Unrestricted Use), Off-site Treatment and Disposal

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 5 pieces of equipment 1) dozer, 2) excavator, 3) loader,
4) tree removal equipment, 5) revegetation equipment

#2 Supervision/oversight - say 2 persons per week
2 people * 50 hours * $36.96/hr = about $3,696 per week

#3 PPE cost included with indirect cost

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Unrestricted Tree/ Brush Removal
Trees cut to 1 foot above ground surface. Small trees & branches to be mulch and left on site.
Timber to remain on-site.
Areas with trees/brush for removal 52.4 acres
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 10,481 trees & stumps
Time to cut & stockpile tree is about 100 trees per day = 105 days or 21 weeks
Stumps to be chipped & disposed with non-hazardous soil.
Brush clearing for removal 21.6 acres: assume medium density
Time to clear brush is about 1.5 acres per day or 15 days or 3 weeks
Assume duff (pine straw) added no volume or weight for disposal.

#6 Excavation, Transportation & Disposal
Allow 10 days of site preparation for trees & soil prior to transport & disposal.

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
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Assume 1 cy of soil = 1.5 tons

Total excavation areas	3,194,914	sf		
Depth	1	ft		
	3,194,914	cf		
TRPH excavation 1' to 2'	500	sf	(25' * 20')	
Depth	1	ft		
	500			
Total excavation volume	3,195,414	cf	=	118,349 cy

assume 10,000 cy is haz & sent to subtitle C landfill	10,000	cy	or	15,000 tons
the remaining to subtitle D landfill	108,349	cy	or	162,523 tons

Haz truck time: 20 trucks per day with 25 tons per load = 500 tons/day
15,000 ton / 500 = 30 days
Non-haz truck time: 35 trucks per day with 25 tons per load = 875 tons/day
162,523 cy / 875 = 186 days
Total time to excavate/haul/dispose: 10 + 186 + 30 = 226 days or 230 days = 46 weeks

#7 Site Restoration

Backfill to pre-excavation grade.
118,345 cy of fill needed.
Time to complete backfill at 800 cy/day
118,345 cy/800 cy/day = 147 days or 150 days
Assume backfill begins during excavation and is completed 50 days after excavation is finished.

Revegetation:

Wetland areas	187,823	sf	or	1,878 csf
			or	188 msf
All remaining areas				
Brush Areas	21.6	ac		
Tree Areas	52.4	ac		
	74.0	ac or		
	3,223,440	sf		
-Wetland areas	187,823	sf		
	3,035,617	sf	or	337,291 sy
				3,036 msf

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

#8 Time to Complete Site Work

	Work Days		Work Weeks
Mob	5		1
Clear Trees & Shrubs	5		1
Excavation Startup	10		2
Excavation T&D	230		46
Backfill	50		10
Site Restoration	10		2
Demob	5		1
Total	315	or	63

Assume excavation to begin 5 days after start of clearing
Assume backfill occurs during excavation
Assume site restoration will start during excavation and continues for 10 days after.

Alternative # 4B: Excavation (Unrestricted Use), On-site Soil Washing

#1 Equipment Mob/Demob at 2 times Means Cost
Assume 9 pieces of equipment 1) dozer, 2) excavator, 3) 2 loaders,
4) tree removal equipment, 5) 2 trucks, 6) screen plant, 7) revegetation equipment

#2 Supervision/oversight - say 2 persons per week
2 people * 50 hours * $36.96/hr = about $3,696 per week

#3 PPE cost included with indirect cost

#4 No construction of new temporary haul roads. Remove trees and drive on existing soil.

#5 Equipment Pad for Soil Washing Equipment
Assume 200' * 200' asphalt pad
Place pad in area following excavation of contaminated soil.
No additional cost for tree/shrub removal.
Add cost to fine grade & place 6" gravel with 3" asphalt
Pad to remain after site work is completed

#6 Unrestricted Tree/Duff/Brush Removal
Trees cut to 1 foot above ground surface. Small trees & branches to be mulch and left on site.
Timber to remain on-site.
Areas with trees/brush for removal 52.4 acres
Assume trees are 12" diameter on 15 ft centers (200 trees per acre)
= 10,481 trees & stumps
Time to cut & stockpile tree is about 100 trees per day = 105 days or 21 weeks
Stumps to be chipped & disposed as non-hazardous material.
Assume 1 stump = 3 cf, Stump Volume 3 cf * 10,481 = 31, 443 cf = 1,165 cy.
Brush clearing for removal: 21.6 acres

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653
SUBJECT: Site 15 FS		
BASED ON:		DRAWING NUMBER:
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY: DATE:

Time to clear brush is about 1.5 acres per day or 15 days or 3 weeks
Assume brush adds 1" to surface requiring disposal as non-hazardous material.
940,857 sf * 1" = 78,405 cf or 2,904 cy
Assume duff (pine straw) adds 4" to surface requiring disposal as non-hazardous material.
2,282,782 sf * 4" = 760,927 cf or 28,193 cy
Total stumps + brush + duff for disposal
1,165 + 2,904 + 28,193 = 32,262 cy
Assume each truck load can haul 30 cy per load and is billed at 25 tons per load.
32,262 / 30 cy per load = 1,076 loads * 25 tons per load =26,900 tons

#7 Excavation & Transportation to Treatment
Allow 10 days for on-site stockpiling of soils prior to treatment.
Screen excavated soil at excavation area. Assume large screened material 5,917 cy (5% of 118,354 cy) or 8,876 tons dispose as non-haz material.
Assume 7% of the screened and washed excavated material is disposed off-site as wet filter cake.
Volume: 118,354 - 5,917 = 112,437 cy * 7% = 7,871 cy or 11,806 tons dry or as filter cake (1.35 ton /cy) 15,938 tons. Disposal as haz & send to subtitle C landfill.
Time to excavate controlled by soil washing treatment plus 10 days.
Soil from treatment 118,354 cy - 5,917 cy - 7,871 cy = 104,566 cy or 156,849 tons

#8 Soil Washing
Costing based on 10/20/03 memo with Brice Environmental.
Cost is about $50 per ton with treatment rate about 50 tons per hour.
Daily Rate: 50 tons per hour = 400 tons per day
112,437 cy or 168,656 tons / 400 = 421 days or 450 days

#9 Backfill/Site Restoration
Return washed soil to excavation areas. Additional 13,788 cy clean fill needed to be purchased to supplement treatment soil.
Revegetation:

Wetland areas		187,823 sf	or	1,878 csf
			or	188 msf
All remaining areas				
	Brush Areas	21.6 ac		
	Tree Areas	52.4 ac		
		74.0 ac or		
		3,223,440 sf		
	-Wetland areas	187,823 sf		
		3,035,617 sf	or	337,291 sy
				3,036 msf

CLIENT: Navy/Cecil Field		JOB NUMBER: N7653	
SUBJECT: Site 15 FS			
BASED ON:		DRAWING NUMBER:	
BY: TJR Date: 4/05 & 4/08	CHECKED BY: Date:	APPROVED BY:	DATE:

#10 Time to Complete Site Work

	Work Days		Work Weeks
Mob	5		1
Clear Trees & Shrubs	5		1
Excavation Startup	10		2
Excavation, Soil Washing, & Backfill	450		90
Site Restoration	15		3
Demob	10		2
Total	495	or	99

Assume excavation to begin 5 days after start of clearing
Assume backfill occurs during excavation/washing plus an additional 15 days.
Assume site restoration will start during excavation/washing and continues for 10 days after.

G.2 ALTERNATIVE 2

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 2: Soil Cover (30" thick)
CAPITAL COST

4/11/2008 11:59 AM

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	3	ea			$110.00	$224.00	$0	$0	$330	$672	$1,002
2.2 Professional Oversight (1 person)	19	mwk			$1,478.00		$0	$0	$28,082	$0	$28,082
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	4	mo			$1,500.00	$2,075.00	$0	$0	$6,000	$8,300	$14,300
3.3 Decon Water Storage Tank, 6,000 gallon	4	mo				$645.00	$0	$0	$0	$2,580	$2,580
3.4 Disposal of Decon Waste (liquid & solid)	4	mo	$900.00				$3,600	$0	$0	$0	$3,600
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	15	ton	$24.50				$368	$0	$0	$0	$368
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 - Tree Removal - 12" dia.	880	ea			$3.65	$8.65	$0	$0	$3,212	$7,612	$10,824
6 COVER AND RESTORATION											
6.1 Import Clean Backfill	29,040	cy		$10.10			$0	$293,304	$0	$0	$293,304
6.2 Plastic Netting	34,848	sy		$0.63	$0.26		$0	$21,954	$9,060	$0	$31,015
6.3 Place, Grade, Compact Backfill	29,040	cy			$3.34	$1.46	$0	$0	$96,994	$42,398	$139,392
6.4 Revegetation - soil nutrients	314	msf		$6.65	$0.38	$0.25	$0	$2,088	$119	$79	$2,286
6.5 Revegetation (grasses)	34,848	sy		$0.35	$1.35	$0.22	$0	$12,197	$47,045	$7,667	$66,908
6.6 Revegetation - wetland nutrients	7.4	msf		$8.90	$0.38	$0.25	$0	$66	$3	$2	$71
6.7 Wetland Recreation	74	csf		$19.67	$10.35		$0	$1,456	$766	$0	$2,221
7 SITE INSPECTIONS & MAINTENANCE (ONE YEAR)											
7.1 Inspections (4 times a year)	1	ls		$2,000.00	$2,367.00		$0	$2,000	$2,367	$0	$4,367
7.2 Labor & Equipment	1	ls			$1,430.00	$2,250.00	$0	$0	$1,430	$2,250	$3,680
7.3 Import Clean Backfill	65	cy		$10.10			$0	$657	$0	$0	$657
7.4 Place, Grade, Compact Backfill	65	cy			$3.34	$1.46	$0	$0	$217	$95	$312
7.5 Revegetation - soil nutrients	0.8	msf		$6.65	$0.38	$0.25	$0	$5	$0	$0	$6
7.6 Revegetation (grasses)	78	sy		$0.35	$1.35	$0.22	$0	$27	$105	$17	$150
Subtotal							$3,968	$334,979	$212,125	$72,892	$623,963
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$3,968	$387,570	$184,973	$63,562	$640,072
Overhead on Labor Cost @ 30%									$55,492		$55,492
G & A on Labor Cost @ 10%									$18,497		$18,497
G & A on Material Cost @ 10%								$38,757			$38,757
G & A on Subcontract Cost @ 10%							$397				$397
Total Direct Cost							$4,364	$426,327	$258,962	$63,562	$753,215
Indirects on Total Direct Cost @ 25%											$188,304
Profit on Total Direct Cost @ 10%											$75,321

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 2: Soil Cover (30" thick)
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
Total Field Cost											$1,016,840
Contingency on Total Field Cost @ 20%											$203,368
Engineering on Total Field Cost @ 15%											$152,526
TOTAL COST											**$1,372,734**

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 2: Soil Cover (30" thick)
Annual Cost

Item	Item Cost Year 1	Item Cost Years 2-30	Item Cost Year 5	Notes
Site Inspection	$15,834	$14,440		2 people for 1 day, reports, vehicle, etc.
Cover Repair	$3,680	$4,500		Soil, Seed, Equipment, etc.
Site Review			$5,500	Preform 5-Year reviews.
TOTALS	$19,514	$18,940	$5,500	

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 2: Soil Cover (30" thick)
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$1,372,734		$1,372,734	1.000	$1,372,734
1		$19,514	$19,514	0.935	$18,246
2		$18,940	$18,940	0.873	$16,535
3		$18,940	$18,940	0.816	$15,455
4		$18,940	$18,940	0.763	$14,451
5		$24,440	$24,440	0.713	$17,426
6		$18,940	$18,940	0.666	$12,614
7		$18,940	$18,940	0.623	$11,800
8		$18,940	$18,940	0.582	$11,023
9		$18,940	$18,940	0.544	$10,303
10		$24,440	$24,440	0.508	$12,416
11		$18,940	$18,940	0.475	$8,997
12		$18,940	$18,940	0.444	$8,409
13		$18,940	$18,940	0.415	$7,860
14		$18,940	$18,940	0.388	$7,349
15		$24,440	$24,440	0.362	$8,847
16		$18,940	$18,940	0.339	$6,421
17		$18,940	$18,940	0.317	$6,004
18		$18,940	$18,940	0.296	$5,606
19		$18,940	$18,940	0.277	$5,246
20		$24,440	$24,440	0.258	$6,306
21		$18,940	$18,940	0.242	$4,583
22		$18,940	$18,940	0.226	$4,280
23		$18,940	$18,940	0.211	$3,996
24		$18,940	$18,940	0.197	$3,731
25		$24,440	$24,440	0.184	$4,497
26		$18,940	$18,940	0.172	$3,258
27		$18,940	$18,940	0.161	$3,049
28		$18,940	$18,940	0.150	$2,841
29		$18,940	$18,940	0.141	$2,671
30		$24,440	$24,440	0.131	$3,202
				TOTAL PRESENT WORTH	**$1,620,155**

G.3 ALTERNATIVE 3A

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

4/11/2008 11:59 AM

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)	17	mwk			$3,696.00		$0	$0	$62,832	$0	$62,832
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 f	30	ea	$55.00				$1,650	$0	$0	$0	$1,650
6 EXCAVATION, TRANSPORTATION AND DISPOSAL OF CONTAMINATED SOIL											
6.1 Excavation - Dozer	60	day			$97.40	$384.30	$0	$0	$5,844	$23,058	$28,902
6.2 Excavation - Backhoe Excavator	60	day			$112.90	$607.15	$0	$0	$6,774	$36,429	$43,203
6.3 Excavation - Track Loader	60	day			$85.90	$461.30	$0	$0	$5,154	$27,678	$32,832
6.4 Transport & Disposal Non-haz (subtitle D)	12,140	ton	$28.75				$349,025	$0	$0	$0	$349,025
6.5 Transport & Disposal Haz (subtitle C)	5,640	ton	$262.40				$1,479,936	$0	$0	$0	$1,479,936
6.6 Waste Characterization Test, 1 per 1000 cy	12	ea	$800.00	$6.00	$35.00		$9,600	$72	$420	$0	$10,092
7 COVER AND RESTORATION											
7.1 Import Clean Backfill	11,853	cy		$10.10			$0	$119,715	$0	$0	$119,715
7.2 Place, Grade, Compact Backfill	11,853	cy			$3.34	$1.46	$0	$0	$39,589	$17,305	$56,894
7.3 Revegetation - soil nutrients	306	msf		$6.65	$0.38	$0.25	$0	$2,035	$116	$77	$2,228
7.4 Revegetation (grasses)	34,025	sy		$0.35	$1.35	$0.22	$0	$11,909	$45,934	$7,486	$65,328
7.5 Revegetation - wetland nutrients	7.4	msf		$8.90	$0.38	$0.25	$0	$66	$3	$2	$71
7.6 Wetland Restoration	74	csf		$19.67	$10.35		$0	$1,456	$766	$0	$2,221
Subtotal							$1,843,334	$136,477	$211,800	$139,628	$2,331,240
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$1,843,334	$157,904	$184,689	$121,756	$2,307,684
Overhead on Labor Cost @ 30%									$55,407		$55,407
G & A on Labor Cost @ 10%									$18,469		$18,469
G & A on Material Cost @ 10%								$15,790			$15,790
G & A on Subcontract Cost @ 10%							$184,333				$184,333
Total Direct Cost							$2,027,667	$173,695	$258,565	$121,756	$2,581,683

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3A: Excavation (Recreational), 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
Indirects on Total Direct Cost @ 25%								$43,424	$64,641	$30,439	$138,504
Profit on Total Direct Cost @ 10%											$258,168
Total Field Cost											$2,978,356
Contingency on Total Field Cost @ 20%											$595,671
Engineering on Total Field Cost @ 10%											$297,836
TOTAL COST											**$3,871,862**

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3A: Excavation (Recreational), 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	

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3A: Excavation (Recreational), Off-Site Treatment and Disposal
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$3,871,862		$3,871,862	1.000	$3,871,862
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	**$3,906,603**

G.4 ALTERNATIVE 3B

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3B: Excavation (Recreational), On-Site Soil Washing
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
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	9	ea			$110.00	$224.00	$0	$0	$990	$2,016	$3,006
2.2 Professional Oversight (2 person)	17	mwk			$3,696.00		$0	$0	$62,832	$0	$62,832
2.3 Treatability Study	1	ls	$10,000.00				$10,000	$0	$0	$0	$10,000
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 fi	30	samp	$55.00				$1,650	$0	$0	$0	$1,650
5.5 T & D Non-haz Stumps/Duff/Brush	2,375	ton	$23.50				$55,813	$0	$0	$0	$55,813
5.6 Waste Characterization Test, 1 per 1000 cy	3	ea	$800.00	$6.00	$35.00		$2,400	$18	$105	$0	$2,523
6 EXCAVATION OF CONTAMINATED SOIL/STUMPS/DUFF											
6.1 Excavation - Dozer (half time)	35	day			$97.40	$384.30	$0	$0	$3,409	$13,451	$16,860
6.2 Excavation - Backhoe Excavator	70	day			$112.90	$607.15	$0	$0	$7,903	$42,501	$50,404
6.3 Excavation - Track Loader	70	day			$85.90	$461.30	$0	$0	$6,013	$32,291	$38,304
6.4 Screen Plant	70	day			$112.90	$399.15	$0	$0	$7,903	$27,941	$35,844
6.5 Transport to Treatment - Off-road truck	70	day			$83.70	$764.45	$0	$0	$5,859	$53,512	$59,371
6.6 T & D Non-haz Screened Material	870	ton	$28.75				$25,013	$0	$0	$0	$25,013
6.7 Waste Characterization Test, 1 per 300 ton	1	ea	$800.00	$6.00	$35.00		$800	$6	$35	$0	$841
7 TREATMENT AND DISPOSAL OF SOIL											
7.1 Equipment Pad	40,000	sf		$1.38	$0.16	$0.20	$0	$55,200	$6,400	$8,000	$69,600
7.2 Soil Washing	16,890	ton	$100.00				$1,689,000	$0	$0	$0	$1,689,000
7.3 Equipment - Wheel Loader	70	day			$85.90	$376.35	$0	$0	$6,013	$26,345	$32,358
7.4 Transport & Disposal Haz Soil (subtitle C)	1,596	ton	$262.40				$418,790	$0	$0	$0	$418,790
7.5 Waste Characterization Test, 1 per 300 ton	6	ea	$175.00	$6.00	$35.00		$1,050	$36	$210	$0	$1,296
8 COVER AND RESTORATION											
8.1 Excavation - Dozer (half time)	35	day			$97.40	$384.30	$0	$0	$3,409	$13,451	$16,860
8.2 Transport to Treatment - Off-road truck	70	day			$83.70	$764.45	$0	$0	$5,859	$53,512	$59,371
8.3 Import Clean Backfill	1,381	cy		$10.10			$0	$13,948	$0	$0	$13,948
8.4 Place, Grade, Compact Backfill	1,381	cy			$3.34	$1.46	$0	$0	$4,613	$2,016	$6,629
8.5 Revegetation - soil nutrients	306	msf		$6.65	$0.38	$0.25	$0	$2,035	$116	$77	$2,228
8.6 Revegetation (grasses)	34,025	sy		$0.35	$1.35	$0.22	$0	$11,909	$45,934	$7,486	$65,328
8.7 Revegetation - wetland nutrients	7.4	msf		$8.90	$0.38	$0.25	$0	$66	$3	$2	$71
8.8 Wetland Restoration	74	csf		$19.67	$10.35		$0	$1,456	$766	$0	$2,221
Subtotal							$2,207,638	$85,898	$212,189	$309,071	$2,814,797

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3B: Excavation (Recreational), On-Site Soil Washing
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
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$2,207,638	$99,384	$185,029	$269,510	$2,761,561
Overhead on Labor Cost @ 30%									$55,509		$55,509
G & A on Labor Cost @ 10%									$18,503		$18,503
G & A on Material Cost @ 10%								$9,938			$9,938
G & A on Subcontract Cost @ 10%							$220,764				$220,764
Total Direct Cost							$2,428,402	$109,323	$259,041	$269,510	$3,066,275
Indirects on Total Direct Cost @ 25%								$27,331	$64,760	$67,377	$159,468
Profit on Total Direct Cost @ 10%											$306,628
Total Field Cost											$3,532,371
Contingency on Total Field Cost @ 20%											$706,474
Engineering on Total Field Cost @ 5%											$176,619
TOTAL COST											**$4,415,464**

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3B: Excavation (Recreational), On-Site Soil Washing
Annual Cost

Item	Item Cost per Year	Item Cost Year 5	Notes
Annual Inspection	$1,844		
Site Review		$5,500	Preform 5-Year reviews.
TOTALS	$1,844	$5,500	

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 3B: Excavation (Recreational), On-Site Soil Washing
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$4,415,464		$4,415,464	1.000	$4,415,464
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	**$4,450,204**

G.5 ALTERNATIVE 3C

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
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 ft	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	

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

G.6 ALTERNATIVE 4A

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 4A: Excavation (Unrestricted Use), 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
1 PRE-CONSTRUCTION											
1.1 Prepare Remedial Action Plan	200	hr			$32.00		$0	$0	$6,400	$0	$6,400
1.2 Post Construction Documents	100	hr			$32.00		$0	$0	$3,200	$0	$3,200
1.3 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)	63	mwk			$3,696.00		$0	$0	$232,848	$0	$232,848
3 DECONTAMINATION											
3.1 Equipment Decontamination Pad	1	ls		$6,000.00	$7,225.00	$850.00	$0	$6,000	$7,225	$850	$14,075
3.2 Decontamination Services	12	mo			$1,500.00	$2,075.00	$0	$0	$18,000	$24,900	$42,900
3.3 Decon Water Storage Tank, 6,000 gallon	12	mo				$645.00	$0	$0	$0	$7,740	$7,740
3.4 Disposal of Decon Waste (liquid & solid)	12	mo	$900.00				$10,800	$0	$0	$0	$10,800
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)	21.6	ac			$185.00	$153.00	$0	$0	$3,996	$3,305	$7,301
5.2 Clearing/Chipping - Tree Removal - 12" dia.	52.4	ac			$1,250.00	$2,875.00	$0	$0	$65,500	$150,650	$216,150
5.3 Chipping Stumps	10,481	ea			$19.80	$5.05	$0	$0	$207,524	$52,929	$260,453
6 EXCAVATION, TRANSPORTATION AND DISPOSAL OF CONTAMINATED SOIL											
6.1 Excavation - Dozer	290	day			$97.40	$384.30	$0	$0	$28,246	$111,447	$139,693
6.2 Excavation - Backhoe Excavator	290	day			$112.90	$607.15	$0	$0	$32,741	$176,074	$208,815
6.3 Excavation - Track Loader	290	day			$85.90	$461.30	$0	$0	$24,911	$133,777	$158,688
6.4 Transport & Disposal Non-haz (subtitle D)	162,523	ton	$28.75				$4,672,536	$0	$0	$0	$4,672,536
6.5 Transport & Disposal Haz (subtitle C)	15,000	ton	$262.40				$3,936,000	$0	$0	$0	$3,936,000
6.6 Waste Characterization Test, 1 per 1000 cy	119	ea	$800.00	$6.00	$35.00		$95,200	$714	$4,165	$0	$100,079
7 FILL AND RESTORATION											
7.1 Import Clean Backfill	118,345	cy		$10.10			$0	$1,195,285	$0	$0	$1,195,285
7.2 Place, Grade, Compact Backfill	118,345	cy			$3.34	$1.46	$0	$0	$395,272	$172,784	$568,056
7.3 Revegetation - soil nutrients	3,036	msf		$6.65	$0.38	$0.25	$0	$20,189	$1,154	$759	$22,102
7.4 Revegetation (grasses)	337,291	sy		$0.35	$1.35	$0.22	$0	$118,052	$455,343	$74,204	$647,599
7.5 Revegetation - wetland nutrients	188	msf		$8.90	$0.38	$0.25	$0	$1,673	$71	$47	$1,792
7.6 Wetland Restoration	1,878	csf		$19.67	$10.35		$0	$36,940	$19,437	$0	$56,378
Subtotal							$8,714,959	$1,379,528	$1,509,159	$911,202	$12,514,849
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$8,714,959	$1,596,114	$1,315,987	$794,568	$12,421,628
Overhead on Labor Cost @ 30%									$394,796		$394,796
G & A on Labor Cost @ 10%									$131,599		$131,599
G & A on Material Cost @ 10%								$159,611			$159,611
G & A on Subcontract Cost @ 10%							$871,496				$871,496
Total Direct Cost							$9,586,455	$1,755,726	$1,842,382	$794,568	$13,979,131
Indirects on Total Direct Cost @ 25%			(not including subcontractor cost)					$438,931	$460,595	$198,642	$1,098,169
Profit on Total Direct Cost @ 10%											$1,397,913

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 4A: Excavation (Unrestricted Use), Off-Site Treatment and Disposal
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Total Field Cost											$16,475,212
Contingency on Total Field Cost @ 20%											$3,295,042
Engineering on Total Field Cost @ 2%											$329,504
TOTAL COST											**$20,099,759**

G.7 ALTERNATIVE 4B

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 4B: Excavation (Unrestricted Use), On-site Treatment
CAPITAL COST

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Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PRE-CONSTRUCTION											
1.1 Prepare Remedial Action Plan	200	hr			$32.00		$0	$0	$6,400	$0	$6,400
1.2 Post Construction Documents	100	hr			$32.00		$0	$0	$3,200	$0	$3,200
1.3 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	9	ea			$110.00	$224.00	$0	$0	$990	$2,016	$3,006
2.2 Professional Oversight (2 person)	99	mwk			$3,696.00		$0	$0	$365,904	$0	$365,904
2.3 Treatability Study	1	ls	$10,000.00				$10,000	$0	$0	$0	$10,000
3 DECONTAMINATION											
3.1 Equipment Decontamination Pad	1	ls		$6,000.00	$7,225.00	$850.00	$0	$6,000	$7,225	$850	$14,075
3.2 Decontamination Services	12	mo			$1,500.00	$2,075.00	$0	$0	$18,000	$24,900	$42,900
3.3 Decon Water Storage Tank, 6,000 gallon	12	mo				$645.00	$0	$0	$0	$7,740	$7,740
3.4 Disposal of Decon Waste (liquid & solid)	12	mo	$900.00				$10,800	$0	$0	$0	$10,800
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)	21.6	ac			$185.00	$153.00	$0	$0	$3,996	$3,305	$7,301
5.2 Clearing/Chipping - Tree Removal - 12" dia.	52.4	ac			$1,250.00	$2,875.00	$0	$0	$65,500	$150,650	$216,150
5.3 Chipping Stumps	10,481	ea			$19.80	$5.05	$0	$0	$207,524	$52,929	$260,453
5.4 T & D Non-haz Stumps/Duff/Brush	26,900	ton	$23.50				$632,150	$0	$0	$0	$632,150
5.5 Waste Characterization Test (TCLP), 1 per 1000 cy	33	ea	$800.00	$6.00	$35.00		$26,400	$198	$1,155	$0	$27,753
6 EXCAVATION OF CONTAMINATED SOIL/STUMPS/DUFF											
6.1 Excavation - Dozer (half time)	248	day			$97.40	$384.30	$0	$0	$24,155	$95,306	$119,462
6.2 Excavation - Backhoe Excavator	495	day			$112.90	$607.15	$0	$0	$55,886	$300,539	$356,425
6.3 Excavation - Track Loader	495	day			$85.90	$461.30	$0	$0	$42,521	$228,344	$270,864
6.4 Screen Plant	495	day			$112.90	$399.15	$0	$0	$55,886	$197,579	$253,465
6.5 Transport to Treatment - Off-road truck	495	day			$83.70	$764.45	$0	$0	$41,432	$378,403	$419,834
6.6 T & D Non-haz Screened Material	8,876	ton	$28.75				$255,185	$0	$0	$0	$255,185
6.7 Waste Characterization Test, 1 per 300 ton	30	ea	$800.00	$6.00	$35.00		$24,000	$180	$1,050	$0	$25,230
7 TREATMENT OF SOIL											
7.1 Equipment Pad	40,000	sf		$1.38	$0.16	$0.20	$0	$55,200	$6,400	$8,000	$69,600
7.2 Soil Washing	168,656	ton	$50.00				$8,432,800	$0	$0	$0	$8,432,800
7.3 Equipment - Wheel Loader	495	day			$85.90	$376.35	$0	$0	$42,521	$186,293	$228,814
7.4 Transport & Disposal Haz Soil (subtitle C)	15,938	ton	$262.40				$4,182,131	$0	$0	$0	$4,182,131
7.5 Waste Characterization Test, 1 per 300 ton	54	ea	$175.00	$6.00	$35.00		$9,450	$324	$1,890	$0	$11,664
8 COVER AND RESTORATION											
8.1 Excavation - Dozer (half time)	248	day			$97.40	$384.30	$0	$0	$24,155	$95,306	$119,462
8.2 Transport to Treatment - Off-road truck	495	day			$83.70	$764.45	$0	$0	$41,432	$378,403	$419,834
8.3 Import Clean Backfill	13,787	cy		$10.10			$0	$139,249	$0	$0	$139,249
8.4 Place, Grade, Compact Backfill	13,787	cy			$3.34	$1.46	$0	$0	$46,049	$20,129	$66,178
8.5 Revegetation - soil nutrients	3,036	msf		$6.65	$0.38	$0.25	$0	$20,189	$1,154	$759	$22,102
8.6 Revegetation (grasses)	337,291	sy		$0.35	$1.35	$0.22	$0	$118,052	$455,343	$74,204	$647,599
8.7 Revegetation - wetland nutrients	188	msf		$8.90	$0.38	$0.25	$0	$1,673	$71	$47	$1,792
8.8 Wetland Restoration	1,878	csf		$19.67	$10.35		$0	$36,940	$19,437	$0	$56,378
Subtotal							$13,583,339	$378,680	$1,541,849	$2,206,319	$17,710,188

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
SITE 15
ALTERNATIVE 4B: Excavation (Unrestricted Use), On-site Treatment
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Local Area Adjustments							100.0%	115.7%	87.2%	87.2%	
Subtotal							$13,583,339	$438,133	$1,344,492	$1,923,910	$17,289,875
Overhead on Labor Cost @ 30%									$403,348		$403,348
G & A on Labor Cost @ 10%									$134,449		$134,449
G & A on Material Cost @ 10%								$43,813			$43,813
G & A on Subcontract Cost @ 10%							$1,358,334				$1,358,334
Total Direct Cost							$14,941,673	$481,947	$1,882,289	$1,923,910	$19,229,819
Indirects on Total Direct Cost @ 25%		(not including subcontractor cost)						$120,487	$470,572	$480,978	$1,072,037
Profit on Total Direct Cost @ 10%											$1,922,982
Total Field Cost											$22,224,838
Contingency on Total Field Cost @ 20%											$4,444,968
Engineering on Total Field Cost @ 2%											$444,497
TOTAL COST											**$27,114,302**