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FINAL TECHNICAL MEMORANDUM FOR NO FURTHER GROUNDWATER MONITORING AT OPERABLE UNIT 5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA NAS CECIL FIELD FL

8/16/2001

TETRA TECH NUS INC

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

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 and May 2000 to supplement the results of previous investigations. The purpose of the TtNUS 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.

This technical memorandum presents information from the previous investigations and the Site 15 investigation conducted in April and May 2000 by TtNUS at Site 15 including related field operations, results, conclusions, and recommendations.

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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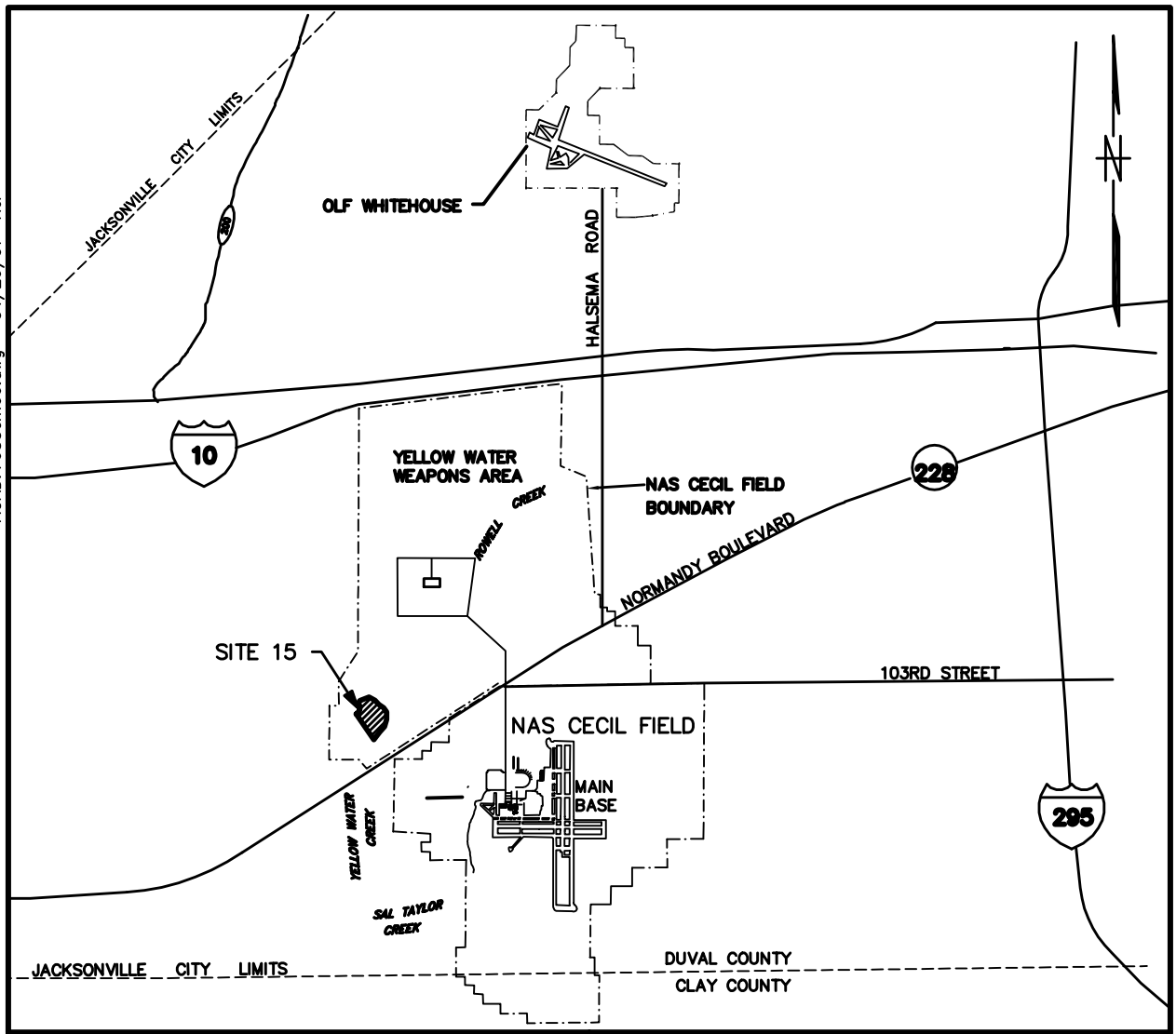

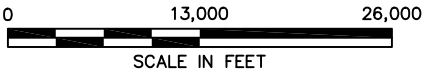

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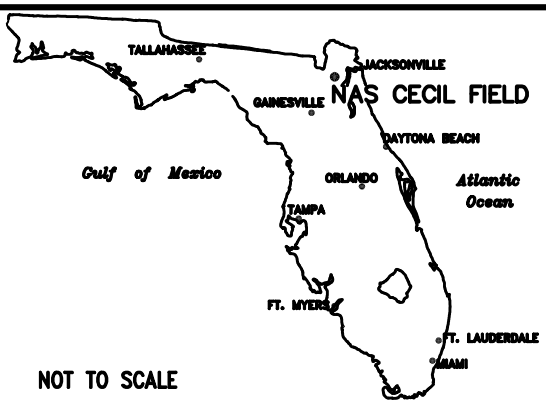

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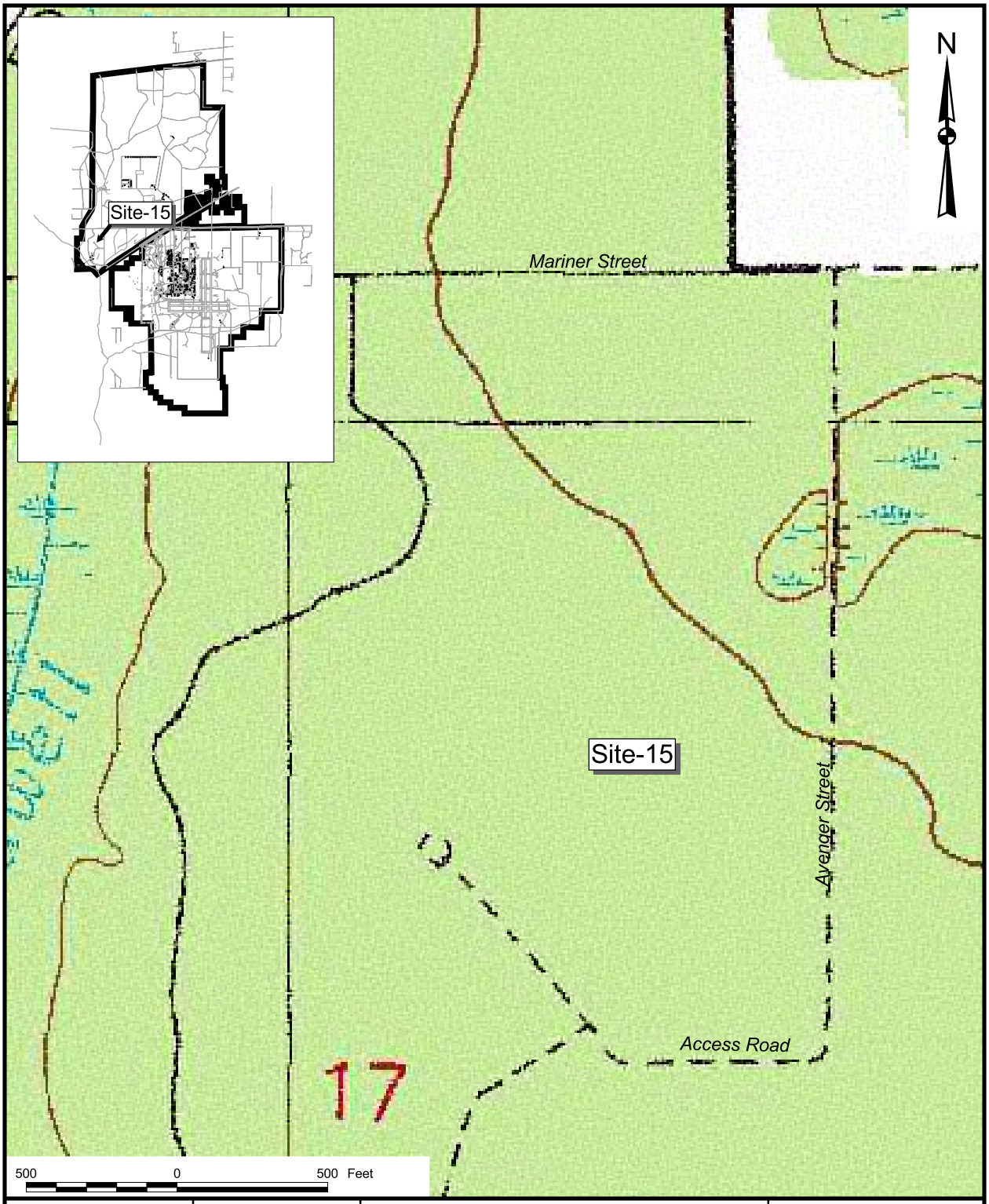

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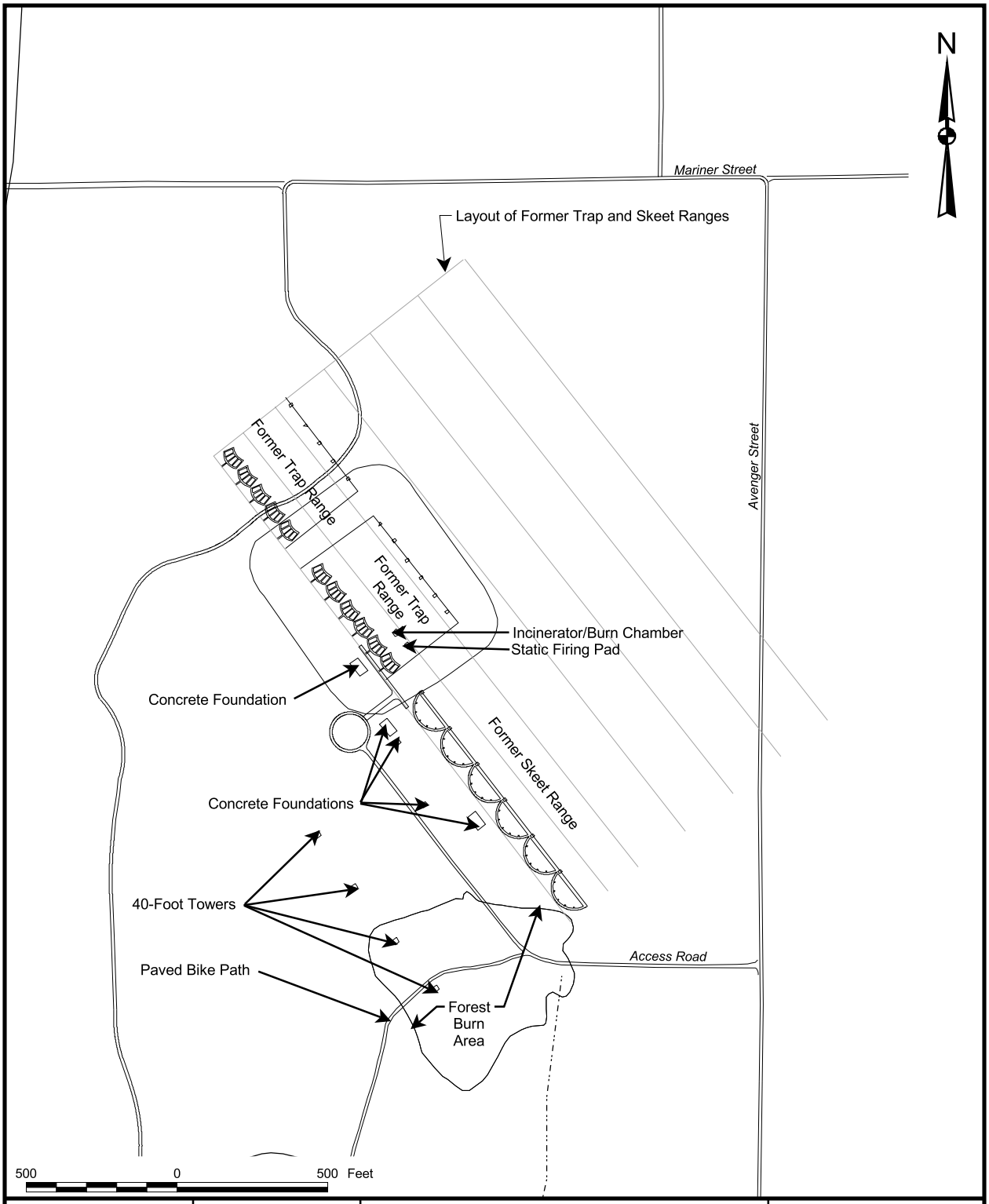

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the skeet range that encompasses much of the eastern area of the site. However, evaluation of the surface soil screening data indicated surface soil contamination, which caused the site to increase in size to approximately 85 acres, extending radially 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

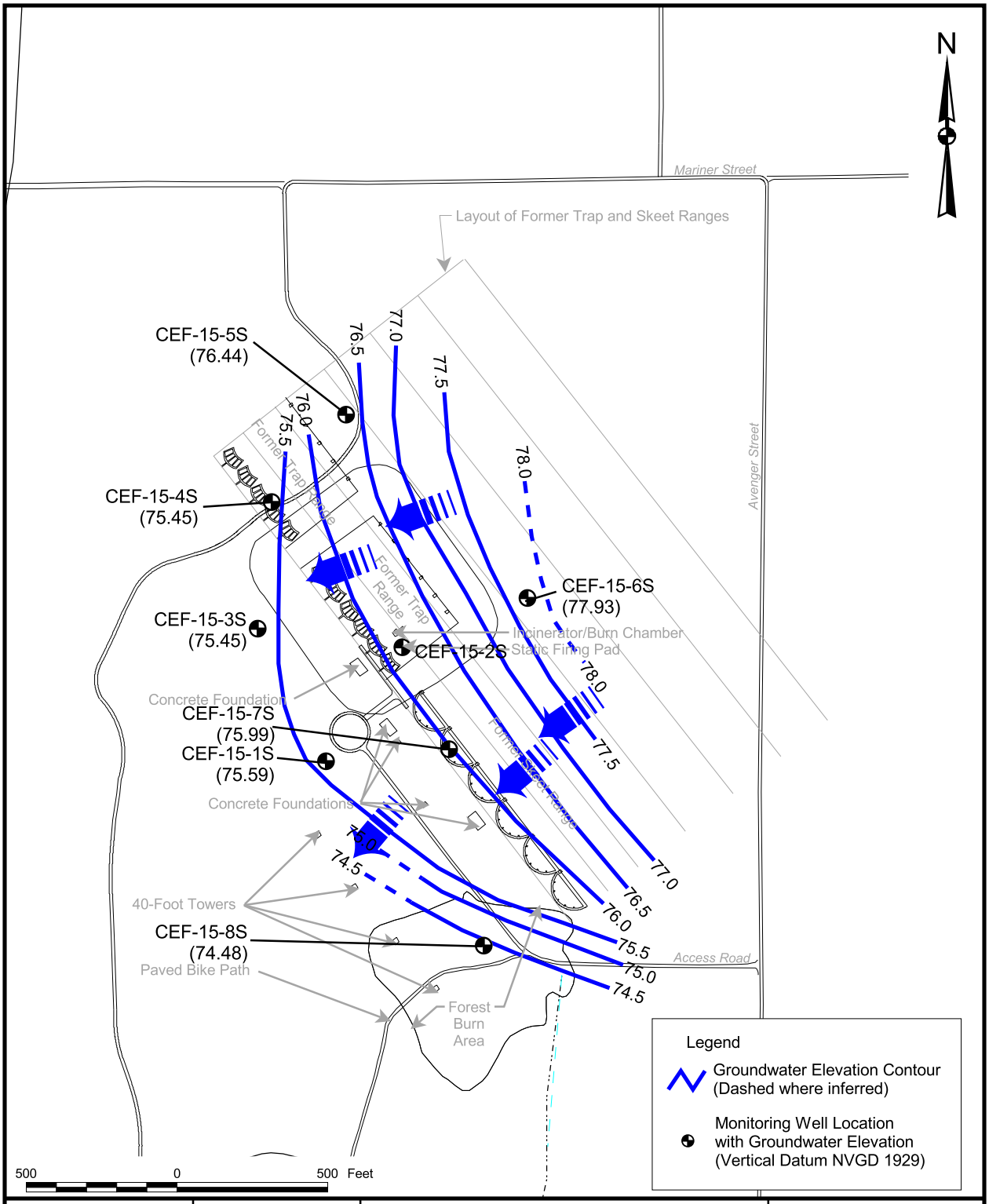
According to Florida Administrative Code (FAC) 62-520.410 (Classification of Ground Water, Usage, Reclassification), the Surficial Aquifer system in northeast Florida comes under the classification of G-II. The code's definition of G-II is as follows: "Potable water use, groundwater in aquifers which 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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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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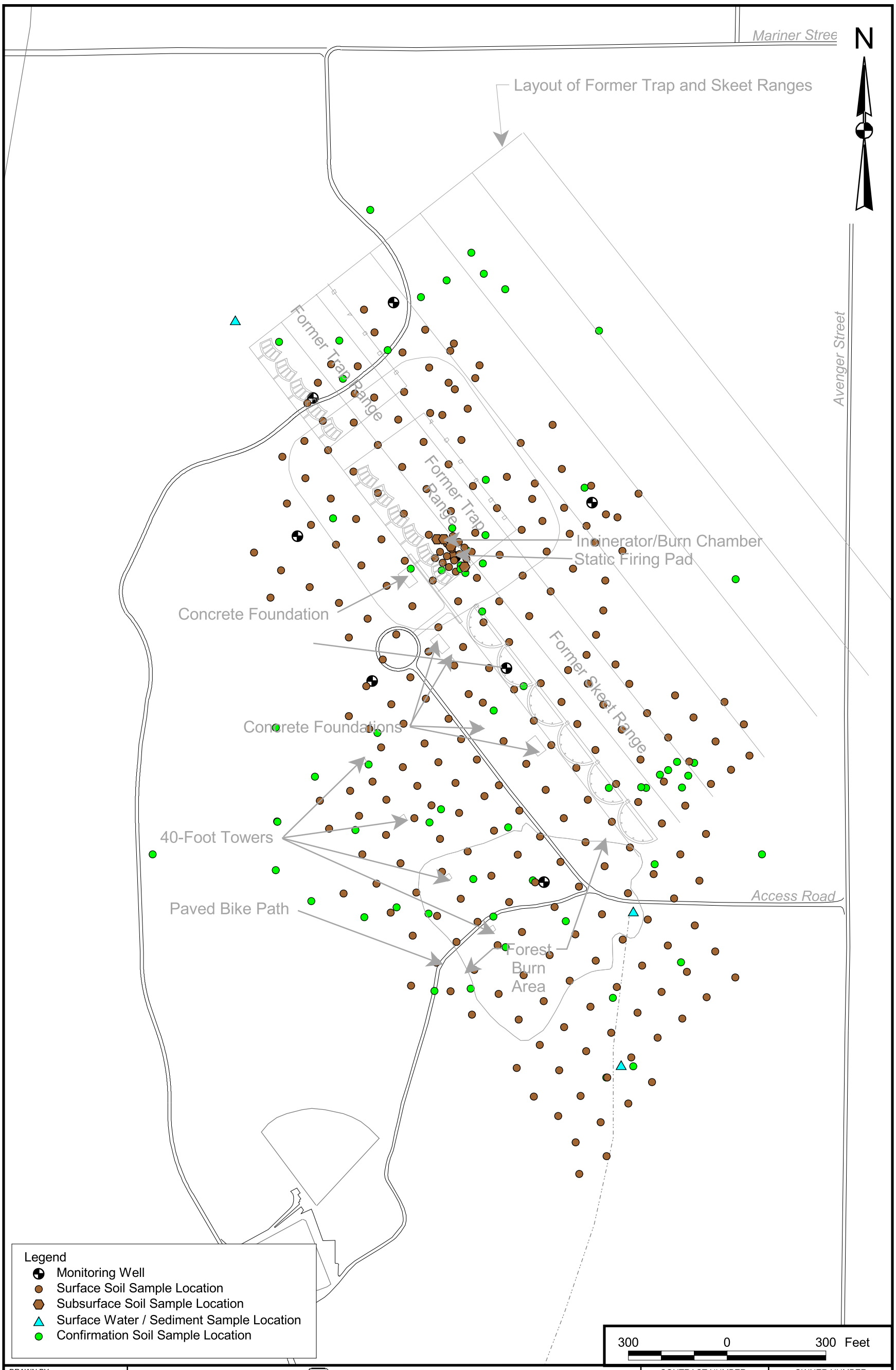

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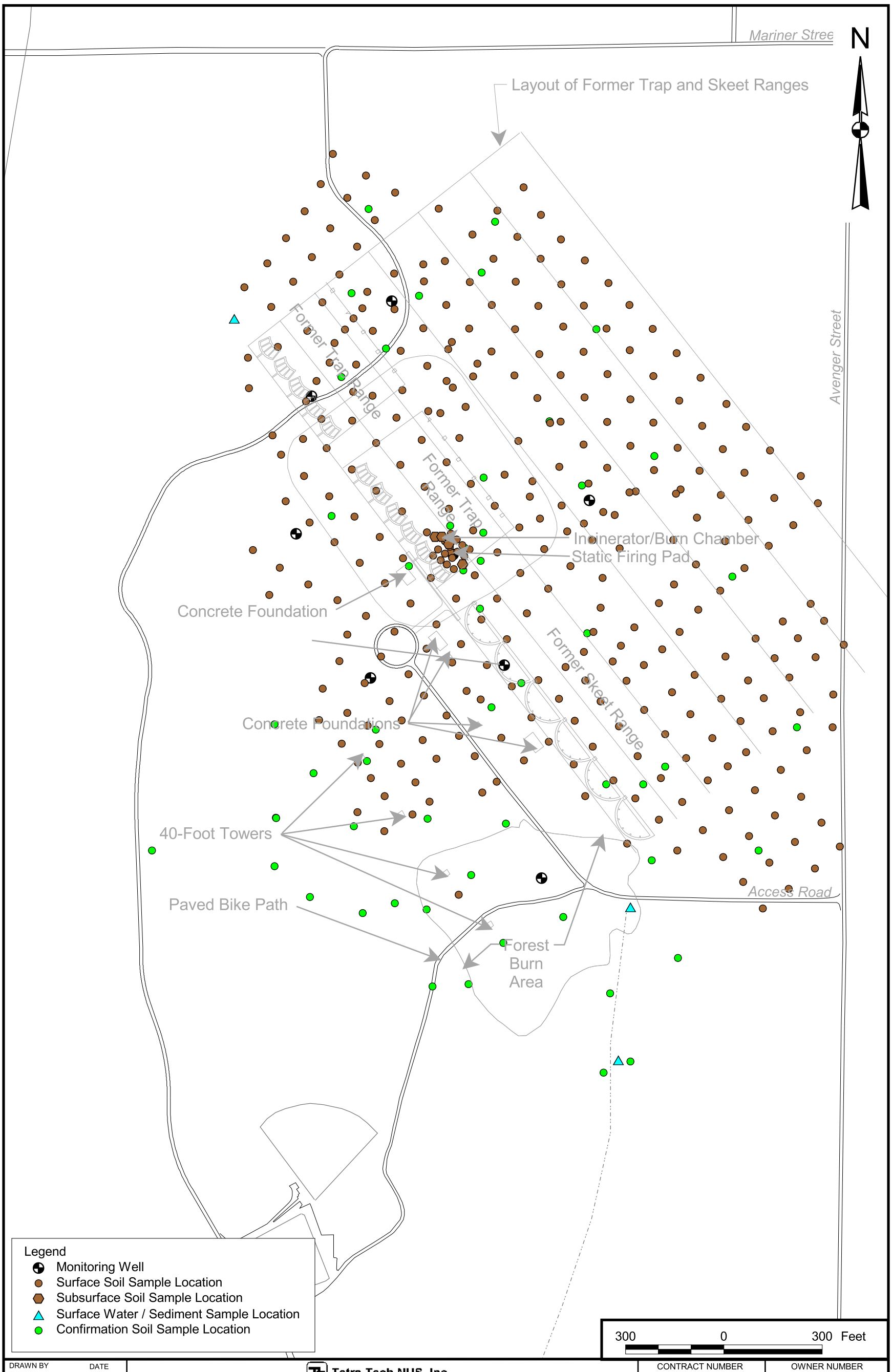
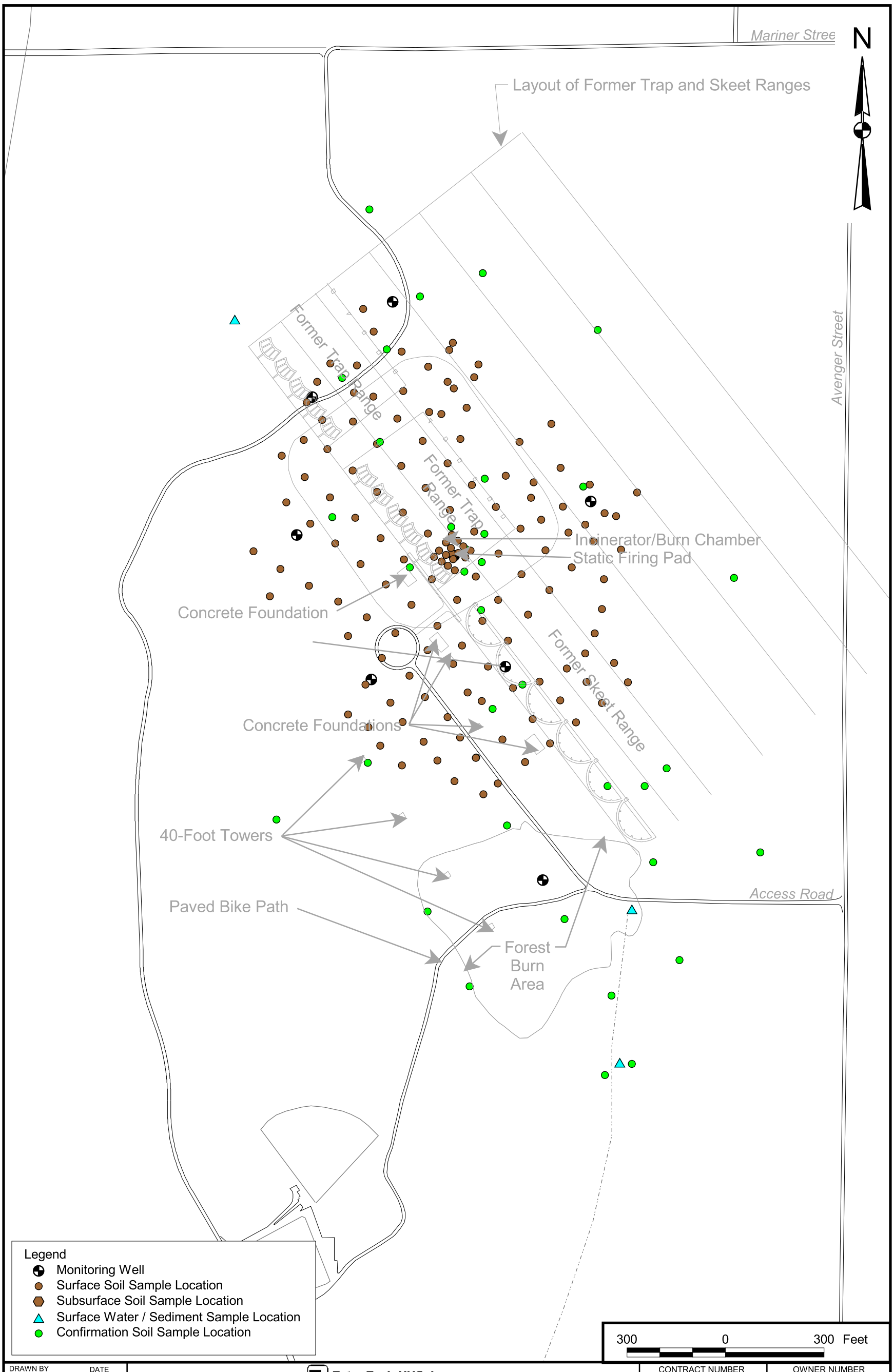
CHECKED BY DATE	RI SOIL AND SEDIMENTSAMPLES LOCATIONS PAHs SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-1	REV 0

P:\GIS\NAS_CecilField\Site-15_TechMemo.apr 26Apr01 MJJ 05-Layout-Lead_Samples



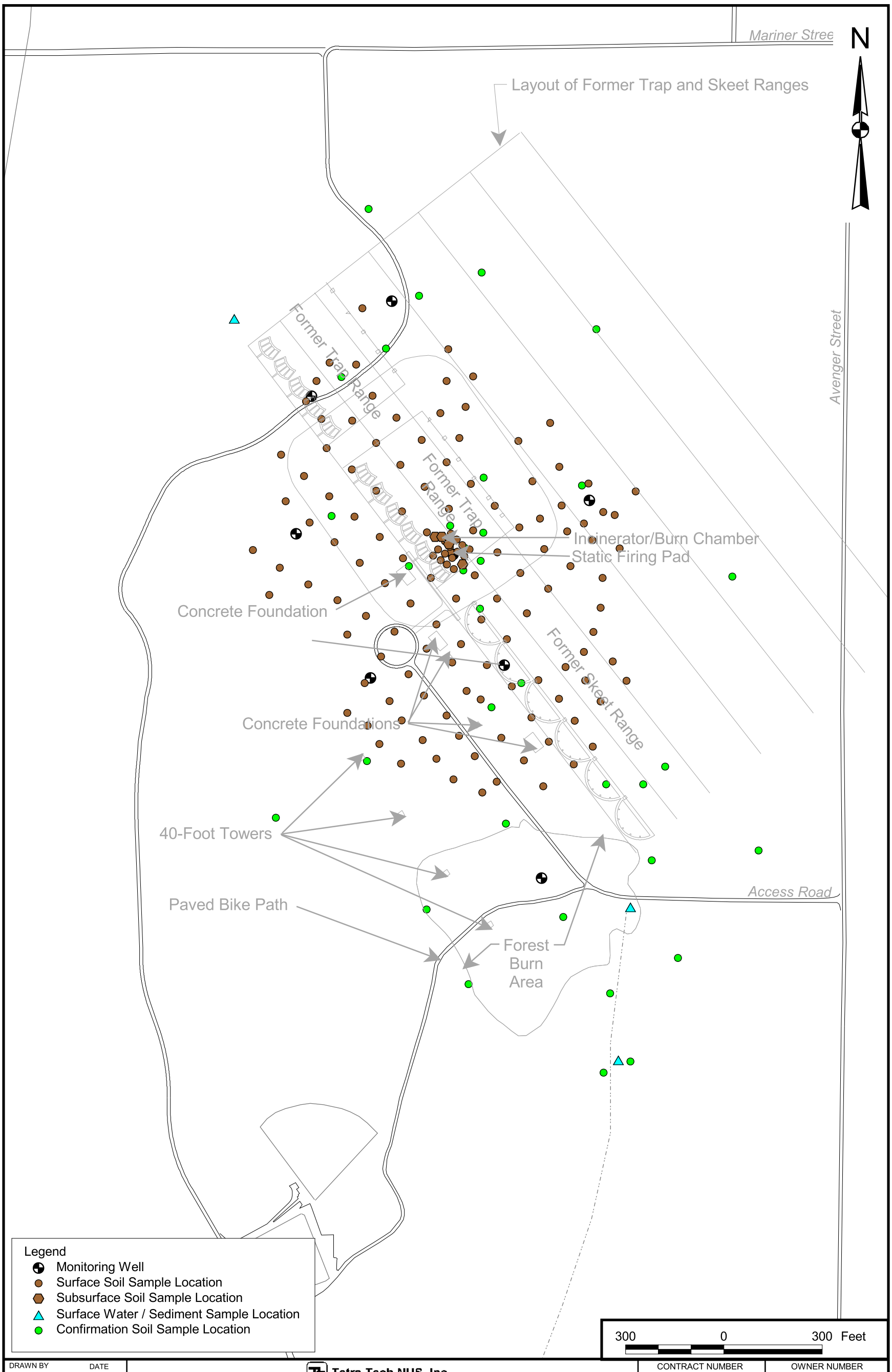
DRAWN BY MJJ DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	RI SOIL AND SEDIMENTSAMPLES LOCATIONS LEAD SCREENING & CONFIRMATORY SAMPLING SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA		APPROVED BY DATE	
SCALE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

P:\GIS\NAS_CecilField\Site-15_TechMemo.apr 26Apr01 MJJ 06-Layout-TNT_Samples



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	
COST/SCHEDULE-AREA		APPROVED BY — DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-3	REV 0

P:\GIS\NAS_CecilField\Site-15_TechMemo.apr 26Apr01 MJJ 07-Layout-TRPH_Samples



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	
COST/SCHEDULE-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-4	REV 0

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.

- 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).

- 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 surface soil sampling took place (TtNUS, 2000). The purpose of this sampling was to assess the leachability of PAHs from soil to groundwater. Four surface soil samples were collected and analyzed for PAHs. The same samples were submitted to a Synthetic

Precipitation Leaching Procedure (SPLP) and the extracts from that procedure were also analyzed for PAHs.

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 Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (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 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.

TABLE 3-1

SUMMARY OF ORGANIC 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)
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

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

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

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) of 6 µg/L. The three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in one of eight 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.

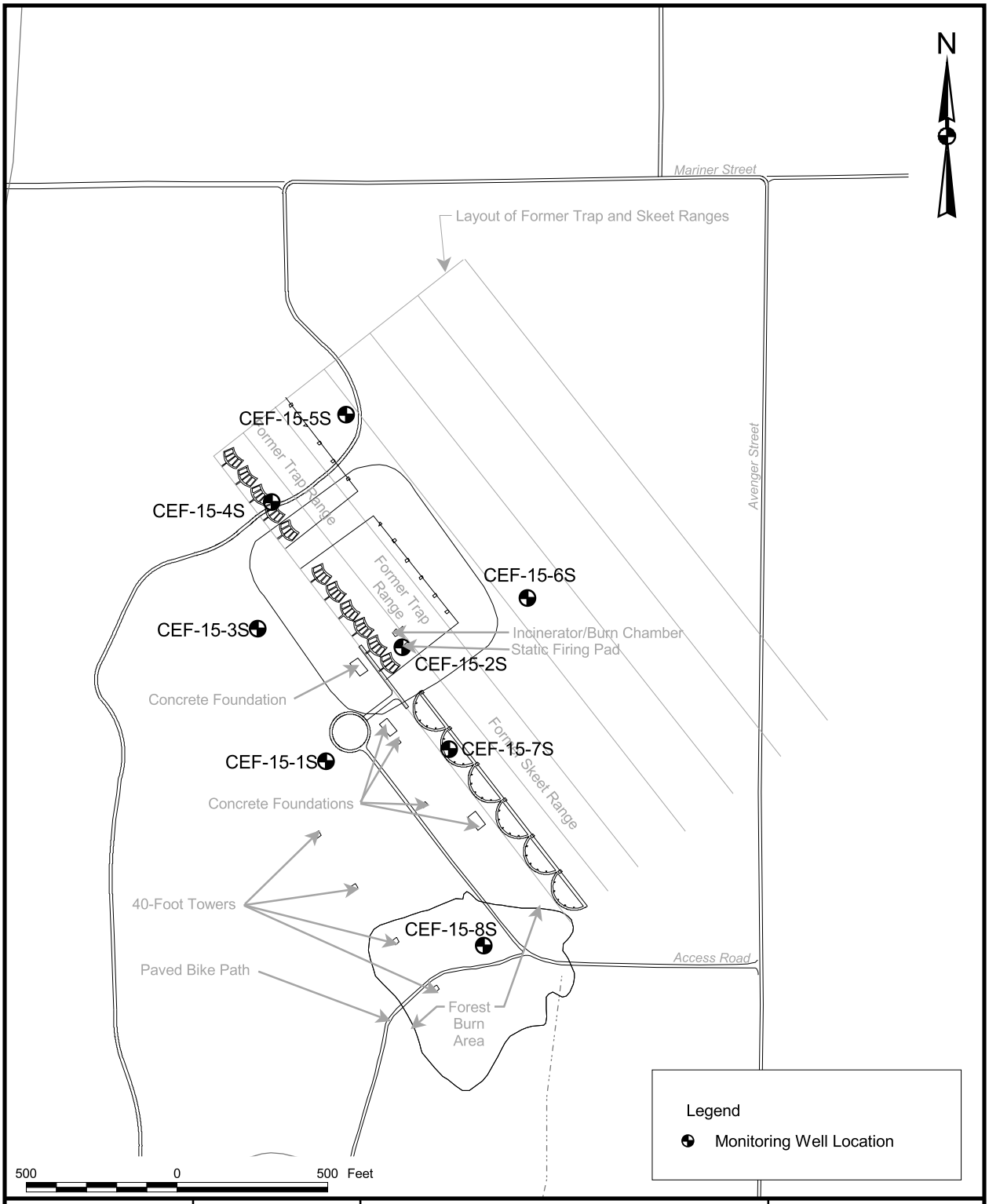
TABLE 3-5

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, mg/L				
Bis(2-ethylhexyl)phthalate	4/8	1.0 - 220	6.0	NA
Pesticides, mg/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, mg/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, mg/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
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, mg/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, mg/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

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 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

Two post-RI sampling events were conducted at Site 15. The purpose of the first of this event was to further delineate the extent of the PAH and lead contamination of surface soil and sediment. The purpose of the second of these events was to evaluate the leachability of PAHs from surface soil to 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.

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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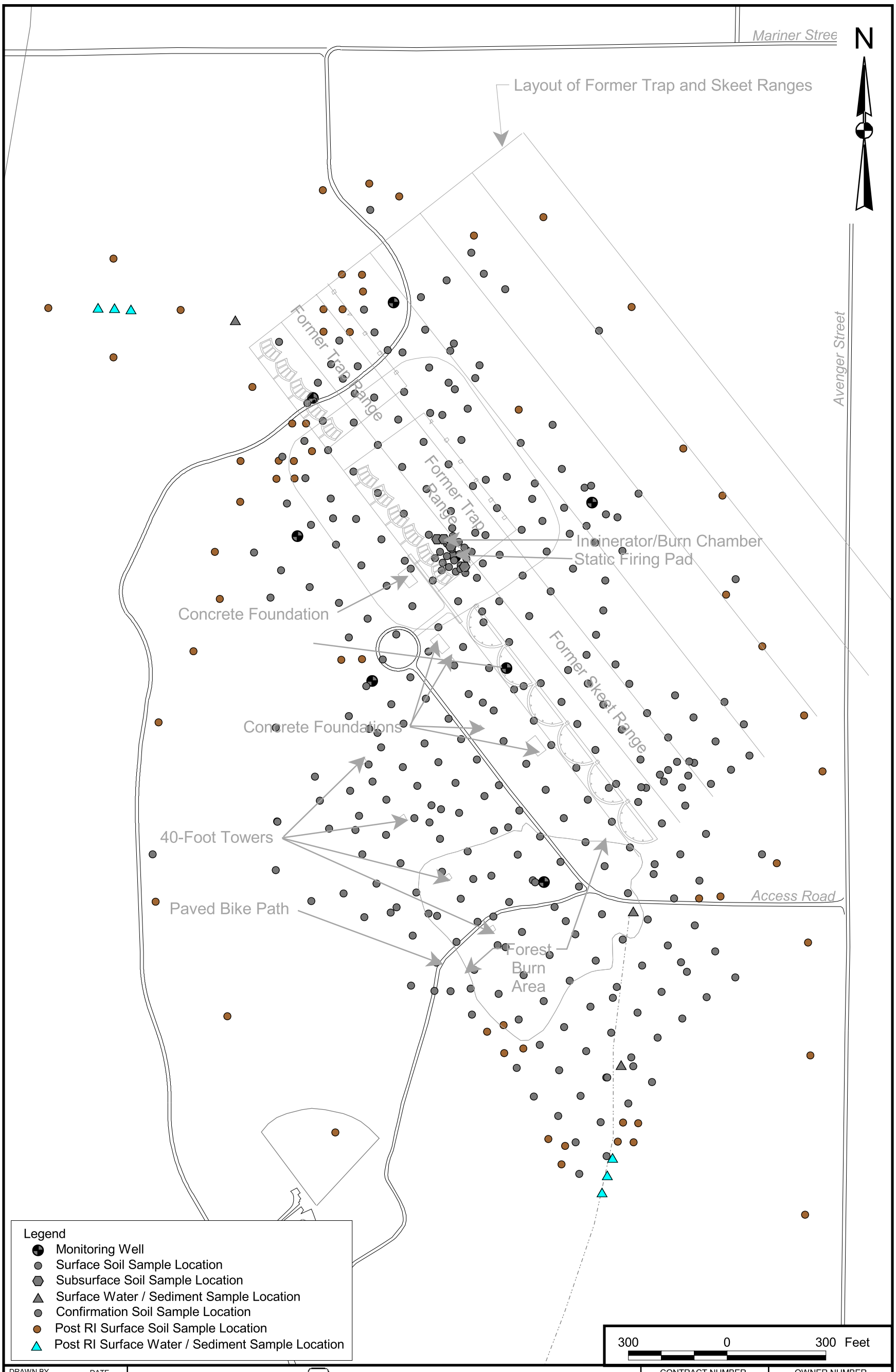

DRAWN BY MJJ DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	APRIL/JUNE 1999 POST RI SURFACE SOIL AND SEDIMENT SAMPLING LOCATIONS, PAHs ANALYSIS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA		APPROVED BY DATE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

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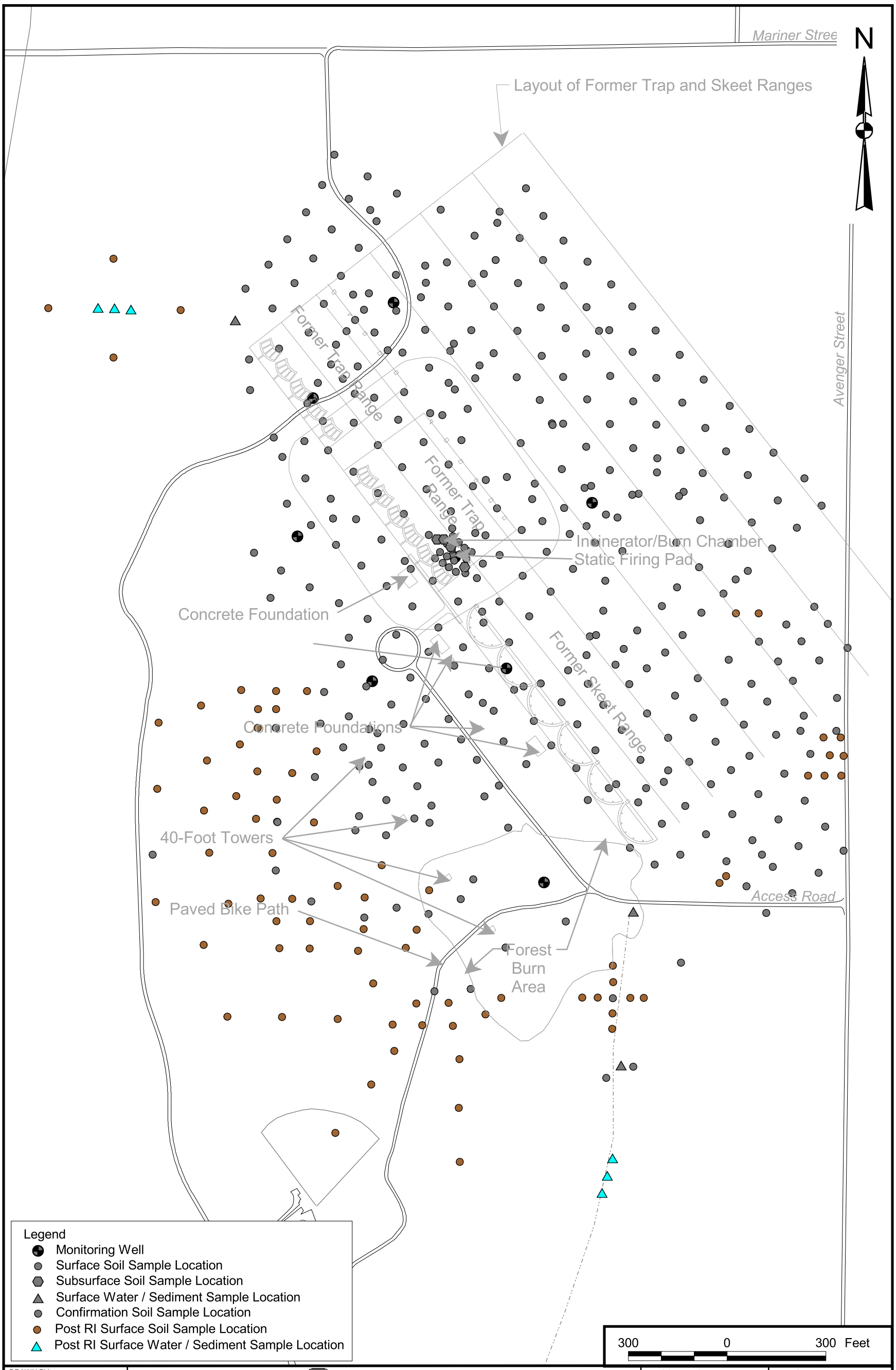

DRAWN BY MJJ DATE 21Jan00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	APRIL/JUNE 1999 POST RI SURFACE SOIL AND SEDIMENT SAMPLING LOCATIONS, LEAD ANALYSIS SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 3-7	REV 0

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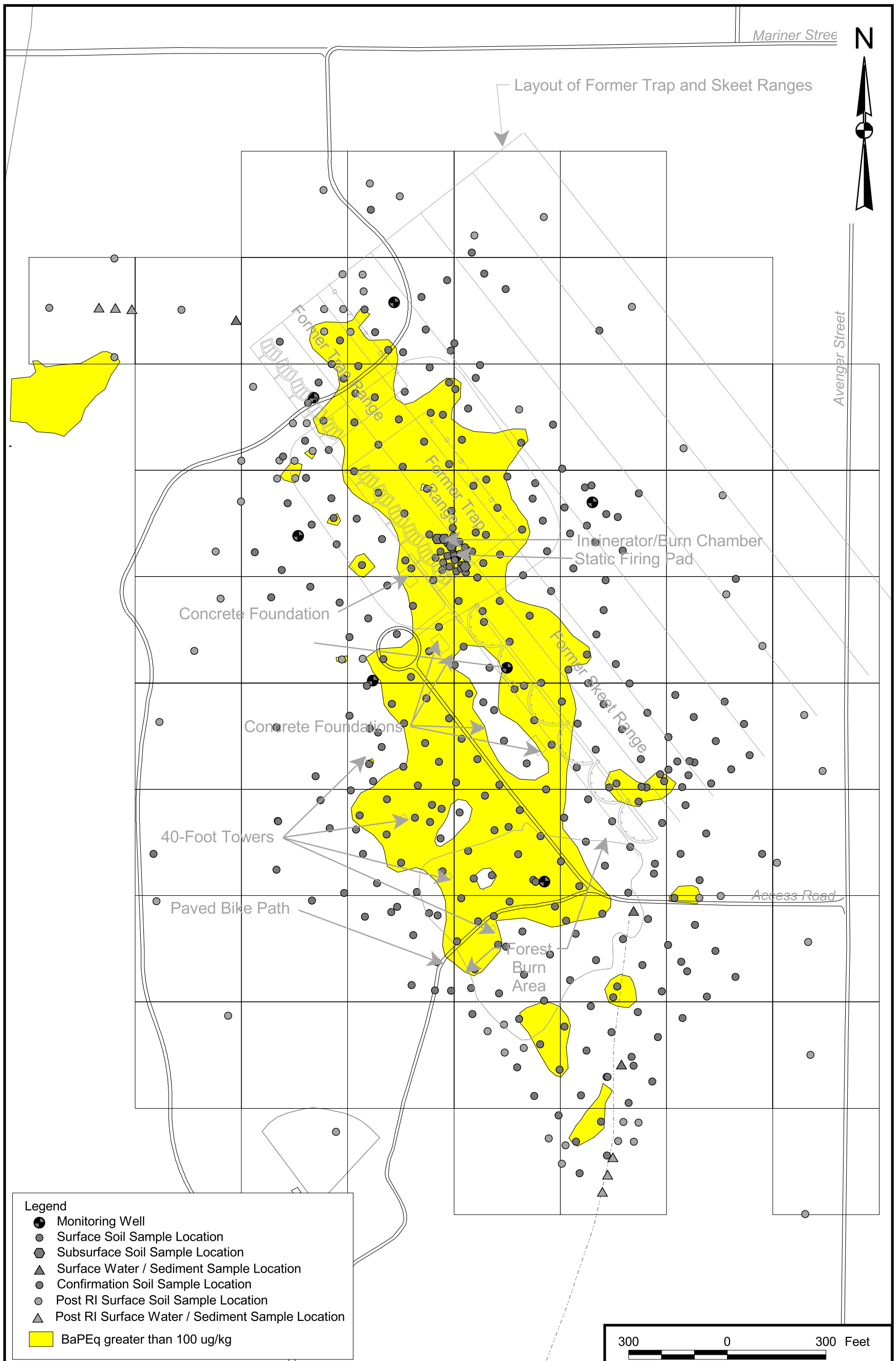

DRAWN BY MJJ DATE 09Feb00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	LOCATIONS OF SURFACE SOIL SAMPLES WITH PAHs CONCENTRATIONS EXCEEDING FDEP SCTLs FOR RESIDENTIAL EXPOSURE SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA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

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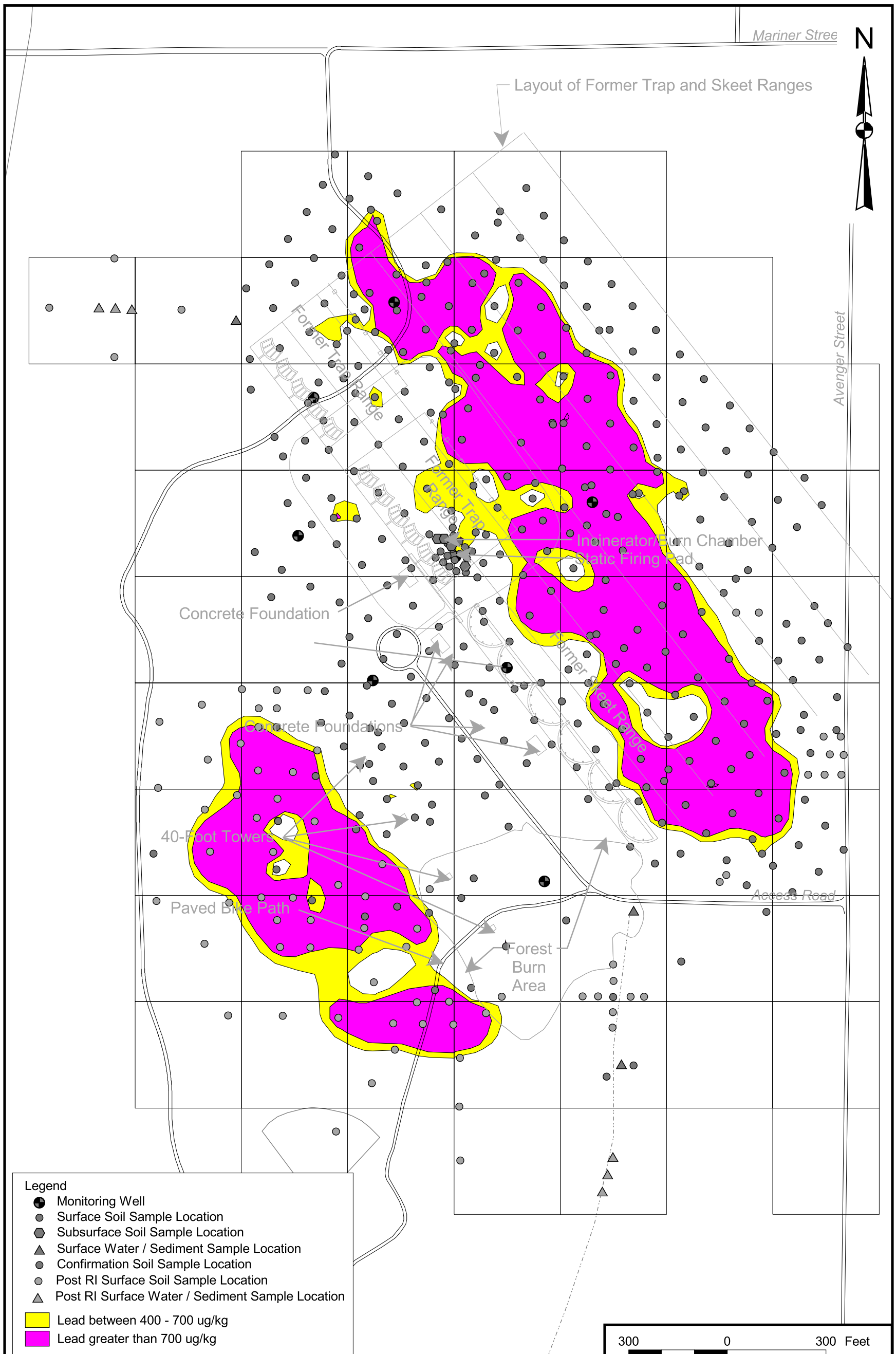

DRAWN BY MJJ DATE 09Feb00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7653	OWNER NUMBER —
CHECKED BY DATE	LOCATIONS OF SURFACE SOIL SAMPLES WITH LEAD CONCENTRATIONS EXCEEDING FDEP SCTLs FOR RESIDENTIAL EXPOSURE SITE 15 TECHNICAL MEMORANDUM NAS CECIL FIELD JACKSONVILLE, FLORIDA	APPROVED BY DATE	
COST/SCHEDULE-AREA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

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

Two 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.

Groundwater samples were collected in accordance 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). As agreed by the BCT, no rinsate and trip blanks were collected.

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. Accutest SouthEast in Orlando, Florida performed the analyses.

5.0 NATURE AND EXTENT OF CONTAMINATION

Analytical results for the groundwater samples collected during the 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.

TABLE 5-1

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

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

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

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 and nitroaromatic and inorganic compounds at concentrations that exceed the FDEP SCTL for leachability to groundwater, these contaminants do not appear to have impacted groundwater quality at the site.

6.2 RECOMMENDATION

Based upon the above conclusion, it is recommended that no further groundwater monitoring be required at Site 15.

REFERENCES

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APPENDIX A

SAMPLING AND ANALYSIS WORK PLAN

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.

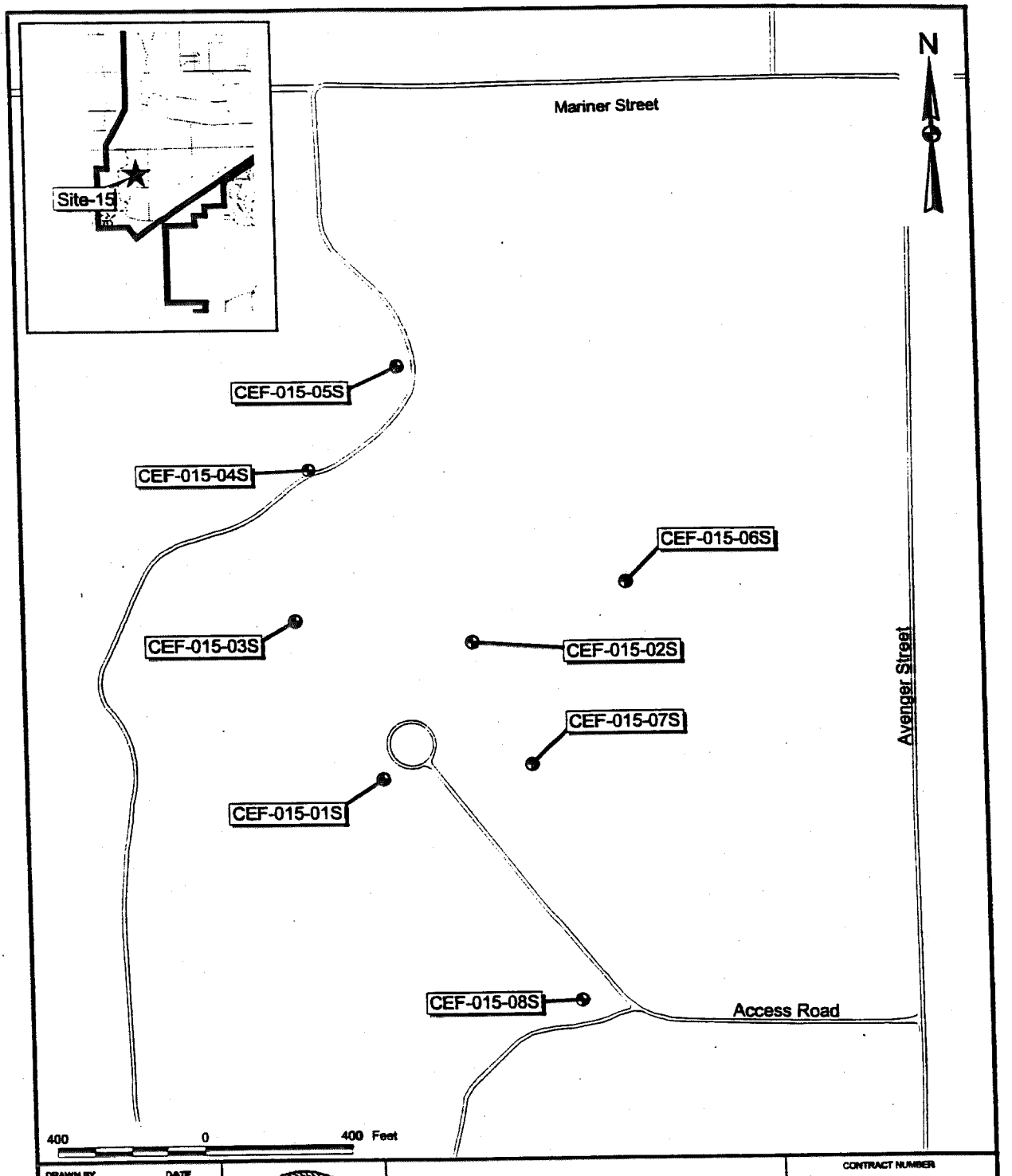
As agreed upon by the BCT, formal data validation has been eliminated from the installation restoration program at NAS Cecil Field. However, the analytical data packages generated by the analytical laboratory will be reviewed by Tetra Tech NUS personnel to eliminate false positives and false negative 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.

APPENDIX B

SAMPLING LOGS

B.1 April 2000 Sampling Logs
B.2 May 2000 Re-Sampling 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.
Marv Dale departed in F250 for Sage.
Plan of Day @ Site 15. Groundwater Sampling. (OUS)
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 energefizes (8330). (metals - total + dissolved)

0900 At PWC Bldg. 1, load truck with supplies. Calibrate horibas (2) # 906024 & 804048. Rental from Response Rentals Peristaltic Pumps (2) (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 (Southdiv Proj. Eng.). HASP briefing per 4/19 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 tour sites for CTO 121.

1128 L.K. begins water levels (see sheet for details). (H.BTOC)

15	5.77
25	6.97
35	7.17
48	7.39
58	4.64
65	6.39
78	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 Marvin W. Dale DATE 4/17/00

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

TITLE Site 15 / RR corrument ~~C70 78~~ MD **PROJECT NO.** 7653 **BOOK NO.** 1299 **139**

Work continued from Page —

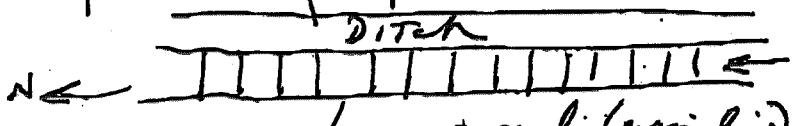
0704 MERV DALE (M.D.) AND ERIC PARKER (E.P.) DEPART IN FESO.
PLAN OF DAY - COMPLETE SAMPLING AT SITE 15 (YELLOW WATER WEAPONS AREA OF CECIL FIELD, JAX, FL.
CEL Ph 614 4443.

EQUIPMENT
(2) HORIBAS (U-10)
(2) HERON WATER LEVEL INDICATORS
(2) Peristaltic Pumps

0847 TRUCK LOADED per checklist. Horibas and P.I.D calibrated. See Cal. sheet.
Proceed to Site 15. HASP tailgate talk.

0917 E.P. unloaded and set at well 3S. 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 TOP 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 me. The crew went to the wrong end of the RR. Will try again tomorrow.

1031 M.D. packing over to well 6S.

1733 M.D. And E.P. depart Site 15. Drum 15-1 about to gallons full for purge water from wells 1S thru 7S.
For purge data see cal 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 Wilber (CW).

TODAY'S AGENDA:
PSC 15 - SAMPLE MW-85
PSC 25 -
PSC 45 - } COLLECT WATER LEVELS
PSC 21

WEATHER: CLEAR: 70s/80s

EQUIPMENT: 2 HORIBAS/PID/ WL INDICATOR/ PERISTALTIC PUMP/ ACCESSORIES

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 free 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 Lorie Knight 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

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: ERIC 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: ~~1400~~ 1600								
Method: Peristaltic	Brn	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/L):	1.5
Start Purge (hrs):	1350
End Purge (hrs):	1550
Total Purge Time (min):	120
Total Vol. Purged (gal/L):	30.5

See Attached Low Flow Purge Data Sheet for Purge Data

15.30
5.77
~9.5 feet of water 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

LAB INFO

LAB: Accutest
4405 Vineland Rd. C-15
Orlando, FL 32811
COC #: 15-041900

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.CA0.0SA.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/L):	5.4
Start Purge (hrs):	1318
End Purge (hrs):	1425
Total Purge Time (min):	67
Total Vol. Purged (gal/L):	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~~ 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 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.C	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	400
Pb, As, Sb (F) -	SW846 6010B	HNO3	1-500 ml bottle Plastic	Accutest	
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml 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 #:

Check if Collected:
[ ] MS / MSD [ ] DUPLICATE / ID No.: None

Signature(s): [signature]

Tetra Tech NUS, Inc. GROUNDWATER SAMPLE LOG SHEET

Project / Site: Cecil Field Site 15
Project No.: N7553.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: 2IN
Well Casing Material: PVC
Total Well Depth (TD in feet): 15.63
Static Water Level (WL in feet): 7.39
One Casing Volume (gal.): 1.3 OR 4.9L
Start Purge (hrs): 1525
End Purge (hrs): 1728
Total Purge Time (min): 123
Total Vol. Purged (gal.): 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~~ bottle FC MB	Accutest	yes
Pb, As, Sb	SW846 6010B	HNO3	1-~~500 ml~~ bottle FC	Accutest	yes
Energetics	SW846 8330	none	2- ~~1-1-2~~ 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): [signature]

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	6.93	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): 1.50
Start Purge (hrs): ~~1535~~ 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

2.41
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

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sample ID No.: CEF- 15-GW-65'-01

Sample Location: CEF- 15-65

Sampler: M. 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: 1205								
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 Goes 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): [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-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-D48900
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 bottle 1L	Accutest	
Pb, As, Sb	SW846 6010B	HNO3	1-500 ml bottle 1L	Accutest	
Energetics	SW846 8330	none	2-1 ~~1-2~~ liter bottle MG	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

SAMPLERS (SIGNATURE): [signature]

PROJECT MANAGER AND PHONE NUMBER: Rob Simcik 412-921-8163

FIELD OPERATIONS LEADER AND PHONE NUMBER: Meru Dale 904-281-0400

CARRIER/WAYBILL NUMBER: FEDEX 8185 2037 5039 / 8185 2037 5326

LABORATORY NAME AND CONTACT: Accutest H. Behzadi

ADDRESS: 4405 Vineland Rd, C-15

CITY, STATE: Orlando, FL 32811

STANDARD TAT ☐
RUSH TAT ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE 2000 YEAR	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	PAH	SW 8446 8310	Pb, As, Sb SW 8446 6010B Unfilter	Pb, As, Sb SW 8446 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		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS: 117653 CAO DSA 440

PINK (FILE COPY) 3/99

APR 21 '00 09:22AM TETRA TECH NUS JAX P.2/5

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER 1[illegible]4/800

PAGE 1 OF 2

MB

PROJECT NO: 7653

SITE NAME: Site 15

PROJECT MANAGER AND PHONE NUMBER: Rob Jurek 407 281 8163

FIELD OPERATIONS LEADER AND PHONE NUMBER: Mark Dale 904 281 0400

CARRIER/WAYBILL NUMBER: FEDEX 2155 2037 5028

LABORATORY NAME AND CONTACT: Accutest H. Rubenfeld

ADDRESS: 4405 Vineland Rd, E-15

CITY, STATE: ORLANDO, FL 32811

SAMPLERS (SIGNATURE): Mark D. Dale

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☑ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G P P G

PRESERVATIVE USED: None UNPRESERVED HNO3 UNPRESERVED HNO3 None

TYPE OF ANALYSIS: PAH; Pb, As, Se, Cd, Cr, Ni, Cu, Zn; Pb, As, Se, Cd, Cr, Ni, Cu, Zn; Fluoride/Nitrate/Nitrite

DATE YEAR	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	PAH	Pb, As, Se, Cd, Cr, Ni, Cu, Zn	Pb, As, Se, Cd, Cr, Ni, Cu, Zn	Fluoride/Nitrate/Nitrite					COMMENTS
		~~CFF 15-GW-15'-01~~	GW	G		✓	✓		✓					Cool to 4°
		~~CFF 15-GW-15'-01-F~~	GW	G				✓						
		~~CFF 15-GW-25'-01~~	GW	G		✓	✓		✓					WRK Relinquished
		~~CFF 15-GW-25'-01-F~~	GW	G				✓						
		~~CFF 15-GW-35'-01~~	GW	G		✓	✓		✓					Forgotten in
		~~CFF 15-GW-35'-01-F~~	GW	G				✓						9/24/800
		~~CFF 15-GW-35'-01~~	GW	G										
4/17	1730	CFF 15-GW-45'-01	GW	G	5	✓	✓		✓					Cooler turned in
4/17	1730	CFF 15-GW-45'-01-F	GW	G	1			✓						3 months holding
4/17	1730	CFF 15-GW-55'-01	GW	G	5	✓	✓		✓					4 months holding
4/17	1730	CFF 15-GW-55'-01-F	GW	G	1			✓						
														No Pesticides
														As, Arsenic
														Sb, Antimony

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: Mark D. Dale	4/17/00	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/ M. 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-15-1$

0900 - Begin setting up for well development of CEF-15-1$

- Used surge plunger for ~4-5 minutes on well CEF-15-1$

0925 - Begin developing well CEF-15-1$

- Pump is ~ 1-2' off of bottom. Only pumps for 1-2 min before shutting off.

M. 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	" "
~~1100~~ AUP 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~~ AUP
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	346.0	

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. Pale
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	0.0062	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~~ 1430		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	4.15	0.062	17.0	Lt. brown, clearing
1535		53.0	9.60	21.80	4.80	0.063	15.60	

APPENDIX C

ANALYTICAL LABORATORY RESULTS

C.1 April 2000 Sampling Analytical Laboratory Results
C.2 May 2000 Re-Sampling Analytical Laboratory Results

C.1

APRIL 2000 SAMPLING ANALYTICAL LABORATORY RESULTS

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	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

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-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

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