N60234.AR.000023
NAS SAUFLEY FIELD
5090.3a

FINAL SITE INSPECTION REPORT FOR SITE 3 PISTOL RANGE MUNITIONS RESPONSE SITE UXO 001 OUTLYING LANDING FIELD NAS SAUFLEY FIELD FL

5/1/2014

TETRA TECH

Final
Site Inspection Report
for
Site 3 Pistol Range
Munitions Response Site (UXO 001)
Outlying Landing Field Saufley

Naval Air Station Pensacola
Pensacola, Florida

Naval Facilities Engineering Command
Southeast

Contract Number N62470-08-D-1001
Contract Task Order JM13

May 2014

051012/P

FINAL
SITE INSPECTION REPORT
FOR
SITE 3 PISTOL RANGE

OUTLYING LANDING FIELD SAUFLEY
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Southeast
NAS Jacksonville Building 103
Jacksonville, Florida 32212

Submitted by:
Tetra Tech, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

CONTRACT NUMBER N62470-08-D-1001
CONTRACT TASK ORDER JM13

MAY 2014

PREPARED UNDER THE DIRECTION OF:

RALPH BASINSKI
PROJECT MANAGER
TETRA TECH, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH, INC.
KING OF PRUSSIA, PENNSYLVANIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

NUMBER

FIGURES

NUMBER

ACRONYMS AND ABBREVIATIONS

%D	Percent deviation
%R	Percent recovery
bgs	Below ground surface
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CSM	Conceptual Site Model
CTO	Contract Task Order
DI	Deionized
DoD	Department of Defense
DQI	Data Quality Indicator
DQO	Data Quality Objective
DVM	Data Validation Manager
FAC	Florida Administrative Code
FBL	Fixed-Base Laboratory
FDEP	Florida Department of Environmental Protection
FOL	Field Operations Leader
GCTL	Groundwater Cleanup Target Levels
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
IDW	Investigation-derived waste
ITRC	Interstate Technology and Regulatory Council
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LUC	Land Use Control
MC	Munitions Constituent
MDL	Method detection limit
MEQ/100	Milliequivalents per 100 grams
mg/kg	Milligrams per kilogram
MRP	Munitions Response Program
MS	Matrix spike
MSD	Matrix spike duplicate

NAAS	Naval Auxiliary Air Station
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Agency
NETMPSA	Naval Education and Training Program Management Support Activity
NETPDTC	Naval Education and Training Professional Development and Technical Center
NFA	No Further Action
OLF	Outlying Landing Field
PA	Preliminary Assessment
PAL	Project Action Limit
QA	Quality Assurance
QC	Quality Control
RPD	Relative percent difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SCTL	Soil Cleanup Target Level
SI	Site Inspection
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedure
TtNUS	Tetra Tech NUS, Inc.
TOC	Total Organic Carbon
TOM	Task Order Manager
USEPA	United States Environmental Protection Agency
UFP	Uniform Federal Policy
µg/L	Micrograms per liter
USDA	United States Department of Agriculture
XRF	X-ray Fluorescence

EXECUTIVE SUMMARY

ES-1 INTRODUCTION

This report presents the results of the Site Inspection (SI) conducted at the Site 3 Pistol Range, located at Outlying Landing Field (OLF) Saufley, Escambia County, Florida. As described in the Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan – for Munitions Response Program [Tetra Tech NUS, Inc. (Tetra Tech), 2009], the main objectives of the SI at the Site 3 Pistol Range were to build on information from the Preliminary Assessment (PA) by gathering field data to perform field reconnaissance and surveys to further develop the Conceptual Site Model (CSM), and to confirm the presence or absence of munitions constituents (MCs).

ES-2 BACKGROUND AND PHYSICAL SETTING

The Site 3 Pistol Range is a 2.47-acre area that includes a clay berm approximately 100 feet in length, 30 feet wide, and 20 feet high. The site is located in the northwest corner of OLF Saufley approximately 800 to 1,000 feet north and west of the two active runways. Currently, the site and surrounding area is undeveloped and is not being used. Soil at the site and vicinity appear to consist of clay or intermixed clay and silt.

The site elevation is approximately 30 feet above mean sea level and storm water run-off flows north into Eleven Mile Creek, which is located approximately 1,000 feet to the north. OLF Saufley is surrounded by a perimeter security fence; however, a separate fence or other barrier is not provided for Site 3. Access to OLF Saufley is restricted to Navy and civilian personnel, authorized contractors, and visitors.

ES-3 SI FIELD ACTIVITIES

SI field activities at the Site 3 Pistol Range included the following:

- Sampling and analysis of 46 surface soil samples in the field using an X-ray fluorescence (XRF) analyzer for lead.

- The field analysis was used to select samples for analysis by a fixed-base laboratory (FBL) for select MC (i.e., antimony, arsenic, copper, lead, tin, and zinc).

- Sampling of soil stockpiles in the area of Site 3 for analysis of lead by XRF.

- Installation of a temporary monitoring well and sampling of shallow groundwater for analysis by the FBL for antimony and lead.

It should be noted that although the laboratory subcontract and documentation specified only analysis for antimony, arsenic, copper, lead, tin, and zinc, the laboratory analyzed and also reported analysis for mercury and silver.

ES-4 SUMMARY OF RESULTS

The surface and subsurface soil sample intervals were analyzed in the field via XRF and select samples were sent to the FBL for confirmatory analysis of select metals. XRF lead concentrations exceeded the Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Level (SCTL) under Chapter 62-777, Florida Administrative Code (FAC) for Residential Direct Exposure of 400 milligrams per kilogram (mg/kg) in 5 of the 47 discrete surface soil samples collected from intervals of ground surface to 0.5 foot below ground surface (bgs). One surface sample collected at a depth interval of 0.5 to 2 feet bgs within the berm contained lead at a concentration greater than its Residential Direct Exposure SCTL. Two step-out locations were sampled near perimeter samples at a depth of 2 to 4 feet (C5 and F5) following XRF readings greater than 200 mg/kg at the 0.5- to 2-foot depth.

Concentrations of lead in soil samples exceeded its FDEP Residential Direct Exposure SCTL at several locations at the Pistol Range, with the highest detected concentrations in two samples, (XRF: 616 mg/kg and FBL: 478 mg/kg for PRSBC4-0.5/2.0; and XRF: 543 mg/kg and FBL: 558 mg/kg for PRSBF6-0.5/2.0) at the area of the berm. Based on the field screening and FBL analytical results, the majority of lead contamination appears to be limited to 0 to 0.5 foot bgs.

The arsenic concentration (2.36 mg/kg) of one sample slightly exceeded its FDEP SCTL Residential Direct Exposure SCTL (2.1 mg/kg) based on the FBL analysis. The other MCs were detected at concentrations less than their respective FDEP SCTLS.

In addition, the soil sample with the highest detection of lead in the 0.5 to 2.0 feet bgs sample interval as analyzed by XRF (PRSBC5-0.5/2.0) was analyzed by the Synthetic Precipitation Leaching Procedure (SPLP) for the targeted MC metals. The reported concentrations of antimony and lead in the extract were 24.3 and 4,620 micrograms per liter (µg/L), respectively; which is greater than their FDEP Groundwater

Cleanup Target Level (GCTL) of 6 and 15 (µg/L), respectively. The SPLP results for the other MC target analytes were less than their respective FDEP GCTLs.

A shallow groundwater sample was collected from a temporary monitoring well located at the approximate center of the impact berm. The groundwater sample was analyzed for antimony and lead. Antimony and lead results were reported at concentrations less than their method detection limits (MDLs) of 5.0 and 1.50 µg/L, respectively. The detection limits are less than their respective FDEP GCTLs of 6 and of 15 µg/L.

ES-5 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The results of the SI indicate that lead and arsenic were detected at concentrations in surface soil samples and exceeded their respective FDEP SCTLs specified in the Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) (TtNUS, 2009) at several locations of the Site 3 – Pistol Range. The highest detected lead concentrations were from soil samples located in the area of the primary impact berm. The majority of the lead contamination appears to be limited to 0 to 0.5 foot bgs. Only one sample location exhibited a lead concentration greater than the FDEP Residential Direct Exposure SCTL at a depth greater than 0.5 feet bgs. Lead was not detected at concentrations exceeding its FDEP Residential Direct Exposure SCTL at a depth greater than 2.0 feet bgs. Although lead was detected at concentrations greater than its SCTL, the exposure concentration for the site, represented by the arithmetic mean of the lead data, was less than its residential SCTL.

One soil sample contained arsenic at a concentration that slightly exceeded its FDEP Residential Direct Exposure SCTL. Although arsenic was detected at a concentration greater than its residential SCTL at one sampling location, the exposure concentration for the site, represented by the 95 percent upper confidence limit (UCL) of the mean, was less than its residential SCTL.

None of the other targeted MC metals were detected at concentrations exceeding their FDEP Residential Direct Exposure SCTLs. Targeted MC analytes were not detected in any of the soil samples at a concentration that exceeded their FDEP Industrial Direct Exposure SCTLs.

One soil sample was analyzed by SPLP and exceeded the FDEP GCTLs for antimony and lead. However, the shallow groundwater sample collected at the location of the impact berm did not contain antimony or lead at concentrations that exceed their respective GCTLs. Although the SPLP analytical

results suggest the potential for antimony and lead in the site soil to leach to the groundwater and exceed their GCTLs, the analytical results for the groundwater sample demonstrate that they are not leaching to groundwater. The high lead levels from both the XRF and the FBL appear to be associated with actual bullets/bullet fragments observed in the soil in depths from 0 to 2 feet bgs. However, no bullets/bullet fragments were observed at the site at depths greater than 2 feet bgs. Additionally, the XRF lead results from the soil samples collected at the 2 to 4 foot intervals were very low supporting the groundwater result that lead does not appear to be leaching through the soil.

Recommendations

Based on the data presented in this SI, the following recommendations are proposed:

- Lead and arsenic concentrations in several surface soil samples exceeded their FDEP SCTLs Residential Direct Exposure criteria, but not their Industrial Direct Exposure criteria. Although there were exceedances of the residential SCTLs for these two MCs, the exposure concentrations for these MCs were less than their residential SCTLs. Therefore, based on the decision criteria in the UFP-SAP (TtNUS, 2009), No Further Action (NFA) is the proposed remedy for the site.

- Although the soil SPLP analytical results suggest the potential for the exceedance of groundwater standards, the results of a groundwater sample collected at the site indicate that the antimony and lead present in the site soils are not leaching to groundwater. Therefore, NFA for groundwater is warranted for the targeted MC metals.

- Based on the results of this surface soil sampling event, the site is believed to have been adequately delineated relative to the extent of MC metals and additional delineation is not warranted.

- The bullets/bullet fragments observed at the site serve as a potential source of lead in soil; therefore, removal of the bullets/bullet fragments was completed.

1.0 INTRODUCTION

This Site Inspection (SI) Report for the former Site 3 Pistol Range was prepared by Tetra Tech NUS, Inc. (TtNUS) for Naval Facilities Engineering Command (NAVFAC) Southeast under Contract Task Order (CTO) JM13 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62470-08-D-1001. This report presents the results of the SI conducted at the Site 3 Pistol Range located at Outlying Landing Field (OLF) Saufley, Pensacola, Florida.

The Department of Defense (DoD) has established a separate program to address closed military ranges known as the Military Munitions Response Program (MRP). However, because the Site 3 Pistol Range was identified prior to the MRP program, the Navy elected to continue the investigation in the Installation Restoration Program and not to transfer this site to the MRP program. The Site 3 investigation is being conducted following the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process.

Previously, the Naval Energy and Environmental Support Agency (NEESA) conducted a Preliminary Assessment (PA) for Naval Educational and Training Program Management Support Activity (NETPMSA) Saufley. The PA (NEESA, 1992) identified and reported the Site 3 Pistol Range as an area used for small arms during and after World War II; however, exact dates of use were not verified. The findings of the PA, a site walk conducted in July 2008, and a scoping meeting which took place in November 2008 for the UFP-SAP were used to develop and design the field program for the SI, which is described in this report. Representatives from NAVFAC, Naval Air Station (NAS) Pensacola, Florida Department of Environmental Protection (FDEP), and TtNUS participated in the discussions that lead to this sampling approach.

1.1 PURPOSE

The main objective of this SI is to determine whether additional response actions or a remedial investigation are appropriate for this site. The SI is not intended to be a detailed extent-of-contamination or risk assessment. The purpose, therefore, is to build on PA information by gathering initial field data to determine whether munitions constituents (MCs) that may have originated from previous site operations are present and potentially contributing to environmental impacts associated with surface and subsurface soil and groundwater at the site. MCs for Site 3 have been identified as antimony, arsenic, copper, lead, tin, and zinc. As indicated in the UFP-SAP Worksheet 11 (TtNUS, 2009), the Study Goals and Decision Criteria include:

1. Determine whether MC metals (antimony, arsenic, copper, lead, tin, and zinc) concentrations in the study area surface soil exceed FDEP Soil Cleanup Target Levels (SCTLs). If MCs concentrations in surface soil exceed the Industrial SCTLs, then the project team will convene to plan further study or response action. If MC metal concentrations in surface soil are between the Industrial Direct Exposure SCTLs and Residential Direct Exposure SCTLs, then recommend NFA with Land Use Controls (LUCs) as a remedy for the site. If MC metals concentrations in surface soil are less than the Residential Direct Exposure SCTLs, then recommend No Further Action (NFA) for the site.

2. Determine whether the Synthetic Precipitation Leaching Procedure (SPLP) concentration of any MC metal (antimony, arsenic, lead, copper, mercury, silver, tin, and zinc) exceeds applicable screening values. If it does, recommend an investigation of groundwater to determine whether exposure to groundwater is unacceptable; otherwise, do not recommend a groundwater investigation.

3. Begin to delineate the extent of MC metals (antimony, arsenic, copper, lead, tin, and zinc), if any, in surface soil at Site 3. If the data collected during this investigation are adequate to determine the extent of surface soil contamination, then stop collecting data; otherwise, return to the site for further study to complete the delineation of surface soil contamination.

Other objectives were to use the data collected to further develop the conceptual site model (CSM) and subsequently to summarize the information and recommend future site actions.

1.2 SCOPE OF WORK

The SI field program for the Site 3 Pistol Range included collection of surface soil samples to determine whether MCs are present in surface soil at concentrations that are of potential concern. If MCs are detected at concentrations exceeding FDEP SCTLs or Groundwater Cleanup Target Levels (GCTLs), further investigation may be warranted. The rationale and support documentation for this sampling effort is included in the Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) (TtNUS, 2009).

SI field activities at the Site 3 Pistol Range included the following:

- Collection of discrete surface soil samples from two intervals [0 to 0.5- and 0.5 to 2.0-feet below ground surface (bgs)] within a defined grid area that included the primary impact berm of the former Site 3 Pistol Range.

- Analysis of those soil samples in the field for lead via X-ray Fluorescence (XRF) analyzer and selection of a representative number of samples for shipment to the fixed-base laboratory (FBL) for analysis of select MC metals (antimony, arsenic, copper, lead, tin, and zinc).

- Limited "step-out" sampling of both horizontal and vertical surface soil intervals if XRF results exceed the established threshold of 200 milligrams per kilogram (mg/kg). These "step out" samples were only collected near perimeter samples where the contamination boundary needed to be defined and collected from depths down to 2 and 4 feet bgs.

- Collection of one discrete surface soil sample from the soil stockpile at Site 3 to determine whether the material potentially contained any of the MCs being investigated.

Based on the findings of the assessment activities and a discussion between the Navy and FDEP, one groundwater sample was collected from a temporary groundwater monitoring well installed to approximately 18.15 feet bgs in the shallow water table zone of the surficial aquifer. This temporary monitoring well was co-located with soil sample PRSBE5 at the center of the impact berm. The groundwater sample was shipped to the FBL for analysis of antimony and lead.

1.3 REPORT ORGANIZATION

This SI Report consists of five sections: Section 1.0 is this introduction, which includes the purpose and scope and report organization. Section 2.0 describes the background and physical setting of OLF Saufley and the Site 3 Pistol Range, including SI findings. Section 3.0 describes the SI field work design and methodologies. Section 4.0 presents the results of the sampling event for this SI. Section 5.0 presents conclusions and recommendations based on the SI findings. The appendices consist of the following:

- Appendix A – Field Forms
- Appendix B – Site Photos
- Appendix C – Validated Data
- Appendix D – Correlation Analysis
- Appendix E – Site 3 Field Report

2.0 FACILITY AND SITE BACKGROUND AND PHYSICAL SETTING

2.1 OLF SAUFLEY BACKGROUND AND PHYSICAL SETTING

OLF Saufley is located in Escambia County, northwest Florida (Figure 2-1). The facility is situated between Interstate 10 and Perdido Bay approximately five miles northwest of Pensacola, Florida. OLF Saufley encompasses 866 acres with the majority of the area consisting of a number of support buildings, a federal prison located south of the airfield, four air strips, grass covered fields, and approximately 200 acres of undeveloped land.

The area currently occupied by OLF Saufley was farm and woodland before it was purchased by the Navy in the 1930s. Opened in 1940 as Naval Auxiliary Air Station (NAAS) Saufley, NAAS Saufley was used to train pilots during World War II and the Korean Conflict. In 1957, the mission at Saufley Field was changed to basic training for naval aviators. NAAS Saufley was re-designated as a Naval Air Station (NAS) in 1968 and retained that status until 1976 when NAS Saufley operations were discontinued and the facility was placed in caretaker status. Between 1976 and 1979, Saufley Field was used as an OLF for NAS Whiting Field. In 1979, Saufley Field was reactivated as NETPMSA. Saufley Field was renamed the Naval Education and Training Professional Development and Technical Center (NETPDTC) in 1996. Saufley Field is now used primarily to train and educate Navy personnel and to house federal prisoners. NAS Whiting Field pilots use two of the airstrips for touch and go landing exercises for fixed and rotary wing aircraft. Aerial training was temporarily discontinued after a major hurricane affected the area in 2004 and the airfield was used for temporary housing.

Currently, OLF Saufley is an active military facility and the primary mission of this facility is tenant support. Additional missions include use as a practice and emergency landing location and support for firefighting training. Current and anticipated future land use is considered to be military/industrial with appropriate land use/development restrictions associated with an airfield as required by the Federal Aviation Administration and the DoD.

2.2 SITE 3 PISTOL RANGE BACKGROUND AND PHYSICAL SETTING

Site 3 is located in the northwest corner of OLF Saufley approximately 800 to 1,000 feet north and west of the two active runways (Figure 2-2). The site is a 2.47-acre area that includes a clay berm approximately 100 feet in length, 30 feet wide, and 20 feet high (Figure 2-3). Currently, the site and surrounding area is undeveloped and is not being used. Soil at the site and vicinity appear to consist of clay or intermixed clay and silt.

Storm water run-off flows north into Eleven Mile Creek located approximately 1,000 feet to the north. OLF Saufley is surrounded by a perimeter security fence; however, a separate fence or other barrier is not provided for Site 3. Access to the installation is restricted to Navy and civilian personnel, authorized contractors and visitors.

Background information is limited to the history and site description presented in the PA (NEESA, 1992), which reported there was evidence the range was used during and after World War II; however, exact dates of use are unknown and information regarding the historical use is scarce.

Historic aerial photographs were used to estimate the site layout and design of the Site 3 Pistol Range (Figure 2-4). Munitions most likely to be found at the site are limited to small arms ammunition and from 12, 16, and 20 gauge and .410 caliber shotguns. Information used to define the general layout of pistol ranges and areas that may be impacted with MC was gathered from the Interstate Technical and Regulatory Council (ITRC) Guidance document titled "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges" (IRTC, 2003) and site visits. The Site 3 - Pistol Range most likely included a primary impact berm, a range floor, and side berms.

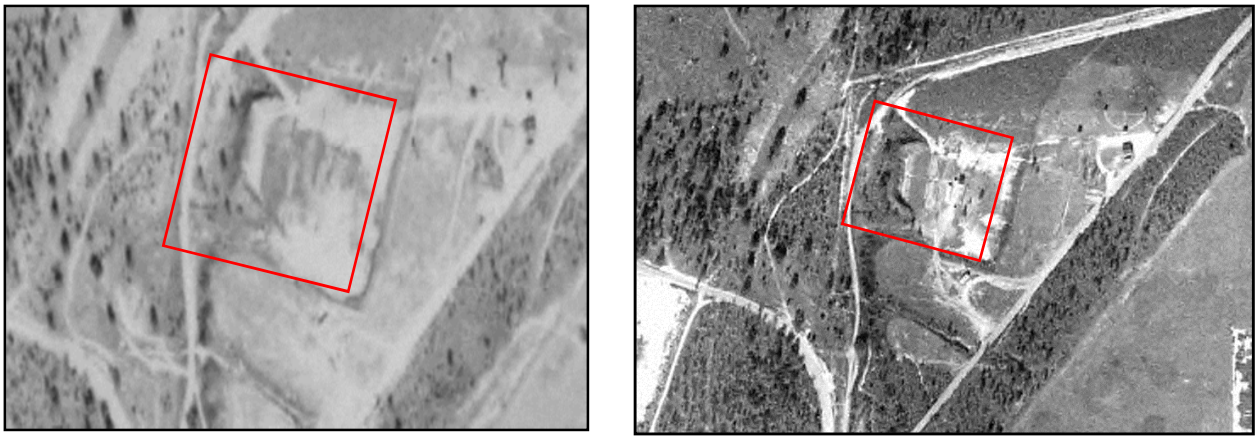


Figure 2-4 – Historical Aerial Photos of Site 3.
The left figure is from 1958 and the right figure is dated 1951.

Based on typical pistol ranges, the penetration depth of small arms on the range floor is generally 1 foot or less. The ITRC document states that rounds that impact the range floor were typically on a flat trajectory that fell short of or missed the target or those resulted from ricochet, and these fragments are usually found within the top 6 inches of soil. Penetration depths within the primary impact berm or side

berms may vary depending on the soil type and other conditions of the site, but are expected to be as deep as 1 foot.

2.3 PHYSICAL CHARACTERISTICS

2.3.1 Topography

OLF Saufley is bordered on the southwest by Perdido Bay and to the north by Eleven Mile Creek and Eight Mile Creek. Escambia Bay lies approximately 8 miles to the southeast. Swampy areas exist adjacent to the western portion of OLF Saufley. However, sandy surface soil in the majority of the area allows for a high portion of rainfall to infiltrate into the ground, resulting in relatively few streams. The surface topography has little dissection and the natural drainage system is poorly developed. Much of the surface drainage has been constructed or modified to accommodate structures on base. Base run-off makes its way to Perdido Bay via a man made drainage ditch.

There are two perennial streams located within the bounds of OLF Saufley. Eight Mile Creek merges with Eleven Mile Creek in the northwestern portion of the installation. Several small (less than 5 acres) freshwater impoundments, associated with the aforementioned stream system, exist in the northwest portion of the installation.

The majority of the site is flat with the exception of the existing impact berm and the soil stockpiles. The Site 3 Pistol Range lies in an area of topographic depression northwest of the airfield. This makes the site prone to standing water following severe precipitation events. Due to the topography of the area and the vegetative ground cover, the potential for erosion beyond the site is limited. The local terrain east of the Site 3 Pistol Range is flat; however, the terrain east of the site slopes upward to meet an unpaved access road and continues upward to the northwestern edge of the airfield. Surface runoff from this area would tend to meet and collect adjacent to the site.

2.3.2 Geology

The surficial geology in the area of the site typically consists of Pleistocene marine deposits made up of light brown to tan fine quartz sand with associated stringers and lenses of gravel and clay. Underlying these deposits, increasing with age, are the Citronelle Formation, the Miocene Coarse Clastics, the Pensacola Clay, the Tampa Formation, the Chickasawhay Limestone, the Bucatunna Clay member of the Byram Formation, the Ocala Group, the Lisbon equivalent, the Tallahatta Formation, and the Hatchetigbee Formation. The Pleistocene deposits and Citronelle formation are often impossible to

differentiate, and together range in thickness from approximately 30 feet to 800 feet across the county (NEESA, 1983).

2.3.3 Hydrology

Groundwater in Escambia County occurs in three major aquifers: a shallow surficial aquifer, which is artesian and non-artesian (the sand and gravel aquifer), and two deep artesian aquifers (the upper and lower limestone of the Floridan aquifer).

In the southern half of Escambia County (the location of OLF Saufley), the sand, and gravel aquifer and the upper limestone of the Floridan aquifer are separated by a thick section of relatively impermeable clay; however, in the northern half the sand and gravel aquifer and the upper limestone of the Floridan aquifer are in contact with one another. The upper limestone of the Floridan aquifer is separated from the lower limestone by a thick clay bed (Musgrove et. al., 1965).

Water levels in the shallow aquifer range from 27 feet (near the southeastern perimeter of the facility) to approximately 50 feet bgs. The groundwater flow is generally toward the Gulf of Mexico and the Escambia and Perdido Rivers; however, groundwater flow can vary locally due to the effect of topography or surface water bodies. Also, recharge of the shallow aquifer is predominantly from local precipitation (Trapp, 1973).

2.3.4 Soil and Vegetation Types

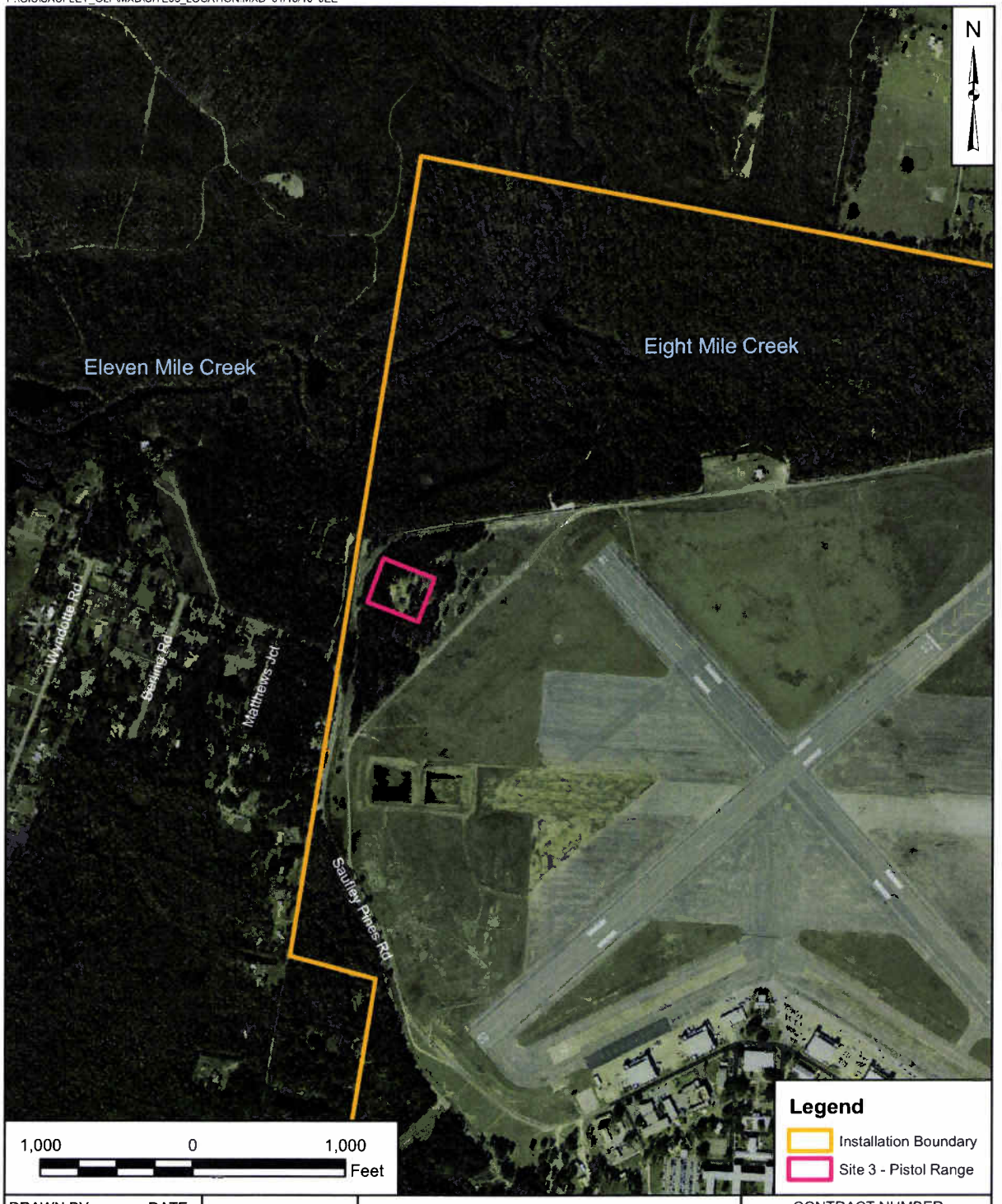
Soil at OLF Saufley is mostly of the Bonifay Series, which consists of very deep, well drained soils formed in sandy and loamy marine sediments (USDA, 2004). These types of soil occur on the summits, shoulder slopes, and side slopes in uplands. The soil mapping unit at Site 3 is the Bonifay Loamy Sand 0 to 5 percent slopes and occurs from 0 to 80 inches in undisturbed areas. Slopes are long and smooth. Typically the surface layer is loamy dark brown sand about 3 inches thick. The substratum is yellow to reddish brown silty clayey sand with varying amounts of each at a maximum thickness of 80 inches (USDA, 2004). The soil observed while collecting soil samples at Site 3 are comparable in texture and color of the description of the Bonifay Sand.

Vegetation in the site area consists of a mature stand of mixed deciduous trees and palms, with understory vegetation within the former footprint of the pistol range layout. Vegetation was removed to access certain sampling locations. However, only understory vegetation up to 3 inches in diameter was cut as part of the investigation to allow the field team to collect the necessary samples.

P:\GIS\SAUFLEY_OLF\MAPDOCS\MXD\SAUFLEY_OLF_LOCATION.MXD 11/19/09 TW

DRAWN BY T. WHEATON	DATE 11/19/09		CONTRACT NUMBER
CHECKED BY J. BOURGEOIS	DATE 11/19/09	FACILITY LOCATION MAP OLF SAUFLEY PENSACOLA, FLORIDA	APPROVED BY / DATE
REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		FIGURE NO. 2-1 / REV 0

P:\GIS\SAUFLEY_OLF\MXD\SITE03_LOCATION.MXD 01/15/10 JEE



DRAWN BY K. MOORE	DATE 01/28/09	SITE LOCATION OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 0116
CHECKED BY Y. MARTINEZ	DATE 01/15/10		APPROVED BY — DATE —
COST/SCHED AREA			APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. 2-2 REV 0

NAVFAC

P:\GIS\SAUFLEY_OLF\MAPDOCS\MXD\SITE03.MXD 01/15/09 JEE

DRAWN BY K. MOORE	DATE 07/15/08	NAVFAC	SITE LAYOUT SITE 3 - PISTOL RANGE OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 0116
CHECKED BY Y. MARTINEZ	DATE 01/15/10			APPROVED BY ___ DATE ___
COST/SCHED AREA				APPROVED BY ___ DATE ___
SCALE AS NOTED				FIGURE NO. 2-3 / REV 0

3.0 FIELD WORK DESIGN AND METHODS

This section describes the sampling design, collection methods, and documentation utilized during the SI field activities performed in October 2009 at the Site 3 Pistol Range at OLF Saufley, as described in the UFP-SAP (TtNUS, 2009).

3.1 OVERVIEW

The SI included collecting soil samples with a stainless steel hand auger at 23 locations. A total of 47 discrete samples were collected from depths of 0 to 0.5 foot bgs, 0.5 to 2 feet bgs, and 2 to 4 feet bgs. The 47 samples were analyzed in the field for lead via XRF. Twenty (20) of the soil samples (from 15 soil boring locations) were sent to an FBL and analyzed for select MC metals. Table 3-1 presents the sample locations, designations, and date collected. The soil boring locations are shown on Figure 3-1. One groundwater sample was collected from a temporary monitoring well and analyzed for lead at the FBL. Figure 3-1 shows the location of the monitoring well.

The SI field work was conducted in accordance with the procedures and methodologies described in the UFP-SAP (TtNUS, 2009). Standard Operating Procedures (SOPs) that governed the field work are included in Appendix A of the UFP-SAP. Sample log sheets, field documentation, site photographs, and other supporting information associated with the SI are provided in Appendices A and B of this SI Report.

3.2 PRELIMINARY ACTIVITIES

TtNUS personnel began mobilization activities on October 12, 2009, after submittal of the UFP-SAP for regulatory review on August 18, 2009. The field team reviewed the UFP-SAP, associated appendices, and Health and Safety Plan (HASP) prior to the start of project activities. In addition, the Field Operations Leader (FOL) held a field team orientation meeting to ensure that personnel were familiar with the scope of work for the field activities.

Utility clearance of the investigation area was completed prior to mobilization. The utility clearance indicated that buried utilities are not present within ¼ mile of the investigation area. Prior to collecting any environmental samples at the site, the FOL and field personnel arrived at the site and began on-site mobilization activities. Mobilization activities included verifying the receipt of all field equipment directly from vendors, each piece of equipment was checked to verify that it was in proper working condition. Additionally, to facilitate day to day communication between the field personnel and the Task Order

Manager (TOM), an electronic Toughbook® was used with previously uploaded sample collection information for the sampling event.

In support of the field activities, OLF Saufley maintenance crews conducted brush clearing activities to allow access to sample locations on and around the primary impact berm in June 2009. This included the removal of thick underbrush and the transfer of scrap piles of vegetation away from the investigation area.

3.3 SITE INVESTIGATION METHODS AND PROCEDURES

3.3.1 Sample Design

The SI sample design was determined during a Data Quality Objective (DQO) meeting conducted on November 4, 2008, and subsequent communications with stakeholders. The DQOs and sample design were formalized in the UFP-SAP submitted for regulatory review on August 18, 2009.

During the DQO discussions, it was determined that the site investigation would be limited to the evaluation of surface soil at the pistol range. However, to characterize the nature and extent of surface soil contamination by MC, areas at the pistol range that were thought to be contaminated and non-contaminated were sampled (i.e., the perimeter of the impacted area was established). The following items address the horizontal and vertical boundaries for the study:

1. The media of interest included the surface and subsurface soil within the range floor and the face of the impact berm that may have been contaminated directly by previous site operations or subsequent migration of MC contaminants.

2. The initial horizontal study boundary encompassed the area most likely to have been impacted by previous site activities (the berm face and range floor). Lateral expansion of the horizontal study boundary via XRF field screening was also conducted during this investigation. MC contaminant concentrations on both sides of the boundary are of interest.

3. The initial vertical study boundary was limited to 2 feet bgs because the CSM indicates that penetration of soil by MC is not generally expected to be deeper than 1 foot bgs. FDEP defines the surface soil interval as 0 to 2 feet bgs and requires data from two intervals including, the 0 to 0.5 foot and the 0.5 to 2 foot depth to characterize surface soil. Vertical expansion of the study boundary via XRF field screening was necessary during this investigation. The maximum depth samples were collected and XRF field screened was 4 feet bgs.

Based on the results of an SPLP analysis, which indicated the potential for lead to leach from the site soil, the water table was added as a vertical boundary. One shallow groundwater sample was collected from a temporary monitoring well at the site and analyzed for lead.

3.3.2 XRF Analysis

Soil samples undergoing XRF field screening analysis were processed and analyzed in the field in accordance with TtNUS SOP-07 (TtNUS, 2009). Prior to analyzing samples, the XRF instrument was standardized in accordance with the manufacturer's instructions, and three known lead concentrations (National Institute of Standards and Technology standards) were analyzed to verify the accuracy of the instrument and to assess the stability and consistency of the results.

Sample processing prior to field XRF analysis consisted of homogenizing each soil sample within a large Ziploc® bag, removing rocks and other debris through a sieve, placing the sample in a small aluminum pan, and drying the sample in an electric convection oven for approximately 10 to 15 minutes to eliminate clods and produce a fine uniform particle size. Each sample was then transferred to a smaller Ziploc® bag from which three separate XRF measurements were made, one from each end and one from the center of the sample Ziploc® bag. The average of the three sample readings was used as the final XRF lead concentration.

During sample collection activities, the soil material was visually inspected in the field for the presence of bullets or bullet fragments. The soil material was again visually monitored in the field laboratory during processing for XRF analysis. Bullets or bullet fragments were not observed in any of the sample material at the Site 3 Pistol Range. However, bullet fragments were observed on the ground surface in the central portion of the site near grids F6 and G6, as shown on Figure 3-1.

3.3.3 Sample Logging

Soil sample log sheets and groundwater log sheets maintained for the samples collected during this SI are included in Appendix A and contain the following information, as appropriate for each sample:

- Sample location and sample ID
- Name of person(s) collecting the sample
- Sample collection method

- Sample depth, date, and time
- Brief soil description

3.4 SAMPLING OPERATIONS

A total of 47 discrete surface and subsurface soil samples were collected from 23 locations at the Site 3 - Pistol Range (Figure 3-1). Two intervals of interest were collected from each soil boring location (0 to 0.5 foot and 0.5 to 2 feet bgs). Soil samples were collected at each grid location in accordance with SOP 05 and SOP-06 (TtNUS, 2009). A clean decontaminated stainless steel hand auger was used to conduct each soil boring and collect a soil sample from each sample interval. Each soil sample was placed in a Ziploc® bag and thoroughly homogenized.

Each soil sample was analyzed in the field via XRF using the sample preparation process discussed in Section 3.3.2. The average XRF lead concentration for each of these samples was used as the basis for determining if additional sampling was required in the area adjacent to that sample. Any discrete sample location on the sample grid perimeter with an average XRF lead concentration greater than the UFP-SAP Project Action Limit (PAL) of 200 mg/kg was selected for "step-out" sampling of both surface soil intervals. "Step-out" samples were collected at two locations.

In addition, one soil sample (Sample PRSP01-0/0.5) from the 0 to 0.5 foot bgs interval was collected from the soil stockpiles adjacent to the site to assess whether the soil contains any of the target MCs. Site photographs of field activities are provided in Appendix B.

Twenty surface soil samples and one duplicate, representing a range of XRF-measured lead concentrations were sent to the FBL for analysis of antimony, arsenic, copper, lead, tin, and zinc. The FBL analytical results serve two functions, (1) to determine if MC constituents in surface soil exceed their SCTLs under Chapter 62-777, FAC as specified in the UFP-SAP (TtNUS, 2009), and (2) to confirm the correlation with the observed XRF data.

It should be noted that although the laboratory subcontract and documentation specified only analysis for antimony, arsenic, copper, lead, tin, and zinc, the laboratory also reported analysis for mercury and silver. The analytical results for the original and additional parameters are included in the data summary tables and Appendix C.

The soil sample from the 0.5 to 2.0 feet bgs interval (PRSBC5-05/2.0) with the highest lead concentration, as measured via XRF, was selected for SPLP analysis of MC metals including: antimony, arsenic, copper, lead, tin, and zinc and the two additional metals mercury and silver.

One sample (PRSBC7-0/0.5) was also selected for acidity/alkalinity (pH), total organic carbon (TOC), and cation exchange capacity (CEC) analysis in an area determined to not be impacted by targeted MCs based on field XRF analysis, and to provide data for further evaluation for the potential impact to groundwater.

Additionally, to further evaluate the site conditions based on the results of the SPLP analysis, one shallow groundwater sample was collected from a temporary monitoring well installed in the middle of the berm at sample location PRSBE5 to a depth of approximately 18.15 feet bgs by the Navy. A monitoring well construction log is provided in Appendix A.

The monitoring well was purged using a peristaltic pump until the water quality parameters were stable over consecutive readings, in accordance with the FDEP SOP DEP SOP 001/01. Temperature, pH, specific conductance, dissolved oxygen concentration, and turbidity were recorded while the well was purged. The groundwater sample log sheet is provided in Appendix A. The groundwater laboratory analytical report is provided in Appendix C.

3.5 FIELD SAMPLE DOCUMENTATION

Sample documentation consisted of the completion of sample log sheets, chain-of-custody records, field logbook, and health and safety documentation. Field documentation was completed in accordance with TtNUS SOP-SA-6.3 (TtNUS, 2009). The sample log sheets contain information such as sample location and sample identification number, container requirements, analyses to be performed, and sample type, time, and date. Any unusual circumstances encountered during sample collection were noted on the form. Chain-of-custody forms were used to track each sample from collection to receipt and analysis to the FBL. Field log sheets and field forms are included in Appendix A of this document. Electronic versions of forms were completed with data gathered in the field and periodically updated for the TOM to have current field screening data for decision making.

3.6 SAMPLE HANDLING, PACKAGING, AND SHIPPING

Sample handling activities included field-related considerations concerning allowable holding times, sample custody, and maintaining samples at the appropriate storage temperature. All sample containers

shipped to the FBL were sealed in plastic Ziploc® bags to minimize the possibility of breakage during transport. The sample containers were then placed in a cooler lined with a large plastic garbage bag and covered with ice. A temperature blank was placed in the cooler prior to shipment. The plastic garbage bag was sealed, and the chain-of-custody form was sealed in a Ziploc® bag and taped to the inside of the cooler lid. A signed and dated custody seal was applied to each end of the cooler and then covered with strapping tape to provide a tamper-evident seal. A FedEx® air bill was applied to the shipping cooler. TtNUS maintained custody of the samples until they were relinquished to FedEx®. The FedEx® tracking number (air bill number) was recorded on the chain-of-custody form, and the sender's copy of the air bill was maintained for shipment tracking, if needed. The samples were shipped to the FBL for overnight delivery and were received within sample holding times.

3.7 QUALITY CONTROL SAMPLES

Quality assurance (QA)/quality control (QC) samples were generated and collected during sampling activities to monitor both field and laboratory procedures, in accordance with the UFP-SAP (TtNUS,2009). QA/QC samples included field duplicates and temperature blanks. Field duplicate results are tabulated in Appendix C of this document. Types of QA/QC samples are briefly described as follows:

- Field Duplicates - consisted of a single sample split into two portions. Field duplicates were collected at the rate of 1 in 20 during this field investigation to assess the overall precision of the sampling and analysis program. The field duplicate sample for this investigation was designated FD10130901 for sample PRSBG5-0.5/2.0.

- Temperature blanks - used to determine if samples were adequately cooled during shipment. Temperature blanks consisted of analyte-free water supplied by the FBL. One temperature blank was submitted to the laboratory in each cooler, and the temperature was checked upon receipt at the laboratory.

3.8 SAMPLE GRID AND LOCATIONS

The soil sample locations were established and selected by using a Geographic Information System (GIS) to place a grid on a georeferenced aerial photograph (Figure 3-1) that represents the areas most likely impacted by the types of weapons presumably used at the Site 3 Pistol Range. The sample grid and location coordinates were obtained from the georeferenced photograph and transferred electronically to a Trimble XT (sub-meter) Global Positioning System (GPS) unit. Each sample location was acquired in the field using the Trimble XT GPS unit. Each sample location at the Site 3 Pistol Range was initially

marked with a brightly colored pin flag pushed into the ground adjacent to the proposed boring location. Following sample collection, each location was subsequently marked with a wooden stake. The four corners of the sample grid, which were also acquired in the field using the Trimble XT GPS unit, were also marked with a 5-foot long, Schedule-40 polyvinyl chloride (PVC) pipe. The actual northing and easting coordinates for each sample location that were logged by TtNUS personnel utilizing the GPS unit is retained in the TtNUS main database and can be used as a reference if additional sampling and/or remediation is required.

3.9 DECONTAMINATION PROCEDURES

Non-dedicated, non-disposable equipment (e.g. hand augers) involved in field sampling activities were decontaminated before beginning work, between sample locations, and at the completion of field activities in accordance with TtNUS SOP-SA-7.1.

The following decontamination steps were taken:

- Potable water and phosphate-free detergent wash (scrub if necessary)
- Potable water rinse
- Deionized (DI) water rinse
- Air dry (if possible)
- Wrap in aluminum foil (if not used immediately)

3.10 INVESTIGATION-DERIVED WASTE HANDLING

Investigation derived waste (IDW) consisted of decontamination fluids, temporary well purge fluids, pin flags, paper towels, and personnel protective equipment (PPE). All PPE was double bagged and placed in OLF Saufley trash receptacles (i.e. dumpsters).

Soil removed from a sample location that was not used as part of samples sent to the FBL was returned to its original boring.

Equipment decontamination fluids and purge water fluids were containerized by TtNUS in a single 55-gallon drum that was labeled, sealed, and temporarily stored on site. The drum containing IDW will be appropriately disposed of as per Navy instructions.

3.11 SITE MANAGEMENT AND FACILITY SUPPORT

The FOL was designated as the lead in coordinating all day-to-day activities during the investigation. The FOL was responsible for ensuring the field team members were familiar with the UFP-SAP and HASP during this investigation. Additionally, the FOL was responsible for all sampling operations, QA/QC, field documentation requirements, and field change orders. The FOL reported to the TOM on a daily basis regarding the status of fieldwork.

3.12 RECORD KEEPING

SI records including daily activity logs, sample log sheets, and chain-of-custody forms were completed in accordance with TtNUS SOP-SA-6.3. Information recorded daily included field activities, weather conditions, identity and arrival/departure times of personnel, management issues, etc. Copies of daily activity records are included in Appendix A.

TABLE 3-1

SOIL SAMPLE SUMMARY
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

SAMPLE DATE	SOIL BORING LOCATION	SAMPLE DESIGNATION	FIELD GRID COORDINATES		SAMPLE DEPTH (ft bgs)	FIXED-BASED LABORATORY ANALYSIS
10/13/09	PRSBC4	PRSBC4-0/0.5	C	4	0 - 0.5	No
10/13/09		PRSBC4-0.5/2.0	C	4	0.5 - 2.0	No
10/13/09	PRSBC5	PRSBC5-0/0.5	C	5	0 - 0.5	Yes
10/13/09		PRSBC5-0.5/2.0	C	5	0.5 - 2.0	Yes
10/14/09		PRSBC5-2.0/4.0	C	5	2.0 - 4.0	No
10/13/09	PRSBC6	PRSBC6-0/0.5	C	6	0 - 0.5	Yes
10/13/09		PRSBC6-0.5/2.0	C	6	0.5 - 2.0	No
10/13/09	PRSBC7	PRSBC7-0/0.5	C	7	0 - 0.5	Yes
10/13/09		PRSBC7-0.5/2.0	C	7	0.5 - 2.0	No
10/13/09	PRSBD4	PRSBD4-0/0.5	D	4	0 - 0.5	No
10/13/09		PRSBD4-0.5/2.0	D	4	0.5 - 2.0	No
10/13/09	PRSBD5	PRSBD5-0/0.5	D	5	0 - 0.5	No
10/13/09		PRSBD5-0.5/2.0	D	5	0.5 - 2.0	Yes
10/13/09	PRSBD6	PRSBD6-0/0.5	D	6	0 - 0.5	No
10/13/09		PRSBD6-0.5/2.0	D	6	0.5 - 2.0	No
10/13/09	PRSBD7	PRSBD7-0/0.5	D	7	0 - 0.5	No
10/13/09		PRSBD7-0.5/2.0	D	7	0.5 - 2.0	No
10/13/09	PRSBE4	PRSBE4-0/0.5	E	4	0 - 0.5	No
10/13/09		PRSBE4-0.5/2.0	E	4	0.5 - 2.0	No
10/13/09	PRSBE5	PRSBE5-0/0.5	E	5	0 - 0.5	Yes
10/13/09		PRSBE5-0.5/2.0	E	5	0.5 - 2.0	Yes
10/13/09	PRSBE6	PRSBE6-0/0.5	E	6	0 - 0.5	Yes
10/13/09		PRSBE6-0.5/2.0	E	6	0.5 - 2.0	No
10/13/09	PRSBE7	PRSBE7-0/0.5	E	7	0 - 0.5	Yes
10/13/09		PRSBE7-0.5/2.0	E	7	0.5 - 2.0	No
10/13/09	PRSBF4	PRSBF4-0/0.5	F	4	0 - 0.5	No
10/13/09		PRSBF4-0.5/2.0	F	4	0.5 - 2.0	No
10/13/09	PRSBF5	PRSBF5-0/0.5	F	5	0 - 0.5	Yes
10/13/09		PRSBF5-0.5/2.0	F	5	0.5 - 2.0	Yes
10/14/09		PRSBF5-2.0/4.0	F	5	2.0 - 4.0	No
10/13/09	PRSBF6	PRSBF6-0/0.5	F	6	0 - 0.5	Yes
10/13/09		PRSBF6-0.5/2.0	F	6	0.5 - 2.0	Yes
10/13/09	PRSBF7	PRSBF7-0/0.5	F	7	0 - 0.5	Yes
10/13/09		PRSBF7-0.5/2.0	F	7	0.5 - 2.0	No
10/13/09	PRSBG4	PRSBG4-0/0.5	G	4	0 - 0.5	Yes
10/13/09		PRSBG4-0.5/2.0	G	4	0.5 - 2.0	No
10/13/09	PRSBG5	PRSBG5-0/0.5	G	5	0 - 0.5	Yes

TABLE 3-1

SOIL SAMPLE SUMMARY
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

SAMPLE DATE	SOIL BORING LOCATION	SAMPLE DESIGNATION	FIELD GRID COORDINATES		SAMPLE DEPTH (ft bgs)	FIXED-BASED LABORATORY ANALYSIS
10/13/09		PRSBG5-0.5/2.0	G	5	0.5 - 2.0	Yes
10/13/09	PRSBG6	PRSBG6-0/0.5	G	6	0 - 0.5	No
10/13/09		PRSBG6-0.5/2.0	G	6	0.5 - 2.0	No
10/13/09	PRSBG7	PRSBG7-0/0.5	G	7	0 - 0.5	Yes
10/13/09		PRSBG7-0.5/2.0	G	7	0.5 - 2.0	No
10/14/09	PRSBB[1]5 (Step out)	PRSBB5-0/0.5	b'	5	0 - 0.5	Yes
10/14/09		PRSBB5-0.5/2.0	b'	5	0.5 - 2.0	No
10/14/09	PRSBG[1]5 (Step out)	PRSBH5-0/0.5	g'	5	0 - 0.5	Yes
10/14/09		PRSBH5-0.5/2.0	g'	5	0.5 - 2.0	No
10/13/09	PRSP01 (Soil stock pile)	PRSP01-0/0.5	NA	NA	0 - 0.5	No

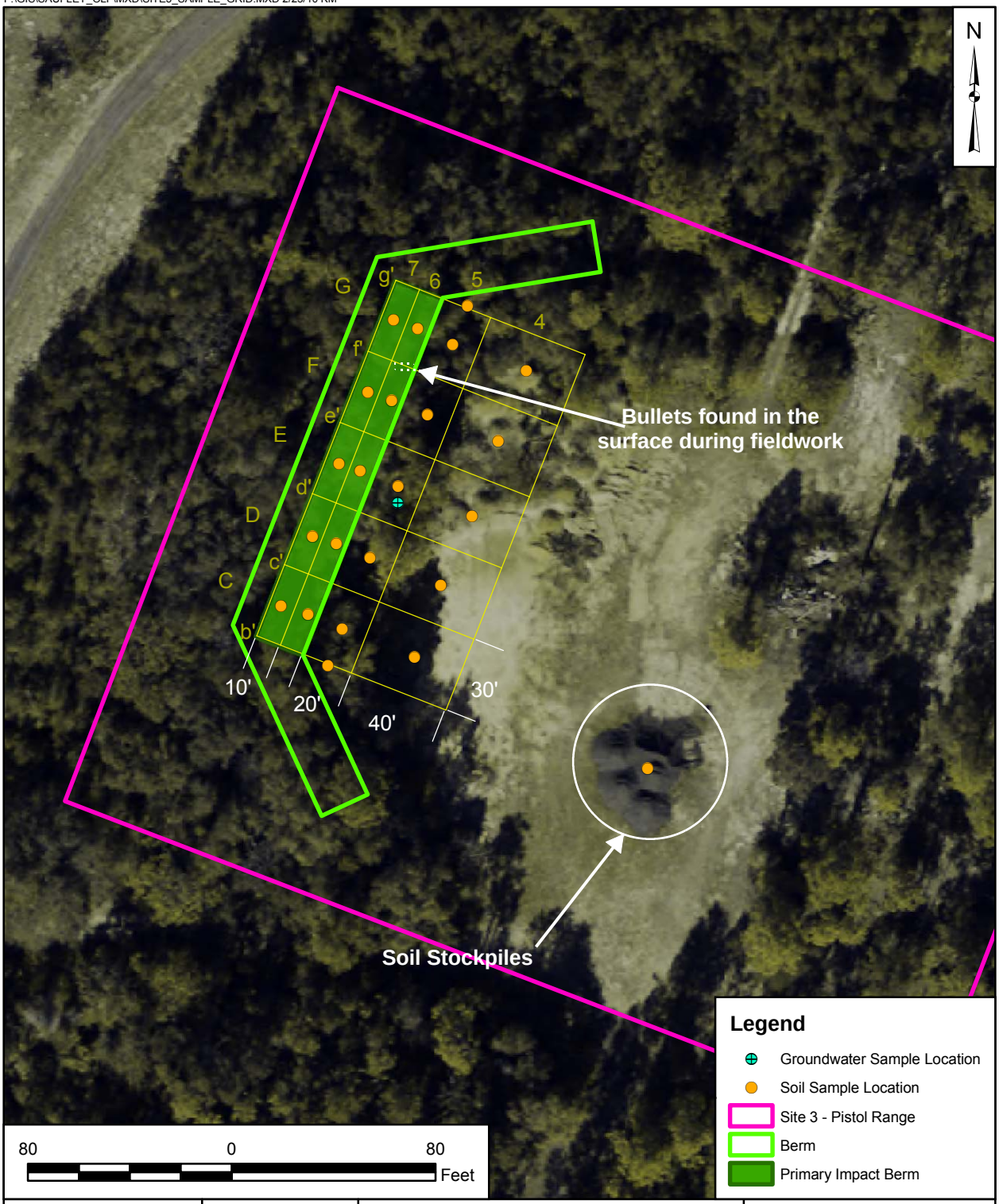
Notes:

All samples were analyzed for lead using a field X-ray Fluorescence (XRF) instrument. The results of the XRF field analysis were also used to select samples to be analyzed for MC specific metals at a fixed-based laboratory.

ft bgs = Feet below ground surface.

NA – Not applicable.

P:\GIS\SAUFLEY_OLF\MXD\SITE3_SAMPLE_GRID.MXD 2/23/10 KM



DRAWN BY K. MOORE	DATE 01/28/09	SOIL SAMPLE LOCATIONS SITE 3 - PISTOL RANGE OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER
CHECKED BY M. BROCK	DATE 2/23/10		APPROVED BY ___ DATE ___
COST/SCHED AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. 3-1 REV 0

4.0 RESULTS

This section summarizes the field activities that were performed as based on the sampling design, environmental sample collection methods, and field documentation utilized during the SI field activities performed in October 2009 and February 2010 at the Site 3 Pistol Range at OLF Saufley.

4.1 MUNITIONS CONSTITUENT RESULTS

4.1.1 Field Work Summary

The soil sampling design consisted of sample locations spaced in a grid pattern on the face of the impact berm and along the range floor (Figure 3-1). To meet the FDEP requirements for characterization of surface soil, two soil samples were collected from each of the 20 predetermined locations identified in the sample grid. At each location, one sample was collected from 0 to 0.5 foot and one from 0.5 to 2.0 feet bgs. A total of 40 discrete surface soil samples were first collected from these two depths. One surface soil sample was collected from 0 to 0.5 foot bgs at the adjacent sand stockpiles.

Based on field XRF analysis, discrete sample locations with lead concentrations greater than 200 mg/kg were then subject to “step-out” sampling of both surface soil intervals. Six “step-out” samples were collected at four sample locations; four to delineate horizontally and two to delineate vertically, as a result of XRF analysis.

The Navy installed a temporary monitoring well to a depth of approximately 18.15 feet bgs in the shallow water table zone of the surficial aquifer. The monitoring well was co-located with soil sample location PRSBE5 at the approximate center of the impact berm. The temporary monitoring well was developed, purged, and sampled by Tetra Tech in accordance with FDEP SOP 001/01.

4.1.2 Comparisons to Screening Criteria

Surface soil analytical results obtained for lead by XRF and the MCs by FBL were compared to the FDEP SCTLs under Chapter 62-777, FAC as stipulated in the UFP-SAP (TtNUS, 2009). Additionally, one soil sample was analyzed by the SPLP for the targeted MC analytes and these results were compared to their FDEP GCTLs under Chapter 62-550, FAC and Chapter 62-777, FAC as stipulated in the UFP SAP (TtNUS, 2009). XRF and FBL results for lead are summarized in Table 4-1, and FBL analytical results are summarized in Table 4-2. Complete analytical results are presented in Appendix C.

4.1.3 Surface Soil

Initially, 40 surface soil samples were collected within the sampling grid at the site and underwent field screening for lead via XRF. Eight of the 40 initial surface soil samples had an average XRF lead concentration greater than the 200 mg/kg PAL (Table 4-1 and Figure 4-1). This included sample locations:

- PRSBC5 – 0/0.5 (616 mg/kg),
- PRSBC5 – 0.5/2.0 (461 mg/kg),
- PRSBE5 – 0/0.5 (562 mg/kg),
- PRSBE6 – 0/0.5 (247 mg/kg),
- PRSBF5 – 0/0.5 (477 mg/kg),
- PRSBF5 – 0.5/2.0 (244 mg/kg),
- PRSBF6 – 0/0.5 (543 mg/kg), and
- PRSBG5 – 0.5/2.0 (229 mg/kg) (Figure 4-1).

Soil samples with the highest lead concentrations were located near the area where the primary impact berm abuts the pistol range floor. The remaining 32 surface soil samples had XRF lead concentrations less than its 200 mg/kg PAL.

Four additional soil samples from two added locations (PRSBB15 and PRSBG15) were selected for "step-out" sampling, based on the XRF results from grid locations PRSBC5 and PRSBG5. Taking advantage of the electronic log book "Toughbook®" and data transmittal, the TOM and Navy Remedial Project Manager (RPM) were informed and consulted by the field team as to how to proceed. Sample locations PRSBB15 and PRSBG15 were "stepped-out" 15 feet perpendicular from PRSBC5 and PRSBG5 respectively. Surface soil samples were collected from both depth intervals at each of these two "step-out" locations. Lead was detected in the 0.0 to 0.5 foot bgs samples at 3 and 153 mg/kg, respectively, and in the 0.5 to 2.0 feet bgs samples at 0 and 64 mg/kg, respectively. The XRF results from the "step-out" locations were less than the 200 mg/kg PAL for lead.

Two additional soil samples from original soil boring grid locations PRSBC5 and PRSF5 were collected at a depth of 2.0 to 4.0 feet bgs. These two samples were collected because the XRF lead concentrations at 0.5 to 2.0 feet bgs exceeded the 200 mg/kg PAL. The XRF lead concentration at PRSBC5 at the 2.0- to 4.0-foot sample interval was 26 mg/kg. The XRF lead concentration at PRSBF5 at the 2.0- to 4.0 foot sample interval was 16 mg/kg. Based on these analytical results, both of the samples collected at the 2.0- to 4.0-foot sample interval contained lead at a concentration less than the 200 mg/kg PAL.

Twenty (20) of the 46 discrete surface soil samples, representing a range of XRF lead concentrations, were identified for select metals analysis at the FBL. Analytical results for 5 of the 20 surface soil samples analyzed at the FBL exceeded the FDEP Residential Direct Exposure SCTL for lead of 400 mg/kg. The samples with exceedances include:

- PRSBC5 – 0/0.5 [estimated ("J" qualifier) 478 mg/kg]
- PRSBC5 – 0.5/2.0 (405 mg/kg)
- PRSBE5 – 0/0.5 (504 mg/kg)
- PRSBF5 – 0/0.5 (462 mg/kg)
- PRSBF6 – 0/0.5 (estimated 558 mg/kg)

None of the soil samples analyzed by the FBL contained the targeted MC analytes at concentrations that exceed their FDEP Industrial SCTLs (Table 4-2). Figure 4-2 shows the regulatory exceedance by depth. As seen with the XRF data, the sample locations with the highest concentrations were located where the primary impact berm abuts the pistol range floor.

One of the 20 surface soil samples exceeded the FDEP Residential Direct Exposure SCTL for arsenic of 2.1 mg/kg. Sample PRSBD5 – 0.5/2.0 contained an arsenic concentration of 2.36 mg/kg, which is slightly greater than the Residential Direct Exposure criteria. None of the other targeted MC analytes exceeded their Residential Direct Exposure SCTLs in this sample.

Targeted MC analytes were not detected in any of the soil samples at a concentration that exceeded their FDEP Industrial Direct Exposure SCTLs.

Soil sample PSBC5-0.5/2.0, collected from the 0.5 to 2.0 foot interval, was selected for SPLP analysis. Sample PRSBC5 – 0.5/2.0 exhibited a field XRF result of 461 mg/kg and an FBL result of 405 mg/kg. The SPLP analysis indicated the extract contained antimony at 24.3 micrograms per liter (µg/L) and lead at 4,620 µg/L. Antimony was detected in the SPLP extract at a concentration that exceeds the FDEP GCTL of 6 µg/L. Lead was detected in the SPLP extract at a concentration that exceeds the FDEP GCTL of 15 µg/L. Based on the SPLP analytical results, antimony and lead have the potential to be leached from the site soils and adversely impact groundwater.

Additionally, 1 of the 20 samples collected from within the sample grid that exhibited little or no result from the XRF analysis was sent to the FBL for analysis of pH, TOC, and CEC. Sample PRSBC7 – 0/0.5 had

an XRF result of 12 mg/kg for lead and the FBL analytical result was 9.97 mg/kg. If necessary, this sample will be used to provide data that will aide further evaluation of the potential for sorption or desorption of the targeted MC analytes and their potential to adversely impact groundwater.
The results of the pH, TOC, and CEC analysis are provided in Section 4.4.

4.1.4 Soil Stockpiles

One soil sample was collected from the sand stockpiles adjacent to the site for XRF analysis. This sample was collected to assess whether the soil contains any of the target MCs being investigated at Site 3. The XRF screening result from the sand stockpile sample was 0 mg/kg (less than the field instrument detection limit).

4.1.5 Groundwater

Based on the results of the SPLP analysis and discussion by the Navy with FDEP personnel, a shallow temporary monitoring well was installed to approximately 18.15 feet bgs by the Navy in February 2010 at the site. The groundwater sample (SFDR-MWE5-0210) was collected from the temporary monitoring well following purging operations. The laboratory analytical results for the groundwater sample indicated that antimony and lead were below their method detection limits (MDLs) of 5.0 U and 1.50 U µg/L. The FDEP GCTLs for antimony and lead are 6 µg/L and 15 µg/L, respectively. Therefore, antimony and lead were not detected at concentrations that exceed their GCTLs. Even though the SPLP sample indicated a high potential for lead and antimony to have reached the groundwater at the site, the FBL results indicate this is not the case at this particular site. The high lead levels from both the XRF and the FBL appear to be associated with actual bullets/bullet fragments observed in the soil in depths from 0 to 2 feet bgs. However, no bullets/bullet fragments were observed at the site at depths greater than 2 feet bgs. Additionally, the XRF lead results from the soil samples collected at the 2 to 4 foot intervals were very low supporting the groundwater result that lead does not appear to be leaching through the soil.

4.2 DATA QUALITY REVIEW

This section describes the data review process used to determine whether laboratory analytical data were of acceptable technical quality for use in decision making. The review began with data validation, which is a comparison of data quality indicators (DQIs) to prescribed acceptance criteria. The DQIs used are measures to assess the bias and precision of the analytical calibrations and sample analyses. The output of this review was a set alphabetic flags such as “U”, “J”, “R”, or combinations thereof, which may have been assigned to individual results based on the validation effort. These flags were used to infer the

general quality of the data. Also evaluated were the measures of data completeness, sensitivity, comparability, and representativeness.

4.2.1 Date Validation Process

Full data validation was conducted to evaluate false positives including evaluations of data completeness, holding time compliance, calibrations, field QC and laboratory-generated blanks, field duplicate precision, and detection limits for the data collected during the SI. Assignment of data qualification flags conformed to United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review (1999) to the greatest extent practicable for non-Contract Laboratory Program Data. Data validation specifications require that various data qualifiers be assigned when a deficiency is detected or when a result is less than its detection limit. If no qualifier is assigned to a result that has been validated, the data user is assured that technical deficiencies were not identified during validation. The qualification flags are defined as follows:

- "U" – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

- "J" – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

- "UR" – Indicates that the chemical may or may not be present. The non-detected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (e.g. holding time missed by a factor of two times the specified time limit, severe calibration non-compliance, and extremely low analyte recovery).

- "R" – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data and qualification with "UR" or "R" qualifiers. These data are considered invalid and are not used for decision-making purposes unless they

are used in a qualitative way and the use is justified and documented. Minor problems are defined as issues resulting in the estimation of data and qualification with "U", "J", and "UJ" qualifiers. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use. A "U" qualifier does not necessarily indicate that a data deficiency exists because all non-detect values are flagged with the "U" qualifier regardless of whether a quality deficiency has been detected. No data from the Site 3 Pistol Range were rejected or considered unusable.

4.2.2 Data Validation Outputs

After data were validated, a list was developed of non-conformities requiring data qualifier flags used to alert the data user to inaccurate or imprecise data. The reviewer then prepared a technical memorandum presenting qualification of the data, if necessary, and the rationale for making such qualifications (see Appendix C). The net result was a data package that had been carefully reviewed for its adherence to prescribed technical requirements. Pertinent quality estimates are summarized in a more quantitative format in the following section.

4.2.2.1 Data Quality Review

DQIs are parameters monitored to help establish the quality of data generated during an investigation. Some of the DQIs are generated from analysis of field samples (e.g. field duplicates) and some are generated from the analysis of laboratory samples (e.g. laboratory duplicates). Individually, field and laboratory DQIs provide measures of the performance of the respective investigative operations (field or laboratory). During data validation, individual QC results were evaluated. If individual QC results were acceptable, no validation flag was assigned to an analytical result; otherwise, a flag indicating the type of QC deficiency was assigned to the result. All QC criteria were met for all samples for all parameters at the Site 3 Pistol Range.

4.2.2.2 Completeness

Completeness is a measure of the number of valid samples or measurements that are available relative to the number of samples or measurements that were intended to be generated. For this project, completeness was measured on two different basis:

- Samples collected – measure of the usable samples collected compared to those intended to be collected.

- Laboratory measurements – measure of the amount of usable valid laboratory measurements per matrix for each target analyte.

Usable valid samples (or results) were those judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or additional data review. Completeness was determined using the following equation:

$$\%C = V / T \times 100$$

where %C = percent completeness
V = number of samples (or results) determined to be valid
T = total number of planned samples (or results)

All samples proposed for collection at the Site 3 Pistol Range were collected (100 percent completeness), and the Site 3 Pistol Range percent completeness for laboratory measurements was 100 percent.

4.2.2.3 Sensitivity

Detection limits for all Site 3 Pistol Range analytical parameters were less than their screening levels which included FDEP SCTLs and GCTLs.

4.2.2.4 Accuracy

Accuracy requirements for field measurements are typically ensured through control over sample collection and handling and through routine instrument calibration. Field accuracies were monitored through the use of blanks to detect cross-contamination and by monitoring adherence to procedures that prevent sample contamination or degradation. One equipment rinsate blank was collected during the SI to assess cross-contamination via sample collection equipment. The blank was obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and before use. The rinsate blank was analyzed for the same chemical constituents as the associated environmental samples.

Accuracy in the laboratory was measured through the comparison of a spiked sample or laboratory control sample (LCS) result to a known or calculated value and was expressed as a percent recovery (%R). It was also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods. LCSs were used to assess the accuracy of laboratory operations with minimal sample matrix effects. Matrix spike (MS) and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCS and MS analyses were performed at a frequency of 1 per 20 associated samples of like matrix. Laboratory accuracy was assessed by comparing calculated %R values to accuracy control limits specified by the laboratory using SW-846 Methods.

Percent recovery is calculated using the following equation:

$$\%R = (Ss - So) / S \times 100$$

where %R = percent recovery
Ss = result of spiked sample
So = result of non-spiked sample
S = concentration of spiked amount

All matrix spiked duplicate (MSD), LCS duplicate (LCSD), and surrogate recoveries met accuracy limits as specified by the laboratory.

4.2.2.5 Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions. Precision for chemical parameters is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the difference to the mean for the two values being evaluated. RPDs, typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = (V1 - V2) / [(V1 + V2) / 2] \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

The precision estimates obtained from duplicate field samples encompasses the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, sub-sampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

All field duplicate, LCS/LCSD, and MS/MSD RPDs met QC limits.

4.2.2.6 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g. among sampling points and among sampling events). Comparability was achieved by using standardization sampling and analysis methods and the standardization data reporting formats. Comparability of field data was ensured by following the SI SAP (TtNUS, 2009). Comparability of laboratory measurements was achieved primarily through the use and documentation of standard sampling and analytical methods. Results were reported in units that ensured comparability with previous data and with current state and federal standards and guidelines. Comparability of laboratory measurements was assessed primarily through the use of QC samples and through adherence to the laboratory's QA plans.

4.2.2.7 Representativeness

Representativeness is an expression of the degree to which data accurately and precisely depict the actual characteristics of a population or environmental condition existing at the site. The SI UFP-SAP (TtNUS, 2009) and the use of standardized sampling, sample handling, sample analysis, and data reporting procedures were designed so that the final data would accurately represent actual site conditions. It is believed that all reported data are adequately representative of site conditions.

4.3 CORRELATION BETWEEN XRF AND FIXED-BASE LABORATORY

For the samples that were analyzed in the field using XRF and also at the FBL, a regression analysis was conducted to evaluate the correlation between the FBL lead results and the XRF results. To evaluate the regression analysis, the Pearson Correlation and the R-squared value were calculated. The Pearson Correlation is a measure of the strength of the linear relationship between two or more variables with a range of -1 to +1. The value of -1 represents a perfect negative correlation (as one variable decreases the other increases proportionally); whereas, a value of +1 represents a perfect positive correlation (as

one variable increases the other increases proportionally). A value of 0 represents a lack of correlation. The data gathered during this sampling event for Site 3 had a correlation of 0.98.

This excellent correlation indicates that the regression equation describing the relation between the co-located XRF and FBL data can be used to derive predicted FBL lead concentrations for the XRF samples. These predicted concentrations are presented in Table 4-1. The regression analysis is included in Appendix D.

4.4 ADDITIONAL FIELD PARAMETERS (PH, TOC, AND CEC)

As mentioned in Section 4.1.3, one soil sample was analyzed for pH, TOC, and CEC; the results of these analyses are discussed below.

4.4.1 pH

Soils support a number of inorganic and organic chemical reactions. Many of these reactions are dependent on some particular soil chemical properties. One of the most important chemical properties influencing reactions in a soil is potential hydrogen or pH. Soil pH is primarily controlled by the concentration of free hydrogen ions in the soil matrix. Soils with a relatively large concentration of hydrogen ions tend to be acidic. Site 3 pH was determined to be 4.43 (see Appendix C).

4.4.2 Total Organic Carbon

TOC is the amount of carbon bound in an organic compound and is often used as a non-specific indicator of sorption. The higher the organic carbon content, the more organic and inorganic chemicals/elements may be adsorbed to the soil and the less those chemicals will be available to leach to groundwater. TOC is a highly sensitive, non-specific measurement of all organics present in a sample. TOC was reported as 5,560 mg/kg (Appendix C).

4.4.3 Cation-Exchange Capacity

CEC is defined as the degree to which a soil can adsorb and exchange cations. Soil particles and organic matter have negative charges on their surfaces. Any element with a positive charge is called a cation and in this case, it refers to the basic cations, calcium (Ca+2), magnesium (Mg+2), potassium (K+1) and sodium (Na+1) and the acidic cations, hydrogen (H+1) and aluminum (Al+3). The amount of these positively charged cations a soil can hold is described as the CEC and is expressed in milliequivalents per 100 grams (MEQ/100) of soil. The larger this number, the more cations the soil can

hold. A clay soil will have a larger CEC than a sandy soil. Also, the CEC of most soils increases with an increase in soil pH. CEC is highly dependent upon soil texture and organic matter content. The CEC for Site 3 was 1.49 MEQ)/100 (Appendix C). In A typical CEC for a soil in the Coastal Plains region is about 2.0 MEQ/100 of soil.

4.5 MC DATA SUMMARY

The residential direct exposure SCTL for lead is based on OSWER Directive #9355.4–12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA, 1994a). The guidance level for lead in soils described in this directive was calculated with the USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (USEPA, 1994b). Research indicates that young children are particularly sensitive to the effects of lead and require specific attention in the development of an SCTL for lead. Thus, an SCTL that is protective for young children is expected to be protective for older persons as well. The 400 mg/kg guidance level for lead in residential soils cited in the 1994 OSWER directive was calculated such that a hypothetical child would have no more than 5% risk of exceeding 10 µg/dL blood lead concentration. This target blood lead level is based on research conducted by the Centers for Disease Control and by the USEPA that associates blood lead levels exceeding 10 µg/dL with health effects in children.

The soil lead concentration entered into the IEUBK model should be the arithmetic mean, based on IEUBK User's Guide (section 2.2.4): "The TRW recommends that the soil contribution to dust lead be evaluated by comparing the average or arithmetic mean of soil lead concentrations from a representative area in the child's yard". Accordingly, comparison of the arithmetic mean soil lead concentration to the residential SCTL would be appropriate for determining a need for additional investigation or action.

Twenty-one soil samples were collected from the 0 to 0.5 foot bls interval. Seven soil samples were analyzed by XRF only and 14 soil samples were analyzed by both XRF and the FBL. The combined XRF and FBL analytical results had 21 positive detections for lead which ranged from 3 to 558 milligrams per kilogram (mg/kg). One of the soil samples analyzed by XRF was not reported to contain a lead concentration above the XRF detection limit of 10 mg/kg in any of the three sample aliquots.

The average lead concentrations for samples collected from the 0 to 0.5 foot bls, solely using the FBL concentrations and the combined FBL analyses and predicted FBL concentrations, were less than the FDEP Residential Direct Exposure Soil Cleanup Target Level (SCTL) of 400 mg/kg for lead (Table 4-3).

Twenty-two soil samples were collected from the 0.5 to 2.0 foot bls interval. Sixteen soil samples were analyzed by XRF only and six were analyzed by XRF and fixed-base laboratory. The combined XRF and FBL analytical results indicated 20 positive detections for lead which ranged from 6 to 405 mg/kg. Two of the soil samples analyzed by XRF were not reported to contain a lead concentration above the XRF detection limit of 10 mg/kg in any of the three sample aliquots. The average lead concentration, solely using the FBL results, was less than the residential SCTL; however, only six soil samples for this sample depth interval were analyzed. The average lead concentration using the combined FBL analyses and the predicted FBL concentrations was also less than the residential SCTL (Table 4-3).

Arsenic was the only other MC detected in soil at a concentration greater than its residential SCTL. However, when evaluating potential risk, the exposure concentration is typically represented by the 95 percent upper confidence limit (UCL) of the mean. For arsenic, the UCL arsenic concentration for the site was less than the residential SCTL (Table 4-3).

TABLE 4-1

FIELD XRF AND FIXED-BASE LABORATORY LEAD CONCENTRATIONS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

			XRF READINGS - Lead (mg/kg)				
SAMPLE DATE	**SAMPLE LOCATION**	**SAMPLE ID**	**1st**	**2nd**	**3rd**	**AVG**	**Fixed-Base Laboratory (mg/kg)**
10/13/2009	PRSBC4	PRSBC4-0/0.5	ND	ND	ND	0	---
10/13/2009		PRSBC4-0.5/2.0	36	28	39	34	---
10/13/2009	PRSBC5	PRSBC5-0/0.5	**584**	**736**	**529**	**616**	**478 J**
10/13/2009		PRSBC5-0.5/2.0	**464**	**361**	**557**	**461**	**405**
10/14/2009		PRSBC5-2.0/4.0	27	24	27	26	---
10/13/2009	PRSBC6	PRSBC6-0/0.5	146	146	146	146	166
10/13/2009		PRSBC6-0.5/2.0	22	20	36	26	---
10/13/2009	PRSBC7	PRSBC7-0/0.5	8	12	16	12	9.97
10/13/2009		PRSBC7-0.5/2.0	9	ND	8	6	---
10/13/2009	PRSBD4	PRSBD4-0/0.5	ND	ND	ND	0	---
10/13/2009		PRSBD4-0.5/2.0	ND	ND	ND	0	---
10/13/2009	PRSBD5	PRSBD5-0/0.5	ND	ND	8	3	---
10/13/2009		PRSBD5-0.5/2.0	107	117	103	109	104
10/13/2009	PRSBD6	PRSBD6-0/0.5	28	41	33	34	---
10/13/2009		PRSBD6-0.5/2.0	17	14	15	15	---
10/13/2009	PRSBD7	PRSBD7-0/0.5	26	30	41	32	---
10/13/2009		PRSBD7-0.5/2.0	41	31	45	39	---
10/13/2009	PRSBE4	PRSBE4-0/0.5	15	13	13	14	---
10/13/2009		PRSBE4-0.5/2.0	16	15	20	17	---
10/13/2009	PRSBE5	PRSBE5-0/0.5	**547**	**586**	**552**	**562**	**504**
10/13/2009		PRSBE5-0.5/2.0	149	156	149	151	131
10/13/2009	PRSBE6	PRSBE6-0/0.5	**232**	**265**	**245**	**247**	250
10/13/2009		PRSBE6-0.5/2.0	36	36	46	39	---
10/13/2009	PRSBE7	PRSBE7-0/0.5	123	114	124	120	120
10/13/2009		PRSBE7-0.5/2.0	43	15	12	23	---
10/13/2009	PRSBF4	PRSBF4-0/0.5	11	ND	ND	4	---
10/13/2009		PRSBF4-0.5/2.0	41	52	40	44	---
10/13/2009	PRSBF5	PRSBF5-0/0.5	**462**	**484**	**485**	**477**	**462**
10/13/2009		PRSBF5-0.5/2.0	**343**	**190**	**198**	**244**	221
10/14/2009		PRSBF5-2.0/4.0	12	19	18	16	---
10/13/2009	PRSBF6	PRSBF6-0/0.5	**581**	**521**	**527**	**543**	**558 J**
10/13/2009		PRSBF6-0.5/2.0	198	175	176	183	209
10/13/2009	PRSBF7	PRSBF7-0/0.5	114	101	112	109	93.9
10/13/2009		PRSBF7-0.5/2.0	ND	13	9	7	---
10/13/2009	PRSBG4	PRSBG4-0/0.5	20	20	13	18	16.9
10/13/2009		PRSBG4-0.5/2.0	45	14	30	30	---

TABLE 4-1

FIELD XRF AND FIXED-BASE LABORATORY LEAD CONCENTRATIONS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

			XRF READINGS - Lead (mg/kg)				
SAMPLE DATE	**SAMPLE LOCATION**	**SAMPLE ID**	**1st**	**2nd**	**3rd**	**AVG**	**Fixed-Base Laboratory (mg/kg)**
10/13/2009	PRSBG5	PRSBG5-0/0.5	122	69	88	93	58.7
10/13/2009		PRSBG5-0.5/2.0	**241**	**210**	**235**	**229**	284
10/13/2009	PRSBG6	PRSBG6-0/0.5	63	92	64	73	---
10/13/2009		PRSBG6-0.5/2.0	12	14	12	13	---
10/13/2009	PRSBG7	PRSBG7-0/0.5	28	17	26	24	22.2
10/13/2009		PRSBG7-0.5/2.0	14	9	8	10	---
10/14/2009	PRSBB'5 (Step out location)	PRSBB5-0/0.5	143	145	172	153	194
10/14/2009		PRSBB5-0.5/2.0	62	70	60	64	---
10/14/2009	PRSBG'5 (Step out location)	PRSBH5-0/0.5	ND	ND	10	3	4.70
10/14/2009		PRSBH5-0.5/2.0	ND	ND	ND	0	---
10/13/2009	PRSP01 (Soil stock pile)	PRSP01-0/0.5	ND	ND	ND	0	---

Notes:
XRF = X-ray Fluorescence
AVG = average
mg/kg = milligrams per kilogram
J = analyte was detected at a concentration between its method detection limit and practical quantitation limit.
Bold text indicates an an exceedance either of the field screening lead concentration of 200 mg/kg or an an exceedance of FDEP Residential Direct Exposure SCTL for FBL samples.

"---" indicates sample was not sent to fixed-base laboratory.
ND = Not Detected by the XRF

TABLE 4-2

SUMMARY OF ANALYTICAL RESULTS FOR SOILS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Sample designation	SCTL Residential	SCTL Industrial	SCTL Leachability to Groundwater	PRSBC5-0/0.5	PRSBC5-0.5/2.0	PRSBC6-0/0.5	PRSBC7-0/0.5
Sample location and depth				PRSBC5 0 - 0.5' bgs	PRSBC5 0.5 - 2' bgs	PRSBC6 0 - 0.5' bgs	PRSBC7 0 - 0.5' bgs
Sample Date				10/13/2009	10/13/2009	10/13/2009	10/13/2009
Inorganics (mg/kg)							
ANTIMONY	27	370	5.4	2.07 J	1.15 J	0.357 J	0.264 UJ
ARSENIC	2.1	12	*	1.39	1.03	1.13	0.868
COPPER	150	89,000	*	30.8	23.2	24.3	3.13
LEAD	400	1,400	*	**478 J [R]**	**405 [R]**	166	9.97
MERCURY	3	17	2.1	0.015 U	0.0139 U	0.0142 U	0.0148 U
SILVER	410	8,200	17	0.0519 U	0.0512 U	0.105 U	0.0528 U
TIN	47,000	880,000	*	2.81	2.56 U	2.63 U	2.64 U
ZINC	26,000	630,000	*	5.98	4.73	5.51	3.35
SPLP Metals (ug/L)			**GCTL**				
ANTIMONY	NC	NC	6	NA	**24.3 [L]**	NA	NA
ARSENIC	NC	NC	10	NA	4.83	NA	NA
COPPER	NC	NC	1,000	NA	150	NA	NA
LEAD	NC	NC	15	NA	**4,620 [L]**	NA	NA
MERCURY	NC	NC	2	NA	0.0008 U	NA	NA
SILVER	NC	NC	100	NA	0.250 U	NA	NA
TIN	NC	NC	4,200	NA	2.5 U	NA	NA
ZINC	NC	NC	5,000	NA	104 J	NA	NA
Miscellaneous Parameters							
CATION EXCHANGE CAPACITY (MEQ/100)	NC	NC	NC	NA	NA	NA	1.49
PH (S.U.)	NC	NC	NC	NA	NA	NA	4.43
TOTAL ORGANIC CARBON (mg/kg)	NC	NC	NC	NA	NA	NA	5,560

TABLE 4-2

SUMMARY OF ANALYTICAL RESULTS FOR SOILS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Sample designation	SCTL Residential	SCTL Industrial	SCTL Leachability to Groundwater	PRSBD5-0.5/2.0	PRSBE5-0/0.5	PRSBE5-0.5/2.0	PRSBE6-0/0.5	PRSBE7-0/0.5
Sample location and depth				PRSBD5 0.5 - 2' bgs	PRSBE5 0 - 0.5' bgs	PRSBE5 0.5 - 2' bgs	PRSBE6 0 - 0.5' bgs	PRSBB5 0 - 0.5' bgs
Sample Date				10/13/2009	10/13/2009	10/13/2009	10/13/2009	10/13/2009
Inorganics (mg/kg)								
ANTIMONY	27	370	5.4	0.27 UJ	1.98 J	0.336 J	0.688 J	0.385 J
ARSENIC	2.1	12	*	**2.36 [R]**	1.58	0.906	0.934	0.958
COPPER	150	89,000	*	5.09	26.2	7.68	12.7	10.3
LEAD	400	1,400	*	104	**504 [R]**	131	250	120
MERCURY	3	17	2.1	0.0130 U	0.0128 U	0.0144 U	0.0143 U	0.0137 U
SILVER	410	8,200	17	0.162 U	0.0537 U	0.0523 U	0.0548 U	0.0522 U
TIN	47,000	880,000	*	2.7 U	2.78	2.61 U	2.74 U	2.61 U
ZINC	26,000	630,000	*	4.2 J	6.53	5.95	6.56	4.35
SPLP Metals (ug/L)			**GCTL**					
ANTIMONY	NC	NC	6	NA	NA	NA	NA	NA
ARSENIC	NC	NC	10	NA	NA	NA	NA	NA
COPPER	NC	NC	1,000	NA	NA	NA	NA	NA
LEAD	NC	NC	15	NA	NA	NA	NA	NA
MERCURY	NC	NC	2	NA	NA	NA	NA	NA
SILVER	NC	NC	100	NA	NA	NA	NA	NA
TIN	NC	NC	4,200	NA	NA	NA	NA	NA
ZINC	NC	NC	5,000	NA	NA	NA	NA	NA
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/100)	NC	NC	NC	NA	NA	NA	NA	NA
PH (S.U.)	NC	NC	NC	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON (mg/kg)	NC	NC	NC	NA	NA	NA	NA	NA

TABLE 4-2

SUMMARY OF ANALYTICAL RESULTS FOR SOILS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Sample designation	SCTL Residential	SCTL Industrial	SCTL Leachability to Groundwater	PRSBF5-0/0.5	PRSBF5-0.5/2.0	PRSBF6-0/0.5	PRSBF6-0.5/2.0	PRSBF7-0/0.5
Sample location and depth				PRSBF5 0 - 0.5' bgs	PRSBF5 0.5 - 2' bgs	PRSBF6 0 - 0.5' bgs	PRSBF6 0.5 - 2' bgs	PRSBF7 0 - 0.5' bgs
Sample Date				10/13/2009	10/13/2009	10/13/2009	10/13/2009	10/13/2009
Inorganics (mg/kg)								
ANTIMONY	27	370	5.4	2.15 J	1.15 J	0.85 J	0.621 J	0.262 UJ
ARSENIC	2.1	12	*	1.14	0.842	1.28	1.01	1.06
COPPER	150	89,000	*	50.3	31	50.9	18.3	14.3
LEAD	400	1,400	*	**462 [R]**	221	**558 J [R]**	209	93.9
MERCURY	3	17	2.1	0.014 U	0.0118 U	0.0121 U	0.0119 U	0.0148
SILVER	410	8,200	17	0.0535 U	0.0516 U	0.0518 U	0.052 U	0.0523 U
TIN	47,000	880,000	*	2.98	2.58 U	2.59 U	2.6 U	2.62 U
ZINC	26,000	630,000	*	6.39	4.01	7.69	5.84	5.51
SPLP Metals (ug/L)			**GCTL**					
ANTIMONY	NC	NC	6	NA	NA	NA	NA	NA
ARSENIC	NC	NC	10	NA	NA	NA	NA	NA
COPPER	NC	NC	1,000	NA	NA	NA	NA	NA
LEAD	NC	NC	15	NA	NA	NA	NA	NA
MERCURY	NC	NC	2	NA	NA	NA	NA	NA
SILVER	NC	NC	100	NA	NA	NA	NA	NA
TIN	NC	NC	4,200	NA	NA	NA	NA	NA
ZINC	NC	NC	5,000	NA	NA	NA	NA	NA
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/100)	NC	NC	NC	NA	NA	NA	NA	NA
PH (S.U.)	NC	NC	NC	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON (mg/kg)	NC	NC	NC	NA	NA	NA	NA	NA

TABLE 4-2

SUMMARY OF ANALYTICAL RESULTS FOR SOILS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Sample designation	SCTL Residential	SCTL Industrial	SCTL Leachability to Groundwater	PRSBG4-0/0.5	PRSBG5-0/0.5	PRSBG5-0.5/2.0	FD10130901	PRSBG7-0/0.5
Sample location and depth				PRSBG4 0 - 0.5' bgs	PRSBG5 0 - 0.5' bgs	PRSBG5 0.5 - 2' bgs	Duplicate Sample of PRSBG5-05/2.0	PRSBG5 0 - 0.5' bgs
Sample Date				10/13/2009	10/13/2009	10/13/2009	10/13/2009	10/13/2009
Inorganics (mg/kg)								
ANTIMONY	27	370	5.4	0.258 U	0.262 UJ	0.264 U	0.268 UJ	0.265 UJ
ARSENIC	2.1	12	*	1.57	0.749	0.73	0.826	0.776
COPPER	150	89,000	*	4.44	5.16	8.11	9.21	3.54
LEAD	400	1,400	*	16.9	58.7	284	268	22.2
MERCURY	3	17	2.1	0.0138	0.0131	0.013 U	0.0145 U	0.0122 U
SILVER	410	8,200	17	0.103 U	0.0524 U	0.0529 U	0.107 U	0.106 U
TIN	47,000	880,000	*	2.58 U	2.62 U	2.64 U	2.68 U	2.65 U
ZINC	26,000	630,000	*	17.3	4.6	4.78	5.15	3.43
SPLP Metals (ug/L)			**GCTL**					
ANTIMONY	NC	NC	6	NA	NA	NA	NA	NA
ARSENIC	NC	NC	10	NA	NA	NA	NA	NA
COPPER	NC	NC	1,000	NA	NA	NA	NA	NA
LEAD	NC	NC	15	NA	NA	NA	NA	NA
MERCURY	NC	NC	2	NA	NA	NA	NA	NA
SILVER	NC	NC	100	NA	NA	NA	NA	NA
TIN	NC	NC	4,200	NA	NA	NA	NA	NA
ZINC	NC	NC	5,000	NA	NA	NA	NA	NA
Miscellaneous Parameters								
CATION EXCHANGE CAPACITY (MEQ/100)	NC	NC	NC	NA	NA	NA	NA	NA
PH (S.U.)	NC	NC	NC	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON (mg/kg)	NC	NC	NC	NA	NA	NA	NA	NA

TABLE 4-2

SUMMARY OF ANALYTICAL RESULTS FOR SOILS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Sample designation	SCTL Residential	SCTL Industrial	SCTL Leachability to Groundwater	PRSBB5-0/0.5	PRSBH5-0/0.5
Sample location and depth				Stepout PRSBB15 0 - 0.5' bgs	Stepout PRSBG15 0 - 0.5' bgs
Sample Date				10/14/2009	10/14/2009
Inorganics (mg/kg)					
ANTIMONY	27	370	5.4	0.507 J	0.263 UJ
ARSENIC	2.1	12	*	1.17	0.85
COPPER	150	89,000	*	11	1.83
LEAD	400	1,400	*	194	4.7
MERCURY	3	17	2.1	0.0128 U	0.0129 U
SILVER	410	8,200	17	0.111 U	0.105 U
TIN	47,000	880,000	*	2.78 U	2.63 U
ZINC	26,000	630,000	*	4.34	3.76 J
SPLP Metals (ug/L)			**GCTL**		
ANTIMONY	NC	NC	6	NA	NA
ARSENIC	NC	NC	10	NA	NA
COPPER	NC	NC	1,000	NA	NA
LEAD	NC	NC	15	NA	NA
MERCURY	NC	NC	2	NA	NA
SILVER	NC	NC	100	NA	NA
TIN	NC	NC	4,200	NA	NA
ZINC	NC	NC	5,000	NA	NA
Miscellaneous Parameters					
CATION EXCHANGE CAPACITY (MEQ/100)	NC	NC	NC	NA	NA
PH (S.U.)	NC	NC	NC	NA	NA
TOTAL ORGANIC CARBON (mg/kg)	NC	NC	NC	NA	NA

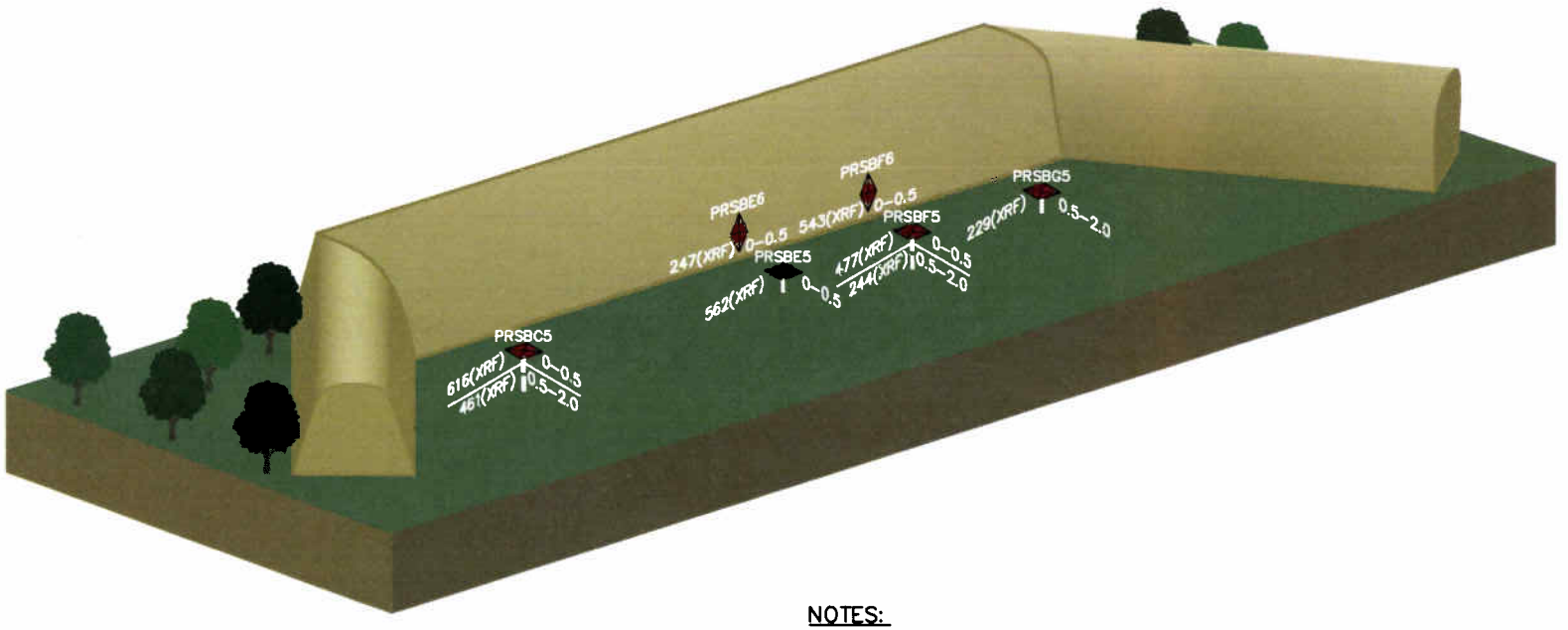
Notes:
SCTL = Soil Cleanup Target Levels, Chapter 62-777, Florida Administrative Code (FAC)
bgs = below ground surface
mg/kg = milligram per kilogram
U = Analyte was not detected above indicated method detection limit.
J = concentration is between the method detection limit and practical quantation limit and is estimated.
UJ = Analyte was not detected above indicated method detection limit and one or more of the quality assurance criteria were not met.
SCTL = Soil Cleanup Target Levels
Bold Value with **[R]** - exceeds residential SCTL and **[I]** - exceeds Industrial SCTL
SPLP = Synthetic Precipitation Leaching Procedure
* = Leachability to Groundwater value determined by the SPLP
ug/L = microgram per liter

GCTL = Groundwater Cleanup Target Level, Chapter 62-550, FAC and Chapter 62-777, FAC
Bold value with **[L]** = exceeds FDEP Groundwater Cleanup Target Level
NC = No Criteria
NA = Not Analyzed
MEQ/100 = milliequivalents per 100 grams
S.U. = Standard Units

TABLE 4-3

LEAD AND ARSENIC CONCENTRATIONS
SITE 3 PISTOL RANGE
SITE INSPECTION REPORT
OLF SAUFLEY
PENSACOLA, FLORIDA

Lead Concentrations (mg/kg)			
Sample Medium	**Maximum**	**Average FBL**	**Average FBL and Predicted FBL**
Soil (0 to 0.5 ft bgs)	558	159	147
Soil (0.5 to 2.0 ft bgs)	405	209	88
Soil (0 to 2.0 ft bgs)	558	226	114
Arsenic Concentrations (mg/kg)			
Sample Medium	**Maximum**	**UCL FBL**	
Soil (0 to 0.5 ft bgs)	1.58	1.42 (Chebyshev Non-Parametric)	
Soil (0.5 to 2.0 ft bgs)	2.36	Not Available (too few samples)	
Soil (0 to 2.0 ft bgs)	2.36	1.27 (Lognormal UCL)	



NOTES:

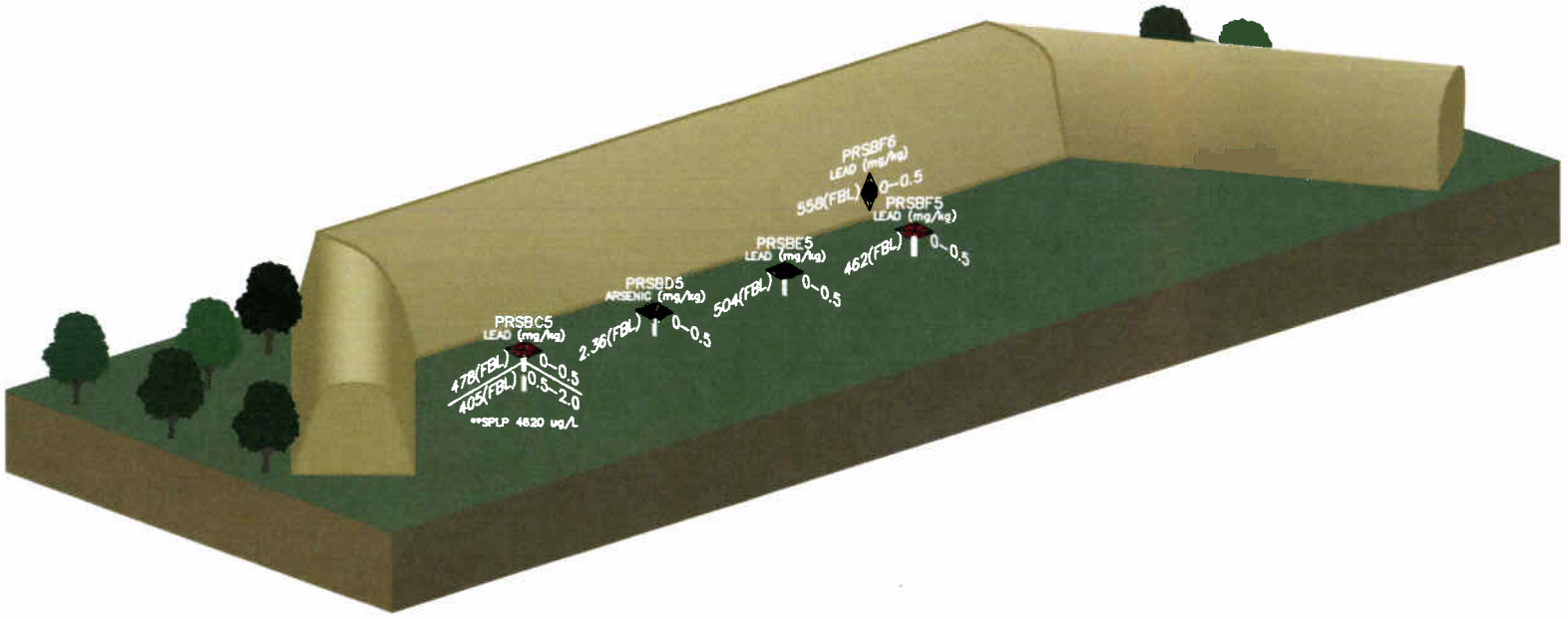
XRF = X-RAY FLUORESCENCE FIELD SCREENING RESULT

PROJECT ACTION LIMIT = 200 MILLIGRAMS PER KILOGRAM (mg/kg)

PRSB## = PISTOL RANGE SOIL BORING AND SAMPLE NUMBER

DRAWN BY CK DATE 02/24/10	NAVFAC	XRF LEAD FIELD SCREENING EXCEEDANCES IN SURFACE SOIL SITE 3 – PISTOL RANGE OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NO. 2352
CHECKED BY DATE			OWNER NO.
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 4–1 REV. 0

R:\2352\Figures\2352FG01.dwg PIT CARLY.KRAMER 2/24/2010 3:11:03 PM



NOTES:

FDEP = FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
SCTL = RESIDENTIAL SOIL CLEANUP TARGET LEVEL, CHAPTER 62–777 FLORIDA ADMINISTRATION CODE (FAC)
GCTL = GROUNDWATER CLEANUP TARGET LEVEL, CHAPTER 62–777, FAC
PRSB## = PISTOL RANGE SOIL BORING AND SAMPLE NUMBER
FBL = FIXED–BASE LAB
**SPLP = SYNTHETIC PRECIPITATION LEACHING PROCEDURE
FDEP RESIDENTIAL SCTL FOR ARSENIC = 2.1 MILLIGRAMS PER KILOGRAM (mg/kg)
FDEP RESIDENTIAL SCTL FOR LEAD = 400 mg/kg
FDEP GCTL FOR SPLP LEAD = 15 MICROGRAMS PER LITER (ug/L)

DRAWN BY CK DATE 02/24/10	NAVFAC	REGULATORY EXCEEDANCES IN SURFACE SOIL SITE 3 – PISTOL RANGE OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NO. 2352
CHECKED BY DATE			OWNER NO.
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 4–2 REV. 0

R:\2352\Figures\2352FG02.dwg PIT CARLY.KRAMER 2/25/2010 10:35:04 AM

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The SI investigation and data indicate that lead in surface soil is present at concentrations that exceed its FDEP SCTL Residential Direct Exposure criteria at various locations of the Site 3 Pistol Range. Most of the sample locations that contained lead at a concentration that exceeded its Residential Direct Exposure criteria were in the area of the primary impact berm. The majority of the lead contamination appears to be limited to 0 to 0.5 foot bgs. Only one location exhibited a lead concentration greater than the FDEP Residential SCTL at a depth greater than 0.5 foot bgs. Lead was not detected at concentrations exceeding FDEP Residential SCTL at a depth greater than 2.0 feet bgs. None of the soil samples collected contained lead at a concentration that exceeded its FDEP Industrial Direct Exposure SCTL.

One soil sample collected at 0 to 0.5 foot bgs contained arsenic at a concentration that slightly exceeded its FDEP Residential Direct Exposure SCTL.

None of the other MC metals were detected at concentrations exceeding their FDEP Residential or Industrial Direct Exposure SCTLs.

One sample was analyzed by the SPLP and exceeded its respective FDEP GCTLs for antimony and lead. However, the groundwater sample did not contain antimony or lead at concentrations that exceeded their GCTLs. Although the SPLP analytical results suggest the potential for antimony and lead in the site soil to leach to the groundwater and exceed their GCTLs, the analytical results for the groundwater sample demonstrate that they are not leaching to groundwater.

5.2 RECOMMENDATIONS

Based on the data presented in this SI the following recommendations are proposed:

- Lead and arsenic concentrations in several surface soil samples exceeded their FDEP SCTLs Residential Direct Exposure criteria, but not their Industrial Direct Exposure criteria. However, exposure concentrations for lead and arsenic are less than their respective residential SCTLs. The average lead concentration, calculating using only FBL data and calculated using a combination of FBL data and predicted FBL data (based on the regression equation between XRF and FBL data) were less than 400 mg/kg. The UCL concentration for arsenic was less than 2.1 mg/kg. Therefore,

based on the decision criteria in the UFP-SAP (TtNUS, 2009), NFA is the proposed remedy for the site.

- Although the soil SPLP analytical results suggest the potential for the exceedance of groundwater standards, the results of a groundwater sample collected at the site indicate that the antimony and lead present in the site soils are not leaching to groundwater. Therefore, NFA for groundwater is warranted for the targeted MC metals.

- Based on the results of this surface soil sampling event, the site is believed to have been adequately delineated relative to the extent of MC metals and additional delineation is not warranted.

- The bullets/bullet fragments observed at the site serve as a potential source of lead in soil; therefore, removal of the bullets/bullet fragments was completed.

REFERENCES

ITRC (Interstate Technology and Regulatory Council), 2003. *Technical/Regulatory Guidelines – Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*, Interstate Technology Regulatory Council, January.

Musgrove, R.H., Barraclough, J.T., and Grantham, R.G., 1965. *Water Resources of Escambia and Santa Rosa Counties, Florida*. Florida Geological Survey, Report Inv. 40, 102p.

NEESA (Naval Energy and Environmental Support Activity), 1983. *Initial Assessment Study of Naval Air Station, Pensacola*. June.

NEESA, 1992. *Preliminary Assessment Report, NETPMSA, Saufley Field, Escambia County, Florida*. Port Hueneme, California. May.

Trapp, Henry Jr., 1973. *Hydrology of the Sand-and-Gravel Aquifer in Central and Southern Escambia County, Florida*: United States Geological Survey, open-file report FL-74027, 40p.

TtNUS (Tetra Tech NUS, Inc.), 2009. *Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Munitions Response Program Site Inspection at Site 3 Pistol Range*. July.

USDA (United States Department of Agriculture), 2004. *Soil Survey if Escambia County, Florida*. Natural Resources Conservation Service, Washington, D.C.

USEPA (United States Environmental Protection Agency), 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. OSWER 9240.1-05A-P; PB99-963506; EPA540/R-99/008. October.

USEPA, 1994a. *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*. OSWER Directive #9355.4–12. August.

USEPA, 1994b. *Technical Support Document: Parameters and Equations Used in the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children*. OSWER #9285.7-22; PB94-963505; EPA 540/R-94/040. December.

APPENDIX A

FIELD FORMS

CONTENTS

PAGE	REFERENCE	DATE

Location NAS P-cola, Saufley Field Date MM-DD-YY 10-12-09 3

Project / Client Site 3, Navy

Personnel: Jason Bourgeois / Tt (JB)
Melissa Demsky / Tt (MD)

Weather: hot, humid with scattered showers high 90°

Equipment: company vehicle mlg 146,618.7 sample kit, XRF, GPS, hand auger (2), cell phone (2), decon kit

Objective: Soil Sampling

0900 (EST) crew meet at office, gather paperwork, meet & discuss scope load vehicle with equipment

1100 mobe to warehouse for supplies, refuel vehicle

1137 mobe to site

James (Jim) Goertz (JG) arrives in Pensacola from Pittsburg late afternoon rents car

1515 (central time) pick up 55-gallon drum from SWS

1540 On-site. Observe berm and face and sand stockpiles. Offload

Location NAS Pensacola, Seaplane Field Date 10-12-09

Project / Client Site 3, Navy

empty 55-gallon drum
according to bermn.
~~0955~~: Contact PM (Gerry Wolke)
1555 Report day's activities.
1610: Offsite to purchase supplies.
1641: Purchase supplies at
Walmart. Mob to base
1735: Check into hotel.
1803: Complete timesheets.
Workday complete.

12-Oct-09

Location Date 13-Oct-09

Project / Client Site 3, Navy

0721: @ truck, organize
equipment, meet Jim
Goert (FOL).
0730: Mob to site
0816: On-site. Discuss
day's activities, HASP,
complete Medical Data
Sheets
0886: Unload vehicle, prep
GPS to mark locations.
Contact John Wright
in Pittsburgh for support.
MD preps decon area.
JB preps IDW drum.
0940: 20 initial locations
marked. Begin sampling.
C-7 0-6" & 6-24"
through G-7 0-6" & 6-24"
1050: Collect C-6 to G6.
1140: Complete C-5 to G5.
1220: Complete C-4 to G4.
1235: Contact PM (Gerry
Wolker) to discuss
morning activities

Location NASP, Saufley Field Date 13-Oct-09
Project / Client Site 3, Navy

1345: Collect sample from soil piles. PRSP01
1403: Offsite to purchase ~~supplies~~ supplies
1510: @ Home Depot, purchase pvc stakes and play sand
1800: At hotel, review SAP, complete timesheet, watch, complete.

13 OCT 09

Location NASP, Saufley Field Date 14-Oct-09
Project / Client Site 3, Navy

0730: Meet at vehicles. Prep for XRF operations.
0845: Oven set up. XRF scan/start setup.
MD - sifts soil, preps samples
JB - runs XRF, enters data
JG - dry's soil in oven, preps samples for XRF.

Table denotes hits > 200ppm

	C	D	E	F	G
7					
6		X		X	
5	X	X	X	X	X
4					

1300: XRF complete, Initial Step outs to be collected are E-5 and F-5.
1325: Mob to Seal Pile Field
1345: At Walmart to purchase additional ziploc's.
1420: Arrive Site 3. Mark corners of Study area ~~with~~ pvc stakes.

Location NASP Saufley Field Date 14-Oct-09

Project / Client Site 3, Navy

Location	Depth	ppm
C 5	0-.5	616
	.5-2	461
E 5	0-5	562
	.5-2	151
EG	0-5	247
	.5-2	39
F 5	0-5	477
	.5-2	244
FG	0-5	543
	.5-2	183
G 5	0-5	93
	.5-2	229

1450

1455: Stepouts B-5 and H-5 collected 0-0.5' and 0.5-2.0'

1510-C5

1525: Vertical samples at C-5 and F-5 collected 2.0-4.0'

1500 F5

1500 H5

*Stepouts were 15' away from initial samples

B5 — 15' — G5

G5 — 15' — H5

Location NASP Saufley Field Date 14-Oct-09

Project / Client Site 3, Navy

1530: Mob to room to continue XRF analysis.

1610: At room, continue XRF.

1850: XRF complete, samples selected and jarred/labeled, packed on ice. COC complete.

14/Oct/09

Location NASP, Saufley Field Date 15-Oct-09
Project / Client Site 3, Navy

0700: @ truck, mob to Saufley Field to dispose of soil.
0800: on-site. Dispose of extra soil. "Hot" samples (>200ppm) are returned to holes. "Clean" samples are used to fill remaining holes.
0810: Receive call from PM (Gerry Walker). He requests IDW drum be ~~returned~~ transported to Sherman Field Fuel Farm.
0830: Awaiting call from PM re: SPLP sample and IDW drum.
0935: Call from PM. SPLP sample will remain ~~0.5~~ 0.5 - 2.0'. IDW drum will be transported to drum storage at Saufley Field

Location NASP, Saufley Field Date 15-Oct-09
Project / Client Site 3, Navy

1113: Check out of BOQ. Mob to Tallahassee
1525 (EST): Arrive Tallahassee. Unload trucks
1623: @ warehouse to unload equipment.
1650: At office. Complete demob. Complete timesheet

15/Oct/09

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 1814 | PAGE 1 OF 2

PROJECT NO: 112G02352	FACILITY: Sanfley Field	PROJECT MANAGER Gerry Walker	PHONE NUMBER 850-385-9899	LABORATORY NAME AND CONTACT: Emperical Labs
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER Jim Goerdt	PHONE NUMBER 412-443-0244	ADDRESS 1558 Village Square Ste 2 TLH FL 32309
		CARRIER/WAYBILL NUMBER		CITY, STATE

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

DATE (Oct. 13 2009)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)									PRESERVATIVE USED								TYPE OF ANALYSIS 6010B	SPLP	pH	TOC	CEC				COMMENTS
									G	G	G	G	G					1	1	1	1	1												
~~10/13~~	~~1345~~	~~PRSP01-0/0.5~~	PRSP01	0	0.5	SO	C	1																									~~091953-01~~
10/13	1140	PRSBC5-0/0.5	PRSBC5	0	0.5	SO	G	1	✓																								091953-01
	1140	PRSBC5-0.5/2.0	PRSBC5	0.5	2.0			2	✓	✓																							-02
	1050	PRSBC6-0/0.5	PRSBC6	0	0.5			1	✓																								-03
	1130	PRSBE5-0/0.5	PRSBE5	0	0.5			1	✓																								-04
	1130	PRSBE5-0.5/2.0	PRSBE5	0.5	2.0			1	✓																								-05
	1040	PRSBE6-0/0.5	PRSBE6	0	0.5			1	✓																								-06
	0955	PRSBE7-0/0.5	PRSBE7	0	0.5			1	✓																								-07
	1120	PRSBF5-0/0.5	PRSBF5	0	0.5			1	✓																								-08
	1120	PRSBF5-0.5/2.0	PRSBF5	0.5	2.0			1	✓																								-09
	1035	PRSBF6-0/0.5	PRSBF6	0	0.5			1	✓																								-10
	1035	PRSBF6-0.5/2.0	PRSBF6	0.5	2.0			1	✓																								-11
	1000	PRSBF7-0/0.5	PRSBF7	0	0.5			1	✓																								-12

1. RELINQUISHED BY	DATE 10.15.09	TIME 1530	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE 10/16/09	TIME 08:30

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2765 | PAGE 2 OF 2

PROJECT NO: 112G02352	FACILITY: Sanford Field	PROJECT MANAGER Gerry Walker	PHONE NUMBER 850-385-9899
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER Jim Eberdt	PHONE NUMBER 412-443-0244
		CARRIER/WAYBILL NUMBER	

LABORATORY NAME AND CONTACT: Empirical
ADDRESS 1558 Village Sq. Blvd 2
CITY, STATE TLH FL 32309

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

DATE (October 2009) YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: 6010B	SPLP	pH	TOC	CEC				COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	G	G	G				
PRESERVATIVE USED									Ice	Ice	Ice	Ice	Ice				
10/13	1115	PRSBG5-0/0.5	PRSBG5	0	0.5	SO	G	1	✓								0910153-13
	1115	PRSBG5-0.5/2.0	PRSBG5	0.5	2.0			1	✓								-14
	1215	PRSBG4-0/0.5	PRSBG4	0	0.5			1	✓								-15
	1010	PRSBG7-0/0.5	PRSBG7	0	0.5			1	✓								-16
		~~PRSBC4-0/0.5~~	~~PRSBC4~~	~~0~~	~~0.5~~			~~1~~	~~✓~~								
	0940	PRSBC7-0/0.5	PRSBC7	0	0.5			2	✓		✓	✓	✓				-17
10/13	0000	FD 101309 01	—	—	—	QC	C	1	✓								-18
10/14	1520	RB 101409 01	—	—	—	QC	G	2	✓								-19
10/14	1510	IDW 101409 01	—	—	—	IDW	C	8	✓								-20
10/14	1500	PRSB175-0/05	PRSB175	0	0.5	SO	G	1	✓								-21
10/14	1450	PRSB B5-0/0.5	PRSBB5	0.	0.5			1	✓								-22
10/13	1135	PRSB D5-0.5/2.0	PRSBD5	0.5	2.0			1	✓								-23

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY M. Dawley	10.15.09	1503	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY	10/16/09	08:30

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS
FIELD TASK MODIFICATION REQUEST FORM

NAS Pensacola	112G02352 CTO 116	001
Project /Installation Name	**Project Number and CTO**	**Task Mod. Number**
UFP SAP July 2009 (Worksheet #17)	Site 3 – Pistol Range	10/14/09
Modification to (e.g. Work Plan)	**Site/Sample Location**	**Date**

Activity Description:
Worksheet #17 indicated that all "step-out" samples will be collected in a location that is equidistant from the previously collected sample.

The equidistant in this case would have been 30 feet from the previous sample location. Based on the XRF field concentrations we were recording for lead, I felt 15 feet from the previous sample location would be adequate for determining a boundary, with the option of going out a total of 30 feet should the 15-foot "step-out" sample have an XRF lead concentration greater than 200 mg/kg.

Reason for Change:
Changed the distance of "step-out" samples from equidistant from previous sample location to one-half the distance. This was done to better define contamination boundaries, and to lessen any soil removal required under a potential removal action.

Recommended Disposition:
Accept the "step-out" sample location as one-half the distance from the previous sample rather than equidistant (30 feet).

_____ 10-14-09
Field Operations Leader (signature) **Date**

Approved Disposition: _____

_____

_____ _____
Project/Task Order Manager (signature) **Date**

Distribution:
Program/Project File
Project/Task Order Manager
Field Operations Leader

Tetra Tech NUS, Inc.

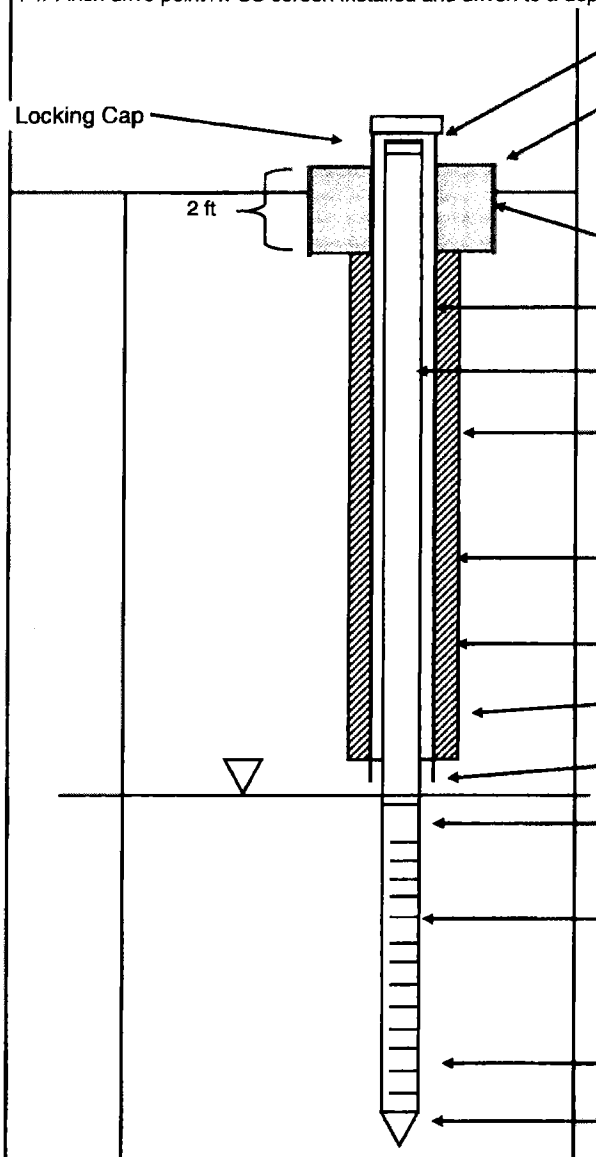
Test Hole E-5

MONITORING WELL SHEET

PROJECT:	Saufley Field Site 3		NAVFAC	BORING No.:	E-5
PROJECT No.:		Installation	John Schoolfield, NAVFAC SE	DATE COMPLETED:	01/28/10
SITE:	Saufley Site 3	DRILLING METHOD:	Hand Auger/Drive Point		
DEV. METHOD:	peristaltic pump	NORTHING	16R 66437	EASTING:	71295

DRILLING METHOD

Hand augured to 14.5 feet. 2" ID PVC casing installed and driven 0.3 feet past bottom of augerhole.
1 1/4 inch drive point /w SS screen installed and driven to a depth of 18.15 feet.



Height of Top of surface casing 7"

Pad extends 3" above surface

Type of Surface Casing: 2" PVC

Type of Surface Seal: Concrete

2 ft ID Sonotube Concrete Form

2" PVC Down Hole Outer Casing

1 1/4" Galv Steel Riser

Borehole Diameter: 4"

Mortar Mix Grout Annular Seal

Elevation / Depth of Seal:

Type of Seal: Mortar Mix Grout 14.5 ft

Depth to bottom of outer casing 14.80 ft

Depth to Water 14.79 ft

Elevation / Depth of Top of Screen: 15.15 ft

Type of Screen: Stainless Steel Drive Point

Length: 3 ft screen

I.D. of Screen: 1 & 1/4 inch

Type of Filter Pack: Natural

Depth of Bottom of Screen: 18.15 feet

Not to Scale

APPENDIX B

SITE PHOTOGRAPHS

NAS Pensacola – Site 3 Pistol Range, OLF Saufley, Florida

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** North	**DESCRIPTION:** Overall view of the pistol range berm (in photo background).	1 10/13/09

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** North	**DESCRIPTION:** Sloughing of the range berm.	2 10/13/09

NAS Pensacola – Site 3 Pistol Range, OLF Saufley, Florida

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** NA	**DESCRIPTION:** Bullets within the range berm.	3 10/13/09

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** West	**DESCRIPTION:** Hand augering in range berm.	4 10/13/09

NAS Pensacola – Site 3 Pistol Range, OLF Saufley, Florida

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** M. Brock **VIEW:** NA	**DESCRIPTION:** Wooden remnants of pistol range target holders.	5 10/13/09

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** M. Brock **VIEW:** NA	**DESCRIPTION:** Clay target fragment located on range berm.	6 10/13/09

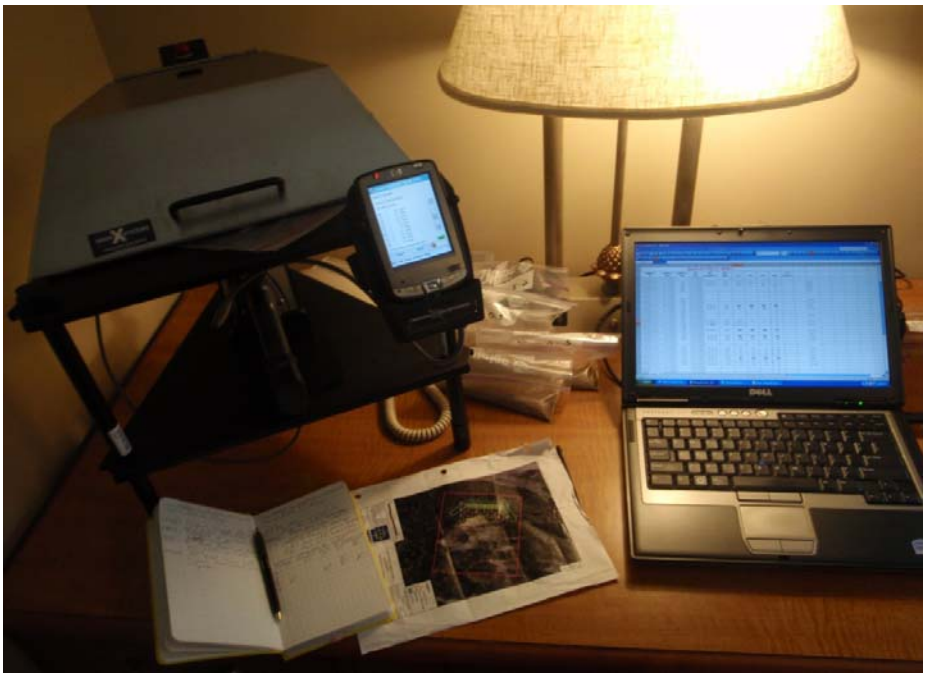
NAS Pensacola – Site 3 Pistol Range, OLF Saufley, Florida

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** Northeast	**DESCRIPTION:** Soil stockpiles located just east of site.	7 10/13/09

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** M. Brock **VIEW:** NA	**DESCRIPTION:** GPS data collection.	8 10/13/09

NAS Pensacola – Site 3 Pistol Range, OLF Saufley, Florida

SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** NA	**DESCRIPTION:** Sieving of soil samples.	9 10/14/09



SITE: Saufley Field Pistol Range	**PHOTOGRAPHER:** J. Goerdt **VIEW:** NA	**DESCRIPTION:** XRF data collection.	10 10/14/09

APPENDIX C

VALIDATED DATA

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **G. WALKER** **DATE:** **DECEMBER 17, 2009**

FROM: **LEANNE M. GANSER** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION –SELECT METALS, CEC, PH, AND TOC**
SAUFLEY FIELD – CTO JM13
SAMPLE DELIVERY GROUP (SDG) – 0910153

SAMPLES: 21/Soil/Metals

FD10130901	PRSBB5-0/0.5	PRSBC5-0.5/2.0
PRSBC5-0/0.5	PRSBC6-0/0.5	PRSBC7-0/0.5
PRSBD5-0.5/2.0	PRSBE5-0.5/2.0	PRSBE5-0/0.5
PRSBE6-0/0.5	PRSBE7-0/0.5	PRSBF5-0.5/2.0
PRSBF5-0/0.5	PRSBF6-0.5/2.0	PRSBF6-0/0.5
PRSBF7-0/0.5	PRSBG4-0/0.5	PRSBG5-0.5/2.0
PRSBG5-0/0.5	PRSBG7-0/0.5	PRSBH5-0/0.5

1/Soil/SPLP Metals
PRSBC5-0.5/2.0

1/Soil /CEC/pH/TOC
PRSBC7-0/0.5

Overview

The sample set for Saufley Field CTO JM13, SDG 0910153, consists of twenty-one (21) soil environmental samples. One (1) field duplicate pair was included within this SDG: PRSBG5-0.5/2.0/FD10130901.

All samples were analyzed for antimony, arsenic, copper, lead, mercury, silver, tin, and zinc. Sample PRSBC5-0.5/2.0 was also analyzed for SPLP extracted metals. Sample PRSBC7-0/0.5 was also analyzed for cation exchange capacity (CEC), pH, and total organic carbon (TOC). The samples were collected by Tetra Tech NUS on October 13-14, 2009 and analyzed by Empirical Laboratories, LLC. Analyses were conducted using SW-846 method 6010B for metals, 7470A for mercury, 9081 for CEC, 9045B for pH, and 9060A for TOC.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Initial and Continuing Calibrations
• Laboratory Method / Preparation Blanks
* • ICP Interference Analysis
* • Laboratory Control Sample / Laboratory Control Sample Duplicate Results
• Matrix Spike / Matrix Spike Duplicate Results
* • Laboratory Duplicate Results
* • Field Duplicate Results
• ICP Serial Dilution Results

Executive Summary

Laboratory Performance: Calibration noncompliance was noted for lead. Lead was present in the laboratory blanks.

Other Factors Affecting Data Quality: MS/MSD percent recoveries were outside of quality control limits for SPLP zinc and antimony. ICP serial dilution noncompliance was noted for zinc.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", October 2004.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Leanne M. Ganser
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02352 SDG: 0910153 FRACTION: M MEDIA: SOIL	NSAMPLE	PRSBC6-0/0.5			PRSBC7-0/0.5			PRSBD5-0.5/2.0			PRSBE5-0.5/2.0		
	LAB_ID	0910153-03			0910153-17			0910153-23			0910153-05		
	SAMP_DATE	10/13/2009			10/13/2009			10/13/2009			10/13/2009		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	91.8			93.8			90.6			93.3		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ANTIMONY		0.357	J	D	0.264	UJ	D	0.27	UJ	D	0.336	J	D
ARSENIC		1.13			0.868			2.36			0.906		
COPPER		24.3			3.13			5.09			7.68		
LEAD		166			9.97			104			131		
MERCURY		0.0142	U		0.0148	U		0.013	U		0.0144	U	
SILVER		0.105	U		0.0528	U		0.162	U		0.0523	U	
TIN		2.63	U		2.64	U		2.7	U		2.61	U	
ZINC		5.51			3.35			4.2	J	I	5.95		

PROJ_NO: 02352 SDG: 0910153 FRACTION: M MEDIA: SOIL	NSAMPLE	PRSBF5-0/0.5			PRSBF6-0.5/2.0			PRSBF6-0/0.5			PRSBF7-0/0.5		
	LAB_ID	0910153-08			0910153-11			0910153-10			0910153-12		
	SAMP_DATE	10/13/2009			10/13/2009			10/13/2009			10/13/2009		
	QC_TYPE	NM			NM			NM			NM		
	UNITS	MG/KG			MG/KG			MG/KG			MG/KG		
	PCT_SOLIDS	93.0			93.9			92.0			91.9		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ANTIMONY		2.15	J	D	0.621	J	D	0.85	J	D	0.262	UJ	D
ARSENIC		1.14			1.01			1.28			1.06		
COPPER		50.3			18.3			50.9			14.3		
LEAD		462			209			558	J	C	93.9		
MERCURY		0.014	U		0.0119	U		0.0121	U		0.0148		
SILVER		0.0535	U		0.052	U		0.0518	U		0.0523	U	
TIN		2.98			2.6	U		2.59	U		2.62	U	
ZINC		6.39			5.84			7.69			5.51		

PROJ_NO: 02352 SDG: 0910153 FRACTION: M MEDIA: SOIL	NSAMPLE	PRSBH5-0/0.5		
	LAB_ID	0910153-21		
	SAMP_DATE	10/14/2009		
	QC_TYPE	NM		
	UNITS	MG/KG		
	PCT_SOLIDS	91.7		
	DUP_OF			
PARAMETER		RESULT	VQL	QLCD
ANTIMONY		0.263	UJ	D
ARSENIC		0.85		
COPPER		1.83		
LEAD		4.7		
MERCURY		0.0129	U	
SILVER		0.105	U	
TIN		2.63	U	
ZINC		3.76	J	I

ANALYSIS DATA SHEET

FD10130901

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 00:00
% Solids: 92.68

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-18
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0145	0.0368	1	U	SW7471A	9K02003	11/02/09 13:03
7440-36-0	Antimony		0.268	0.805	1	UN	SW6010B	9J30219	11/03/09 18:40
7440-38-2	Arsenic	0.826	0.161	0.268	1		SW6010B	9J30219	11/03/09 18:40
7440-50-8	Copper	9.21	0.268	0.537	1		SW6010B	9J30219	11/03/09 18:40
7439-92-1	Lead	268	0.0805	0.161	1		SW6010B	9J30219	11/03/09 18:40
7440-22-4	Silver		0.107	0.268	1	U	SW6010B	9J30219	11/03/09 18:40
7440-31-5	Tin		2.68	5.37	1	U	SW6010B	9J30219	11/03/09 18:40
7440-66-6	Zinc	5.15	0.268	1.07	1		SW6010B	9J30219	11/03/09 18:40

ANALYSIS DATA SHEET

PRSBB5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/14/09 14:50
% Solids: 89.85

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-22
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0128	0.0330	1	U	SW7471A	9K02004	11/02/09 13:10
7440-36-0	Antimony	0.507	0.278	0.835	1	J N	SW6010B	9J30220	11/03/09 19:34
7440-38-2	Arsenic	1.17	0.167	0.278	1		SW6010B	9J30220	11/03/09 19:34
7440-50-8	Copper	11.0	0.278	0.556	1		SW6010B	9J30220	11/03/09 19:34
7439-92-1	Lead	194	0.0835	0.167	1		SW6010B	9J30220	11/03/09 19:34
7440-22-4	Silver		0.111	0.278	1	U	SW6010B	9J30220	11/03/09 19:34
7440-31-5	Tin		2.78	5.56	1	U	SW6010B	9J30220	11/03/09 19:34
7440-66-6	Zinc	4.34	0.278	1.11	1		SW6010B	9J30220	11/03/09 19:34

ANALYSIS DATA SHEET

PRSBC5-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 11:40
% Solids: 93.41

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-02
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7440-36-0	Antimony SPLP	24.3	1.25	3.75	1		SW6010B	9J27922	10/29/09 22:53
7440-38-2	Arsenic SPLP	4.83	0.750	2.50	1		SW6010B	9J27922	10/29/09 22:53
7440-50-8	Copper SPLP	150	1.00	2.50	1		SW6010B	9J27922	10/29/09 22:53
7439-92-1	Lead SPLP	4620	9.38	18.8	25	D	SW6010B	9J27922	10/30/09 09:29
7440-22-4	Silver SPLP		0.250	2.50	1	U	SW6010B	9J27922	10/29/09 22:53
7440-31-5	Tin SPLP		2.50	7.50	1	U	SW6010B	9J27922	10/29/09 22:53
7440-66-6	Zinc SPLP	104	1.25	5.00	1	N	SW6010B	9J27922	10/29/09 22:53
CAS NO.	**Analyte**	**Concentration (mg/L)**	**MDL**	**RL**	**Dilution Factor**	**Q**	**Method**	**Batch**	**Analyzed**
7439-97-6	Mercury SPLP		0.000800	0.00200	1	U	SW7470A	9J28932	10/29/09 08:24
CAS NO.	**Analyte**	**Concentration (mg/Kg dry)**	**MDL**	**RL**	**Dilution Factor**	**Q**	**Method**	**Batch**	**Analyzed**
7439-97-6	Mercury		0.0139	0.0353	1	U	SW7471A	9K02003	11/02/09 12:39
7440-36-0	Antimony	1.15	0.256	0.768	1	N	SW6010B	9J30219	11/03/09 17:11
7440-38-2	Arsenic	1.03	0.154	0.256	1		SW6010B	9J30219	11/03/09 17:11
7440-50-8	Copper	23.2	0.256	0.512	1		SW6010B	9J30219	11/03/09 17:11
7439-92-1	Lead	405	0.0768	0.154	1		SW6010B	9J30219	11/03/09 17:11
7440-22-4	Silver		0.0512	0.256	1	U	SW6010B	9J30219	11/03/09 17:11
7440-31-5	Tin		2.56	5.12	1	U	SW6010B	9J30219	11/03/09 17:11
7440-66-6	Zinc	4.73	0.256	1.02	1		SW6010B	9J30219	11/03/09 17:11

ANALYSIS DATA SHEET

PRSBC5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 11:40
% Solids: 93.00

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-01
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0150	0.0380	1	U	SW7471A	9K02003	11/02/09 12:38
7440-36-0	Antimony	2.07	0.260	0.779	1	N	SW6010B	9J30219	11/03/09 17:07
7440-38-2	Arsenic	1.39	0.156	0.260	1		SW6010B	9J30219	11/03/09 17:07
7440-50-8	Copper	30.8	0.260	0.519	1		SW6010B	9J30219	11/03/09 17:07
7439-92-1	Lead	478	0.156	0.312	2	D	SW6010B	9J30219	11/04/09 10:14
7440-22-4	Silver		0.0519	0.260	1	U	SW6010B	9J30219	11/03/09 17:07
7440-31-5	Tin	2.81	2.60	5.19	1	J	SW6010B	9J30219	11/03/09 17:07
7440-66-6	Zinc	5.98	0.260	1.04	1		SW6010B	9J30219	11/03/09 17:07

ANALYSIS DATA SHEET

PRSBC6-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 10:50
% Solids: 91.82

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-03
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0142	0.0359	1	U	SW7471A	9K02003	11/02/09 12:40
7440-36-0	Antimony	0.357	0.263	0.789	1	J N	SW6010B	9J30219	11/03/09 17:16
7440-38-2	Arsenic	1.13	0.158	0.263	1		SW6010B	9J30219	11/03/09 17:16
7440-50-8	Copper	24.3	0.263	0.526	1		SW6010B	9J30219	11/03/09 17:16
7439-92-1	Lead	166	0.0789	0.158	1		SW6010B	9J30219	11/03/09 17:16
7440-22-4	Silver		0.105	0.263	1	U	SW6010B	9J30219	11/03/09 17:16
7440-31-5	Tin		2.63	5.26	1	U	SW6010B	9J30219	11/03/09 17:16
7440-66-6	Zinc	5.51	0.263	1.05	1		SW6010B	9J30219	11/03/09 17:16

ANALYSIS DATA SHEET

PRSBC7-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 09:40
% Solids: 93.84

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-17
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0148	0.0377	1	U	SW7471A	9K02003	11/02/09 13:00
7440-36-0	Antimony		0.264	0.791	1	U N	SW6010B	9J30219	11/03/09 18:36
7440-38-2	Arsenic	0.868	0.158	0.264	1		SW6010B	9J30219	11/03/09 18:36
7440-50-8	Copper	3.13	0.264	0.528	1		SW6010B	9J30219	11/03/09 18:36
7439-92-1	Lead	9.97	0.0791	0.158	1		SW6010B	9J30219	11/03/09 18:36
7440-22-4	Silver		0.0528	0.264	1	U	SW6010B	9J30219	11/03/09 18:36
7440-31-5	Tin		2.64	5.28	1	U	SW6010B	9J30219	11/03/09 18:36
7440-66-6	Zinc	3.35	0.264	1.06	1		SW6010B	9J30219	11/03/09 18:36
CAS NO.	**Analyte**	**Concentration (meq Na/100 g)**	**MDL**	**RL**	**Dilution Factor**	**Q**	**Method**	**Batch**	**Analyzed**
NA	Cation Exchange Capacity	1.49	0.0543	0.543	1		SW9081	9J29921	11/03/09 23:21

ANALYSIS DATA SHEET

PRSBC7-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 09:40
% Solids: 93.84

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-17
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (pH Units)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
12408-02-5	pH	4.43	0.100	0.100	1	O-04	SW9045B	9J22023	10/22/09 15:10

CAS NO.	Analyte	Concentration (mg/Kg)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7440-44-0	Total Organic Carbon	5560	200	600	1		SW9060A	9J27924	10/27/09 12:28

ANALYSIS DATA SHEET

PRSBD5-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 11:35
% Solids: 90.64

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-23
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0130	0.0331	1	U	SW7471A	9K02004	11/02/09 13:12
7440-36-0	Antimony		0.270	0.811	1	UN	SW6010B	9J30220	11/03/09 19:39
7440-38-2	Arsenic	2.36	0.162	0.270	1		SW6010B	9J30220	11/03/09 19:39
7440-50-8	Copper	5.09	0.270	0.541	1		SW6010B	9J30220	11/03/09 19:39
7439-92-1	Lead	104	0.0811	0.162	1		SW6010B	9J30220	11/03/09 19:39
7440-22-4	Silver		0.162	0.270	1	U	SW6010B	9J30220	11/03/09 19:39
7440-31-5	Tin		2.70	5.41	1	U	SW6010B	9J30220	11/03/09 19:39
7440-66-6	Zinc	4.20	0.270	1.08	1		SW6010B	9J30220	11/03/09 19:39

ANALYSIS DATA SHEET

PRSBE5-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 11:30
% Solids: 93.34

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-05
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0144	0.0366	1	U	SW7471A	9K02003	11/02/09 12:42
7440-36-0	Antimony	0.336	0.261	0.784	1	J N	SW6010B	9J30219	11/03/09 17:26
7440-38-2	Arsenic	0.906	0.157	0.261	1		SW6010B	9J30219	11/03/09 17:26
7440-50-8	Copper	7.68	0.261	0.523	1		SW6010B	9J30219	11/03/09 17:26
7439-92-1	Lead	131	0.0784	0.157	1		SW6010B	9J30219	11/03/09 17:26
7440-22-4	Silver		0.0523	0.261	1	U	SW6010B	9J30219	11/03/09 17:26
7440-31-5	Tin		2.61	5.23	1	U	SW6010B	9J30219	11/03/09 17:26
7440-66-6	Zinc	5.95	0.261	1.05	1		SW6010B	9J30219	11/03/09 17:26

ANALYSIS DATA SHEET

PRSBE5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 11:30
% Solids: 92.57

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-04
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0128	0.0330	1	U	SW7471A	9K02003	11/02/09 12:41
7440-36-0	Antimony	1.98	0.269	0.806	1	N	SW6010B	9J30219	11/03/09 17:21
7440-38-2	Arsenic	1.58	0.161	0.269	1		SW6010B	9J30219	11/03/09 17:21
7440-50-8	Copper	26.2	0.269	0.537	1		SW6010B	9J30219	11/03/09 17:21
7439-92-1	Lead	504	0.0806	0.161	1		SW6010B	9J30219	11/03/09 17:21
7440-22-4	Silver		0.0537	0.269	1	U	SW6010B	9J30219	11/03/09 17:21
7440-31-5	Tin	2.78	2.69	5.37	1	J	SW6010B	9J30219	11/03/09 17:21
7440-66-6	Zinc	6.53	0.269	1.07	1		SW6010B	9J30219	11/03/09 17:21

ANALYSIS DATA SHEET

PRSBE6-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 10:40
% Solids: 90.87

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-06
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0143	0.0363	1	U	SW7471A	9K02003	11/02/09 12:44
7440-36-0	Antimony	0.688	0.274	0.821	1	J N	SW6010B	9J30219	11/03/09 17:30
7440-38-2	Arsenic	0.934	0.164	0.274	1		SW6010B	9J30219	11/03/09 17:30
7440-50-8	Copper	12.7	0.274	0.548	1		SW6010B	9J30219	11/03/09 17:30
7439-92-1	Lead	250	0.0821	0.164	1		SW6010B	9J30219	11/03/09 17:30
7440-22-4	Silver		0.0548	0.274	1	U	SW6010B	9J30219	11/03/09 17:30
7440-31-5	Tin		2.74	5.48	1	U	SW6010B	9J30219	11/03/09 17:30
7440-66-6	Zinc	6.56	0.274	1.10	1		SW6010B	9J30219	11/03/09 17:30

ANALYSIS DATA SHEET

PRSBE7-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Soil
Sampled: 10/13/09 09:55
% Solids: 92.16

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-07
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0137	0.0347	1	U	SW7471A	9K02003	11/02/09 12:45
7440-36-0	Antimony	0.385	0.261	0.782	1	J N	SW6010B	9J30219	11/03/09 17:35
7440-38-2	Arsenic	0.958	0.156	0.261	1		SW6010B	9J30219	11/03/09 17:35
7440-50-8	Copper	10.3	0.261	0.522	1		SW6010B	9J30219	11/03/09 17:35
7439-92-1	Lead	120	0.0782	0.156	1		SW6010B	9J30219	11/03/09 17:35
7440-22-4	Silver		0.0522	0.261	1	U	SW6010B	9J30219	11/03/09 17:35
7440-31-5	Tin		2.61	5.22	1	U	SW6010B	9J30219	11/03/09 17:35
7440-66-6	Zinc	4.35	0.261	1.04	1		SW6010B	9J30219	11/03/09 17:35

ANALYSIS DATA SHEET

PRSBF5-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 11:20
% Solids: 94.10

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-09
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0118	0.0330	1	U	SW7471A	9K02003	11/02/09 12:50
7440-36-0	Antimony	1.15	0.258	0.774	1	N	SW6010B	9J30219	11/03/09 17:45
7440-38-2	Arsenic	0.842	0.155	0.258	1		SW6010B	9J30219	11/03/09 17:45
7440-50-8	Copper	31.0	0.258	0.516	1		SW6010B	9J30219	11/03/09 17:45
7439-92-1	Lead	221	0.0774	0.155	1		SW6010B	9J30219	11/03/09 17:45
7440-22-4	Silver		0.0516	0.258	1	U	SW6010B	9J30219	11/03/09 17:45
7440-31-5	Tin		2.58	5.16	1	U	SW6010B	9J30219	11/03/09 17:45
7440-66-6	Zinc	4.01	0.258	1.03	1		SW6010B	9J30219	11/03/09 17:45

ANALYSIS DATA SHEET

PRSBF5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 11:20
% Solids: 92.95

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-08
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0140	0.0355	1	U	SW7471A	9K02003	11/02/09 12:48
7440-36-0	Antimony	2.15	0.268	0.803	1	N	SW6010B	9J30219	11/03/09 17:40
7440-38-2	Arsenic	1.14	0.161	0.268	1		SW6010B	9J30219	11/03/09 17:40
7440-50-8	Copper	50.3	0.268	0.535	1		SW6010B	9J30219	11/03/09 17:40
7439-92-1	Lead	462	0.0803	0.161	1		SW6010B	9J30219	11/03/09 17:40
7440-22-4	Silver		0.0535	0.268	1	U	SW6010B	9J30219	11/03/09 17:40
7440-31-5	Tin	2.98	2.68	5.35	1	J	SW6010B	9J30219	11/03/09 17:40
7440-66-6	Zinc	6.39	0.268	1.07	1		SW6010B	9J30219	11/03/09 17:40

ANALYSIS DATA SHEET

PRSBF6-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 10:35
% Solids: 93.87

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-11
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0119	0.0330	1	U	SW7471A	9K02003	11/02/09 12:52
7440-36-0	Antimony	0.621	0.260	0.779	1	J N	SW6010B	9J30219	11/03/09 18:07
7440-38-2	Arsenic	1.01	0.156	0.260	1		SW6010B	9J30219	11/03/09 18:07
7440-50-8	Copper	18.3	0.260	0.520	1		SW6010B	9J30219	11/03/09 18:07
7439-92-1	Lead	209	0.0779	0.156	1		SW6010B	9J30219	11/03/09 18:07
7440-22-4	Silver		0.0520	0.260	1	U	SW6010B	9J30219	11/03/09 18:07
7440-31-5	Tin		2.60	5.20	1	U	SW6010B	9J30219	11/03/09 18:07
7440-66-6	Zinc	5.84	0.260	1.04	1		SW6010B	9J30219	11/03/09 18:07

ANALYSIS DATA SHEET

PRSBF6-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 10:35
% Solids: 91.95

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-10
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0121	0.0330	1	U	SW7471A	9K02003	11/02/09 12:51
7440-36-0	Antimony	0.850	0.259	0.777	1	N	SW6010B	9J30219	11/03/09 17:49
7440-38-2	Arsenic	1.28	0.155	0.259	1		SW6010B	9J30219	11/03/09 17:49
7440-50-8	Copper	50.9	0.259	0.518	1		SW6010B	9J30219	11/03/09 17:49
7439-92-1	Lead	558	0.155	0.311	2	D	SW6010B	9J30219	11/04/09 10:21
7440-22-4	Silver		0.0518	0.259	1	U	SW6010B	9J30219	11/03/09 17:49
7440-31-5	Tin		2.59	5.18	1	U	SW6010B	9J30219	11/03/09 17:49
7440-66-6	Zinc	7.69	0.259	1.04	1		SW6010B	9J30219	11/03/09 17:49

ANALYSIS DATA SHEET

PRSBF7-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 10:00
% Solids: 91.90

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-12
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0148	0.0125	0.0330	1	J	SW7471A	9K02003	11/02/09 12:53
7440-36-0	Antimony		0.262	0.785	1	UN	SW6010B	9J30219	11/03/09 18:12
7440-38-2	Arsenic	1.06	0.157	0.262	1		SW6010B	9J30219	11/03/09 18:12
7440-50-8	Copper	14.3	0.262	0.523	1		SW6010B	9J30219	11/03/09 18:12
7439-92-1	Lead	93.9	0.0785	0.157	1		SW6010B	9J30219	11/03/09 18:12
7440-22-4	Silver		0.0523	0.262	1	U	SW6010B	9J30219	11/03/09 18:12
7440-31-5	Tin		2.62	5.23	1	U	SW6010B	9J30219	11/03/09 18:12
7440-66-6	Zinc	5.51	0.262	1.05	1		SW6010B	9J30219	11/03/09 18:12

ANALYSIS DATA SHEET

PRSBG4-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 12:15
% Solids: 93.34

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-15
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0138	0.0119	0.0330	1	J	SW7471A	9K02003	11/02/09 12:57
7440-36-0	Antimony		0.258	0.773	1	UN	SW6010B	9J30219	11/03/09 18:26
7440-38-2	Arsenic	1.57	0.155	0.258	1		SW6010B	9J30219	11/03/09 18:26
7440-50-8	Copper	4.44	0.258	0.515	1		SW6010B	9J30219	11/03/09 18:26
7439-92-1	Lead	16.9	0.0773	0.155	1		SW6010B	9J30219	11/03/09 18:26
7440-22-4	Silver		0.103	0.258	1	U	SW6010B	9J30219	11/03/09 18:26
7440-31-5	Tin		2.58	5.15	1	U	SW6010B	9J30219	11/03/09 18:26
7440-66-6	Zinc	17.3	0.258	1.03	1		SW6010B	9J30219	11/03/09 18:26

ANALYSIS DATA SHEET

PRSBG5-0.5/2.0

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 11:15
% Solids: 93.62

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-14
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0130	0.0330	1	U	SW7471A	9K02003	11/02/09 12:56
7440-36-0	Antimony		0.264	0.793	1	UN	SW6010B	9J30219	11/03/09 18:21
7440-38-2	Arsenic	0.730	0.159	0.264	1		SW6010B	9J30219	11/03/09 18:21
7440-50-8	Copper	8.11	0.264	0.529	1		SW6010B	9J30219	11/03/09 18:21
7439-92-1	Lead	284	0.0793	0.159	1		SW6010B	9J30219	11/03/09 18:21
7440-22-4	Silver		0.0529	0.264	1	U	SW6010B	9J30219	11/03/09 18:21
7440-31-5	Tin		2.64	5.29	1	U	SW6010B	9J30219	11/03/09 18:21
7440-66-6	Zinc	4.78	0.264	1.06	1		SW6010B	9J30219	11/03/09 18:21

ANALYSIS DATA SHEET

PRSBG5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 11:15
% Solids: 91.26

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-13
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury	0.0131	0.0119	0.0330	1	J	SW7471A	9K02003	11/02/09 12:55
7440-36-0	Antimony		0.262	0.786	1	UN	SW6010B	9J30219	11/03/09 18:17
7440-38-2	Arsenic	0.749	0.157	0.262	1		SW6010B	9J30219	11/03/09 18:17
7440-50-8	Copper	5.16	0.262	0.524	1		SW6010B	9J30219	11/03/09 18:17
7439-92-1	Lead	58.7	0.0786	0.157	1		SW6010B	9J30219	11/03/09 18:17
7440-22-4	Silver		0.0524	0.262	1	U	SW6010B	9J30219	11/03/09 18:17
7440-31-5	Tin		2.62	5.24	1	U	SW6010B	9J30219	11/03/09 18:17
7440-66-6	Zinc	4.60	0.262	1.05	1		SW6010B	9J30219	11/03/09 18:17

ANALYSIS DATA SHEET

PRSBG7-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/13/09 10:10
% Solids: 93.96

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-16
Received: 10/16/09 08:30

CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0122	0.0330	1	U	SW7471A	9K02003	11/02/09 12:59
7440-36-0	Antimony		0.265	0.794	1	U N	SW6010B	9J30219	11/03/09 18:31
7440-38-2	Arsenic	0.776	0.159	0.265	1		SW6010B	9J30219	11/03/09 18:31
7440-50-8	Copper	3.54	0.265	0.529	1		SW6010B	9J30219	11/03/09 18:31
7439-92-1	Lead	22.2	0.0794	0.159	1		SW6010B	9J30219	11/03/09 18:31
7440-22-4	Silver		0.106	0.265	1	U	SW6010B	9J30219	11/03/09 18:31
7440-31-5	Tin		2.65	5.29	1	U	SW6010B	9J30219	11/03/09 18:31
7440-66-6	Zinc	3.43	0.265	1.06	1		SW6010B	9J30219	11/03/09 18:31

ANALYSIS DATA SHEET

PRSBH5-0/0.5

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Solid
Sampled: 10/14/09 15:00
% Solids: 91.69

SDG: 0910153
Project: Saufley Field Site 3 Pistol Range CTO116
Laboratory ID: 0910153-21
Received: 10/16/09 08:30

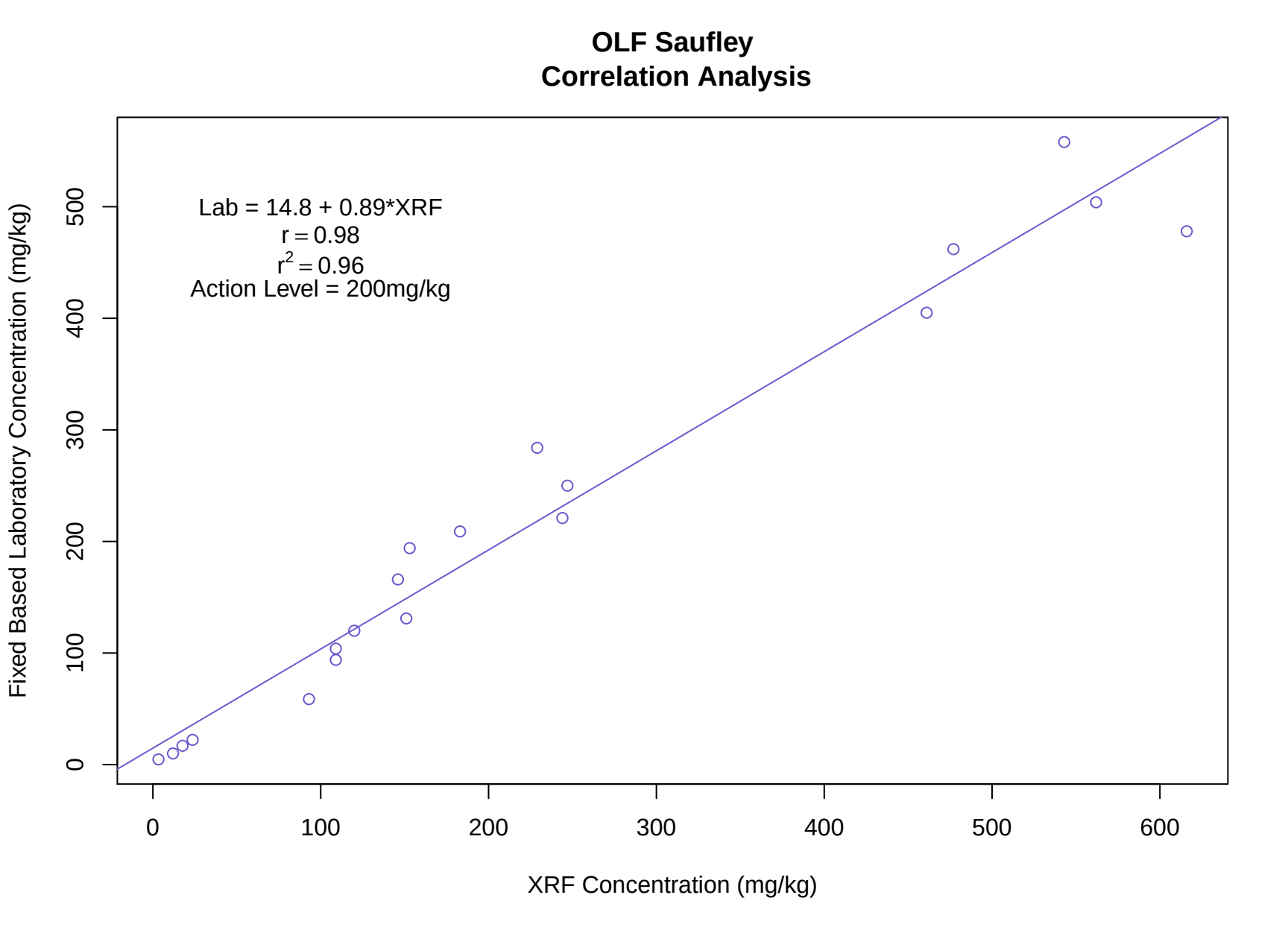
CAS NO.	Analyte	Concentration (mg/Kg dry)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-97-6	Mercury		0.0129	0.0330	1	U	SW7471A	9K02004	11/02/09 13:09
7440-36-0	Antimony		0.263	0.790	1	UN	SW6010B	9J30220	11/03/09 19:29
7440-38-2	Arsenic	0.850	0.158	0.263	1		SW6010B	9J30220	11/03/09 19:29
7440-50-8	Copper	1.83	0.263	0.527	1		SW6010B	9J30220	11/03/09 19:29
7439-92-1	Lead	4.70	0.0790	0.158	1		SW6010B	9J30220	11/03/09 19:29
7440-22-4	Silver		0.105	0.263	1	U	SW6010B	9J30220	11/03/09 19:29
7440-31-5	Tin		2.63	5.27	1	U	SW6010B	9J30220	11/03/09 19:29
7440-66-6	Zinc	3.76	0.263	1.05	1		SW6010B	9J30220	11/03/09 19:29

APPENDIX D

CORRELATION ANALYSIS

Correlation Analysis

Figure 1 is a scatterplot of the Average XRF Lead results and the Laboratory lead results for each sample. From the scatterplot, a strong positive linear trend is evident. The correlation between the fixed based laboratory concentrations and the XRF is 0.98. The correlation always falls between -1 and 1. Values of r near 0 indicate a very weak linear relationship. The strength of the linear relationship increases as r moves away from 0 toward either -1 or 1. Values of r close to -1 and 1 indicate that the points lie close to a straight line. The extreme values -1 and 1 occur only in the case of a perfect linear relationship. So the correlation indicates a strong linear trend. The R-squared value is 96 percent. This value represents the percent of variation in laboratory lead concentrations that can be explained by the lead XRF concentration. An R-Squared value greater than about 80 percent is considered to indicate a very strong relationship between the two measurement methods. The maximum possible value is 100 percent.


OLF Saufley
Correlation Analysis
Lab = 14.8 + 0.89*XRF
r = 0.98
r2 = 0.96
Action Level = 200mg/kg
Fixed Based Laboratory Concentration (mg/kg)
0
100
200
300
400
500
XRF Concentration (mg/kg)
0
100
200
300
400
500
600

FIELD XRF AND FIXED-BASE LABORATORY LEAD CONCENTRATIONS
SITE 3 PISTOL RANGE
OLF SAUFLEY
PENSACOLA, FLORIDA

			XRF READINGS - Lead (mg/kg)				
SAMPLE DATE	**SAMPLE LOCATION**	**SAMPLE ID**	**1st**	**2nd**	**3rd**	**AVG**	**Fixed-Base Laboratory (mg/kg)**
10/13/2009	PRSBC4	PRSBC4-0/0.5	ND	ND	ND	0	
10/13/2009		PRSBC4-0.5/2.0	36	28	39	34	
10/13/2009	PRSBC5	PRSBC5-0/0.5	**584**	**736**	**529**	**616**	**478**
10/13/2009		PRSBC5-0.5/2.0	**464**	**361**	**557**	**461**	**405**
10/14/2009		PRSBC5-2.0/4.0	27	24	27	26	
10/13/2009	PRSBC6	PRSBC6-0/0.5	146	146	146	146	166
10/13/2009		PRSBC6-0.5/2.0	22	20	36	26	
10/13/2009	PRSBC7	PRSBC7-0/0.5	8	12	16	12	9.97
10/13/2009		PRSBC7-0.5/2.0	9	ND	8	6	
10/13/2009	PRSBD4	PRSBD4-0/0.5	ND	ND	ND	0	
10/13/2009		PRSBD4-0.5/2.0	ND	ND	ND	0	
10/13/2009	PRSBD5	PRSBD5-0/0.5	ND	ND	8	3	
10/13/2009		PRSBD5-0.5/2.0	107	117	103	109	104
10/13/2009	PRSBD6	PRSBD6-0/0.5	28	41	33	34	
10/13/2009		PRSBD6-0.5/2.0	17	14	15	15	
10/13/2009	PRSBD7	PRSBD7-0/0.5	26	30	41	32	
10/13/2009		PRSBD7-0.5/2.0	41	31	45	39	
10/13/2009	PRSBE4	PRSBE4-0/0.5	15	13	13	14	
10/13/2009		PRSBE4-0.5/2.0	16	15	20	17	
10/13/2009	PRSBE5	PRSBE5-0/0.5	**547**	**586**	**552**	**562**	**504**
10/13/2009		PRSBE5-0.5/2.0	149	156	149	151	131
10/13/2009	PRSBE6	PRSBE6-0/0.5	**232**	**265**	**245**	**247**	250
10/13/2009		PRSBE6-0.5/2.0	36	36	46	39	
10/13/2009	PRSBE7	PRSBE7-0/0.5	123	114	124	120	120
10/13/2009		PRSBE7-0.5/2.0	43	15	12	23	
10/13/2009	PRSBF4	PRSBF4-0/0.5	11	ND	ND	4	
10/13/2009		PRSBF4-0.5/2.0	41	52	40	44	
10/13/2009	PRSBF5	PRSBF5-0/0.5	**462**	**484**	**485**	**477**	**462**
10/13/2009		PRSBF5-0.5/2.0	**343**	**190**	**198**	**244**	221
10/14/2009		PRSBF5-2.0/4.0	12	19	18	16	
10/13/2009	PRSBF6	PRSBF6-0/0.5	**581**	**521**	**527**	**543**	**558**
10/13/2009		PRSBF6-0.5/2.0	198	175	176	183	209
10/13/2009	PRSBF7	PRSBF7-0/0.5	114	101	112	109	93.9
10/13/2009		PRSBF7-0.5/2.0	ND	13	9	7	
10/13/2009	PRSBG4	PRSBG4-0/0.5	20	20	13	18	16.9
10/13/2009		PRSBG4-0.5/2.0	45	14	30	30	
10/13/2009	PRSBG5	PRSBG5-0/0.5	122	69	88	93	58.7
10/13/2009		PRSBG5-0.5/2.0	**241**	**210**	**235**	**229**	284
10/13/2009	PRSBG6	PRSBG6-0/0.5	63	92	64	73	
10/13/2009		PRSBG6-0.5/2.0	12	14	12	13	
10/13/2009	PRSBG7	PRSBG7-0/0.5	28	17	26	24	22.2
10/13/2009		PRSBG7-0.5/2.0	14	9	8	10	
10/14/2009	PRSBB5	PRSBB5-0/0.5	143	145	172	153	194
10/14/2009		PRSBB5-0.5/2.0	62	70	60	64	
10/14/2009	PRSBH5	PRSBH5-0/0.5	ND	ND	10	3	4.70
10/14/2009		PRSBH5-0.5/2.0	ND	ND	ND	0	
10/13/2009	PRSP01	PRSP01-0/0.5	ND	ND	ND	0	

Shading of a cell indicates exceedance of the field screening lead concentration of 200 mg/kg.
"---" indicates sample was not sent to fixed-base laboratory
ND = Non Detect

APPENDIX E

FIELD REPORT

Field Activities Report
for
Saufley Field Site 3 Pistol Range

Naval Air Station Pensacola
Pensacola, Florida

Naval Facilities Engineering Command Southeast
Contract Number N62470-08-D-1001
Contract Task Order JM57

February 2014

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
FDEP	Florida Department of Environmental Protection
IRP	Installation Restoration Program
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Activity
NFA	No Further Action
NETPMSA	Naval Education and Training Program Management Support Activity
OLF	Outlying Landing Field
PA	Preliminary Assessment
SI	Site Inspection
Tetra Tech	Tetra Tech, Inc.
UFP-SAP	Uniform Federal Policy – Sampling Analysis Plan

1.0 INTRODUCTION

This Field Activities Report for the former Site 3 Pistol Range was prepared by Tetra Tech, Inc. (Tetra Tech) for Naval Facilities Engineering Command (NAVFAC) Southeast under Contract Task Order (CTO) JM57 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62470-08-D-1001. This report presents the field activities associated with the Pilot Test Range Soil Screening conducted at the Site 3 Pistol Range located at Outlying Landing Field (OLF) Saufley, Pensacola, Florida.

The Site 3 Pistol Range underwent a Site Inspection (SI) in October 2009 under the Installation Restoration Program (IRP) and followed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process.

The Naval Energy and Environmental Support Agency (NEESA) conducted a Preliminary Assessment (PA) for Naval Educational and Training Program Management Support Activity (NETPMSA) Saufley. The PA (NEESA, 1992) identified and reported the Site 3 Pistol Range as an area used for small arms during and after World War II; however, exact dates of use were not verified. The findings of the PA, a site walk conducted in July 2008, and a scoping meeting which took place in November 2008 for the Uniform Federal Policy – Sampling and Analysis Plan (UFP-SAP) were used to develop and design the field program for the SI, which is described in the SI Report (Tetra Tech, 2010).

1.1 PURPOSE

Based on the analytical results presented in the SI Report (Tetra Tech, 2010), the former Site 3 Pistol Range at Outlying Landing Field Saufley Field, it was recommended that the site be eligible for a no further action (NFA) determination. The Florida Department of Environmental Protection (FDEP) letter dated October 26, 2011 accepted this recommendation; however, FDEP recommended that the bullets and bullet fragments be removed. This would eliminate a source of potential future lead contamination. The purpose of this study was to determine the amount of soil requiring removal of bullets and bullet fragments and the amount of bullets and bullet fragments that were actually removed from the soil.

1.2 SCOPE OF WORK

The field activities at the Site 3 Pistol Range included the partial excavation of the former target impact berm to a depth of 1 foot. The excavated soil was then screened to remove the bullets, bullet fragments, and casings.

1.3 REPORT ORGANIZATION

This Field Activities Report consists of two sections: Section 1.0 is this introduction, which includes the purpose and scope and report organization. Section 2.0 describes the field activities performed at the Site 3 Pistol Range to screen the soil to remove the bullets, bullet fragments, and casings from the berm soil. Attachment A contains photographs of the work.

2.0 FIELD WORK DESIGN AND METHODS

This section describes the field methodologies utilized during the Pilot Test Study for Soil Screening performed in July and December 2013 at the Site 3 Pistol Range at OLF Saufley.

2.1 OVERVIEW

Tetra Tech subcontracted the soil excavation and screening work to Singley Environmental Services (Subcontractor) located in Pensacola, Florida. On the afternoon of July 9, 2013, the subcontractor mobilized to the site and initiated excavation activities at the Site 3 Pistol Range. The dimensions of the initial excavation were measured to be approximately 100-feet long by 20-feet high by 1-foot deep. The former berm had been completely stripped of vegetation prior to the 2009 SI; therefore, a limited amount of vegetation was present on the berm face at the initiation of the Pilot Study. The subcontractor utilized an excavator to scrape the top 12 inches of soil off the face of the former target berm. The soil was stockpiled near the base of the berm prior to soil screening activities. On July 10th, excavation of the berm soil continued and a small bobcat was used to transfer the excavated soil onto the vibrating soil screener. Due to the weight of the wet soil and the roots within the soil, the small battery operated screener struggled and only a very small amount of soil was actually being screened. A bucket with a thumb was then attached to the bobcat which then "grabbed" a load of soil and jerked it back and forth allowing the sandy soil to drop from the bucket as the root material remained in the bucket. This method was utilized until the majority of roots and vegetation were removed from the excavated soil piles. During the initial screening of the soil, it was observed that .22 caliber casings were also present in the soil and the current one-quarter inch mesh on the screener was not trapping the smaller casings. The subcontractor then purchased a one-eighth inch screen which was capable of retaining the smaller casings; however, the smaller mesh made it even more difficult to screen the soil as the small openings in the screen were getting clogged with the wet soil. Rain and lightning began in the early afternoon and work at the Site 3 Pistol Range was suspended for the day. The subcontractor utilized thick plastic sheeting to cover the excavated piles of soil to keep it from being washed away.

Heavy rains continued throughout the day on July 11th and no further work was completed at the Site 3 Pistol Range. On July 12th, work at the Pistol Range resumed, but due to the very wet soil and the small mesh on the screener, very little soil was actually being processed. Based on the slow production of the screener, the subcontractor fabricated an approximate 6-foot by 6-foot screening device which was then set on top of four 55-gallon drums which were placed under the four corners. The soil was then hand-shoveled onto the screen and the workers manually manipulated the soil through the screen. As the soil

fell through the screen, the bullets, bullet fragments, and casings were hand-picked from the screen and placed in the 55-gallon drums. Again, afternoon thunderstorms with lightning suspended work at the site.

On July 14th, it was estimated that approximately 80 to 90 cubic yards of the estimated 120 cubic yards had been excavated from the Site 3 Pistol Range berm. Upon inspection of the berm face by Tetra Tech, bullets were still visible in the soil in an area centrally located on the berm face. The area was outlined with pin flags and the subcontractor was notified of the need for additional excavation. The range floor directly in front of the former berm, where sloughing of soil had occurred, appeared to be free of any bullets. The subcontractor continued with the hand screening. At the end of the day, due to the slow productivity rate with the current screening process, the Tetra Tech representative, along with the subcontracting Project Manager, decided to suspend all activities at the Site 3 Pistol Range until the soil had the opportunity to dry out and an alternate method of soil screening was found. The Tetra Tech representative measured each of the soil stockpiles and calculated the current total amount of excavated soil at 91 cubic yards.

No additional work was done at the Site 3 Pistol Range over the next several months. During this time the subcontractor routinely visited the site to ensure the stockpiled soil remained covered with the plastic sheeting. Additionally, Tetra Tech was working at other areas of NAS Pensacola at various times and made visits to the site to ensure the soil remained covered.

Due to a wet Fall and continual scheduling conflicts, work at the Site 3 Pistol Range did not resume until December 2013. The week of December 9th, the subcontractor mobilized a much larger screener to the site. This proved to be much more efficient and work progressed at a much quicker pace. An excavator loaded the main hopper with soil which was then vibrated through a series of screens. The larger screener consisted of three ejection points. One was the clean screened soil, another was the larger stones and root material, and the third was the bullets, bullet fragments, and casings. There was still a decent amount of soil that was being ejected with the bullets, so this material was dumped onto the fabricated smaller screener and the material was manually manipulated through the one-eighth inch screen, but at a much higher rate of production than earlier in the summer.

All reclaimed bullets, bullet fragments, and casings were placed into 55-gallon drums. All of the clean screened soil was placed back onto the face of the berm. A geo-blanket was then placed on the face of the berm and the entire area was hydro-seeded. The total estimated amount of screened soil was approximately 120 cubic yards. The amount of reclaimed bullets, bullet fragments, and casings was enough to fill a single 55-gallon drum. The approximate weight of lead from the reclaimed bullets was 1,295 pounds. This material was taken off-site by the subcontractor for recycling purposes.

Various photographs taken over the duration of the Site 3 Pistol Range Pilot Study can be found in Attachment A at the end of this report.

ATTACHMENT A

SITE PHOTOGRAPHS

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** North	**DESCRIPTION:** Northern edge of excavation area prior to initiating excavation of impact berm.	Photo #1 12/4/12

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** North	**DESCRIPTION:** Close-up view of photo #1. Some sloughing has occurred in this area. Large tree (center right) marks northern-most edge of excavation area.	Photo #2 12/4/12

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:**	**DESCRIPTION:** Central and southern edge of excavation area. Sloughing of berm on left side of photograph.	Photo #3 12/4/12

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:**	**DESCRIPTION:** Central area of the berm showing sloughing of berm face.	Photo #4 12/4/12

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** North	**DESCRIPTION:** Sloughing along southern edge of berm face.	Photo #5 10/13/09

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** NA	**DESCRIPTION:** Photo of bullet in the berm face soil.	Photo #6 10/13/09

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** Southwest	**DESCRIPTION:** Stockpiled soil excavated from the berm and covered with plastic.	Photo #7 12/19/13

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** Southwest	**DESCRIPTION:** Excavated range floor directly in front of the impact berm.	Photo #8 10/13/09

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** West	**DESCRIPTION:** Large soil screener.	Photo #9 12/19/13

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** West	**DESCRIPTION:** Screened soil (foreground) as it exits the large screener.	Photo #10 12/19/13

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** NA	**DESCRIPTION:** Final hand screening to ensure all bullets, bullet fragments, and casings are removed from soil.	Photo #11 12/19/13

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** Southwest	**DESCRIPTION:** Returning screened soil to the impact berm.	Photo #12 12/19/13

Attachment A - NAS Pensacola – Saufley Field Pistol Range (Site 3)

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** West	**DESCRIPTION:** Geo blanket and hydro seeding of southern berm face.	Photo #13 12/20/13

SITE: Saufley Field - Pistol Range Berm	**PHOTOGRAPHER:** J. Goerdt **VIEW:** West	**DESCRIPTION:** Geo blanket and hydro seeding of central and northern berm face.	Photo #14 12/19/13