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SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) FOR MUNITIONS RESPONSE PROGRAM SITE INSPECTION AT SITE 3 PISTOL RANGE NAS SAUFLEY FIELD FL

03/24/2010

TETRA TECH

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 1
03/24/10

Sampling and Analysis Plan
(Field Sampling Plan and Quality Assurance Project Plan)
for
Munitions Response Program Site Inspection at Site 3 Pistol Range

Outlying Landing Field Saufley
Pensacola, Florida

Contract Task Order 0116

March 2010

NAVFAC
Naval Facilities Engineering Command
NAVFAC SOUTHEAST
NAS Jacksonville
Jacksonville, Florida 32212-0030

TETRA TECH NUS, Inc.

SAP Worksheet #1 – Title and Approval Page
(UFP-QAPP Manual Section 2.1)

SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)

MARCH 2010

MUNITIONS RESPONSE PROGRAM
SITE INSPECTION AT SITE 3 PISTOL RANGE
OUTLYING LANDING FIELD SAUFLEY
PENSACOLA, FLORIDA

Prepared for:
Naval Facilities Engineering Command
Southeast
NAS Jacksonville Building 103
Jacksonville, Florida 32212

Prepared by:
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Prepared under:
Comprehensive Long-Term Environmental Action Navy
CLEAN Contract No. N62467-04-D-0055
Contract Task Order 0116

BUREAU OF WASTE CLEANUP
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AUG 2 0 2009

FEDERAL PROGRAMS SECTION

SAP Worksheet #1 – Approval Page
(UFP-QAPP Manual Section 2.1)

Document Title: Sampling and Analysis Plan, (Field Sampling Plan and Quality Assurance Project Plan), March 2009, Munitions Response Program Site Inspection at Site 3 Pistol Range, Outlying Landing Field Saufley, Pensacola, Florida

Lead Organization: Naval Facilities Engineering Command Southeast

Preparer's Name and Organizational Affiliation: Yarissa Martinez, TtNUS, Inc.

Preparer's Address and Telephone Number: 1558 Village Square Blvd., Suite 2
Tallahassee, Florida 32309
850.385.9899

Preparation Date (Day/Month/Year): July 30, 2009

Investigative Organization's Project Manager: Gerald Walker
Signature/Date
Gerald Walker, P.G., TtNUS, Inc.

Investigative Organization's Project QA Manager: Kelly Carper
Signature/Date
Kelly Carper, TtNUS, Inc.

Lead Organization's Project Manager: John Schoolfield
Signature/Date
John Schoolfield, NAVFAC SE
Remedial Project Manager

Lead Organization QA Officer: TUCKER.JONATHAN.P.1239524180 Digitally signed by TUCKER.JONATHAN.P.1239524180 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=TUCKER.JONATHAN.P.1239524180 Date: 2009.08.12 15:35:13 -04'00'
Signature/Date
John Tucker, NAVFAC Atlantic

Approval Signatures:

The USEPA Region IV has indicated they will not review or comment on non-NPL Navy sites, particularly at Outlying Landing Fields

Signature/Date
Greg Fraley, USEPA Region 4

David P. Grabka for
Signature/Date
Tracie Bolaños, FDEP

EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has prepared this Uniform Federal Policy Sampling and Analysis Plan (UFP-SAP) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62467-04-D-0055, Contract Task Order (CTO) 0116 for Site 3 Pistol Range (Site 3) at Outlying Landing Field (OLF) Saufley.

OLF Saufley is located in Escambia County, between Interstate 10 and Perdido Bay, approximately five miles northwest of Pensacola, Florida, in the northwest coastal section of the Florida panhandle. The installation's main complex currently encompasses approximately 866 acres and includes a number of support buildings, a federal prison located south of the airfield, four airstrips, and undeveloped lands. The area currently occupied by OLF Saufley included farms and woodlands before it was purchased by the Navy in the 1930s.

Aerial pictures of OLF Saufley show the typical small arm range layout during the 1950s. However, no information regarding the exact dates of operation or reason for closure could be obtained. According to the United States Environmental Protection Agency (USEPA) and Department of Defense (DoD) definitions, "closed, transferred, and transferring" military ranges and sites not located on an operational range are considered "other than operational."

Site 3 is a 2.47-acre area that includes a clay berm approximately 100 feet in length, 30 feet wide, and 20 feet high. The range is located in the northwest corner of OLF Saufley approximately 800 to 1,000 feet north and west of the two active runways. The site and surrounding area are undeveloped and currently unused. The Site 3 Pistol Range and all nearby soil is clay or intermixed clay and silt. The pistol range elevation is 40 feet above sea level. Storm water run-off flows north into Eleven Mile Creek located approximately 1,000 feet to the north. Thick vegetation on and around the berm makes access to the site difficult.

The PA reported that large amounts of spent bullets were scattered around the pistol range and lodged within the surface soil. The observed bullets were lead, lead with steel jackets, and lead with copper jackets.

Typical munitions used at a small arms range include .38- and .45-caliber pistol ammunition and .22- and .30-caliber rifle ammunition. No spent bullets were observed during a July 1, 2008 site visit. Because the Site was used only for small arms training and because there is no historical or current evidence of explosives used at the site, there is no evidence of munitions and explosives of concern (MEC). No soil sampling has been performed at the Site; therefore, it is unknown whether munitions constituents (MC) are present. Potential MC may include metals such as lead, antimony, copper, zinc, tin, and arsenic from

bullets, fragments, and bullet jackets (ITRC, 2003). The PA recommended No Further Action (NFA) for MEC, and additional investigation for MC.

According to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, the Site Inspection (SI) follows a PA. The primary objective of an SI is to determine whether further response actions or remedial investigation (RI) are appropriate for a site. During the SI, background information provided in the PA is considered and supplemental site-specific environmental data are collected to further characterize the nature and extent of MC, especially MC in contaminant source areas identified in the PA Report.

In accordance with this plan, well spaced samples spanning Site 3 will be collected from surface soils in the areas expected to contain contaminants under the assumption that a chemical release has occurred as a consequence of site activities. The samples will be analyzed for MC potentially associated with small arms sites using a combination of fixed base laboratory and field analyses. If concentrations of these chemicals exceed risk-based screening values, further study or response action is recommended, otherwise no further action is recommended. The expected duration of this investigation is approximately three months.

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ACRONYMS

%D	Percent deviation
%R	Percent recovery
°F	Degrees Fahrenheit
°C	Degrees Celsius
AOC	Areas of Concern
bgs	Below ground surface
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
COC	Chain-of-custody
COPC	Constituent of potential concern
CSM	Conceptual Site Model
CTO	Contract Task Order
DI	Dionized
DoD	Department of Defense
DQI	Data Quality Indicator
DQO	Data Quality Objective
DVM	Data Validation Manager
ESV	Ecological Screening Value
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FOL	Field Operations Leader
FTMR	Field Task Modification Request
GCTL	Groundwater Cleanup Target Levels
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HQ	Hazard Quotient
HSM	Health and Safety Manager
IC	Initial Calibration
IDL	Instrument Detection Limit
IDW	Investigation-derived waste
ITRC	Interstate Technology and Regulatory Council
LCS	Laboratory Control Sample

ACRONYMS (CONTINUED)

LCSD	Laboratory Control Sample Duplicate
LFB	Laboratory Fortified Blank
LIMS	Laboratory Information Management Systems
LUC	Land Use Control
MC	Munitions Constituent
MCL	Maximum Contaminant Level
MDL	Method detection limit
MEC	Munitions and Explosives of Concern
mg/kg	Milligrams per kilogram
MRP	Munitions Response Program
msl	Mean sea level
NAAS	Naval Auxiliary Air Station
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
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
NFESC	Naval Facilities Engineering Service Center
OLF	Outlying Landing Field
PA	Preliminary Assessment
PAL	Project Action Limit
PDF	Portable Document Format
PG	Professional Geologist
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PQO	Project Quality Objective
PRP	Potentially Responsible Party
PRQL	Project-Required Quantitation Limit
QA	Quality Assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit

ACRONYMS (CONTINUED)

QMP	Quality Management Plan
QS	Quality System
QSM	Quality Systems Manual
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-based Concentrations
RBSL	Risk-based Screening Levels
RI	Remedial Investigation
RPM	Remedial Project Manager
RSD	Relative Standard Deviation
RT	Retention Time
RTM	Remedial Technical Manager
RTW	Retention Time Window
SAP	Sampling and Analysis Plan
SCTL	Soil Cleanup Target Level
SD	Standard Deviation
SDG	Sample Delivery Group
SDWA	Safe Drinking Water Act
SI	Site Inspection
Site 3	Site 3 Pistol Range
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedure
SQL	Structured Query Language
SRCR	Sample Receipt Condition Report
SRM	Standard Reference Material
SSL	Soil Screening Level
SSO	Site Safety Officer
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
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
U.S.	United States
XRF	X-ray fluorescence

SAP WORKSHEET #2 -- SAP IDENTIFYING INFORMATION

(UFP-QAPP Manual Section 2.2.4)

Operable Unit: Site 3 Former Pistol Range
Contractor Name: TtNUS, Inc.
Contract Number: N62467-04-D-0055
Contract Title: Comprehensive Long-Term Environmental Action Navy (CLEAN)
Work Assignment Number (optional): Contract Task Order (CTO) 0116

1. This Sampling and Analysis Plan (SAP) was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)* (USEPA, 2005) and *EPA Guidance for Quality Assurance Project Plans, USEPA QA/G-5, QAMS (USEPA, 2002).*

2. Identify regulatory program: Department of Defense (DoD) Military Munitions Response Program (MRP) using the general CERCLA process.

3. This SAP is a project-specific SAP.

4. List dates of scoping sessions that were held:

Scoping Session	Date
Meeting No. 1 - Site Walk	July 1, 2008
Meeting No. 2 - Development of Conceptual Site Model (CSM) and Data Quality Objectives (DQOs)	November 3, 2008

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.

Title	Date
Not Applicable – This is the initial MRP SI	

6. List organizational partners (stakeholders) and connection with lead organization:

FDEP (regulatory stakeholder)

Naval Air Station Pensacola (property owner)

7. Lead organization

Naval Facilities Engineering Command Southeast (NAVFAC SE)

8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below:

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management		
Documentation		
1	Title and Approval Page	NA
2	Table of Contents SAP Identifying Information	NA
3	Distribution List	NA
4	Project Personnel Sign-Off Sheet	NA
Project Organization		
5	Project Organizational Chart	NA
6	Communication Pathways	NA
7	Personnel Responsibilities and Qualifications Table	NA
8	Special Personnel Training Requirements Table	NA
Project Planning/Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	NA
10	Problem Definition, Site History, and Background. Site Maps (historical and current)	NA
11	Site-Specific Project Quality Objectives	NA
12	Measurement Performance Criteria Table	NA
13	Sources of Secondary Data and Information, Secondary Data Criteria and Limitations Table	NA
14	Summary of Project Tasks	NA
15	Reference Limits and Evaluation Table	NA
16	Project Schedule/Timeline Table	NA
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	NA
18	Sampling Locations and Methods/Standard Operating Procedure (SOP) Requirements Table Sample Location Map(s)	NA
19	Analytical Methods/SOP Requirements Table	NA
20	Field Quality Control Sample Summary Table	NA
21	Project Sampling SOP References Table, Sampling SOPs	NA
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	NA
Analytical Tasks		
23	Analytical SOPs, Analytical SOP References Table	NA
24	Analytical Instrument Calibration Table	NA
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	NA
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving, and Disposal Sample Handling Flow Diagram	NA
27	Sample Custody Requirements, Procedures/SOPs Sample Container	NA

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
	Identification Example Chain-of-Custody Form and Seal	
Quality Control (QC) Samples		
28	QC Samples Table, Screening/Confirmatory Analysis Decision Tree	NA
Data Management Tasks		
29	Project Documents and Records Table	NA
30	Analytical Services Table Analytical and Data Management SOPs	NA
C. Assessment Oversight		
31	Planned Project Assessments Table, Audit Checklists	NA
32	Assessment Findings and Corrective Action Responses Table	NA
33	QA Management Reports Table	NA
D. Data Review		
34	Verification (Step I) Process Table	NA
35	Validation (Steps IIa and IIb) Process Table	NA
36	Validation (Steps IIa and IIb) Summary Table	NA
37	Usability Assessment	NA

SAP WORKSHEET #3 -- DISTRIBUTION LIST

(UFP-QAPP Manual Section 2.3.1)

Name of SAP Recipients	Title/Role	Organization	Telephone Number (Optional)	E-Mail or Mailing Address	Document Control Number (Optional)
John Schoolfield	NAVFAC SE MRP Lead/Alternate (RPM)	NAVFAC SE	(904) 542-6828	john.schoolfield1@navy.mil	NA
Greg Campbell	Facility Contact (RPM)	NAVY (Pensacola)	(850) 452-3131 ext. 3007	gregory.campbell@navy.mil	NA
David Grabka	RPM	FDEP	(850) 245-8997	david.grabka@dep.state.fl.us	NA
Gerry Walker	Task Order Manager (TOM)	TtNUS	(850) 385-9899	gerry.walker@tetratech.com	NA
James Spalding	Field Operations Leader (FOL)	TtNUS	(850) 385-9899	james.spalding@tetratech.com	NA
Yarissa Martinez	Engineer	TtNUS	(850) 385-9899	yarissa.martinez@tetratech.com	NA
Kelly Carper	Quality Assurance Manager (QAM)	TtNUS	(412) 921-7273	kelly.carper@tetratech.com	NA
Janice Shilling	Laboratory Project Manager (PM)	Empirical Laboratories	(615) 345-1115	jshilling@empirlabs.com	NA

SAP WORKSHEET #4 -- PROJECT PERSONNEL SIGN-OFF SHEET

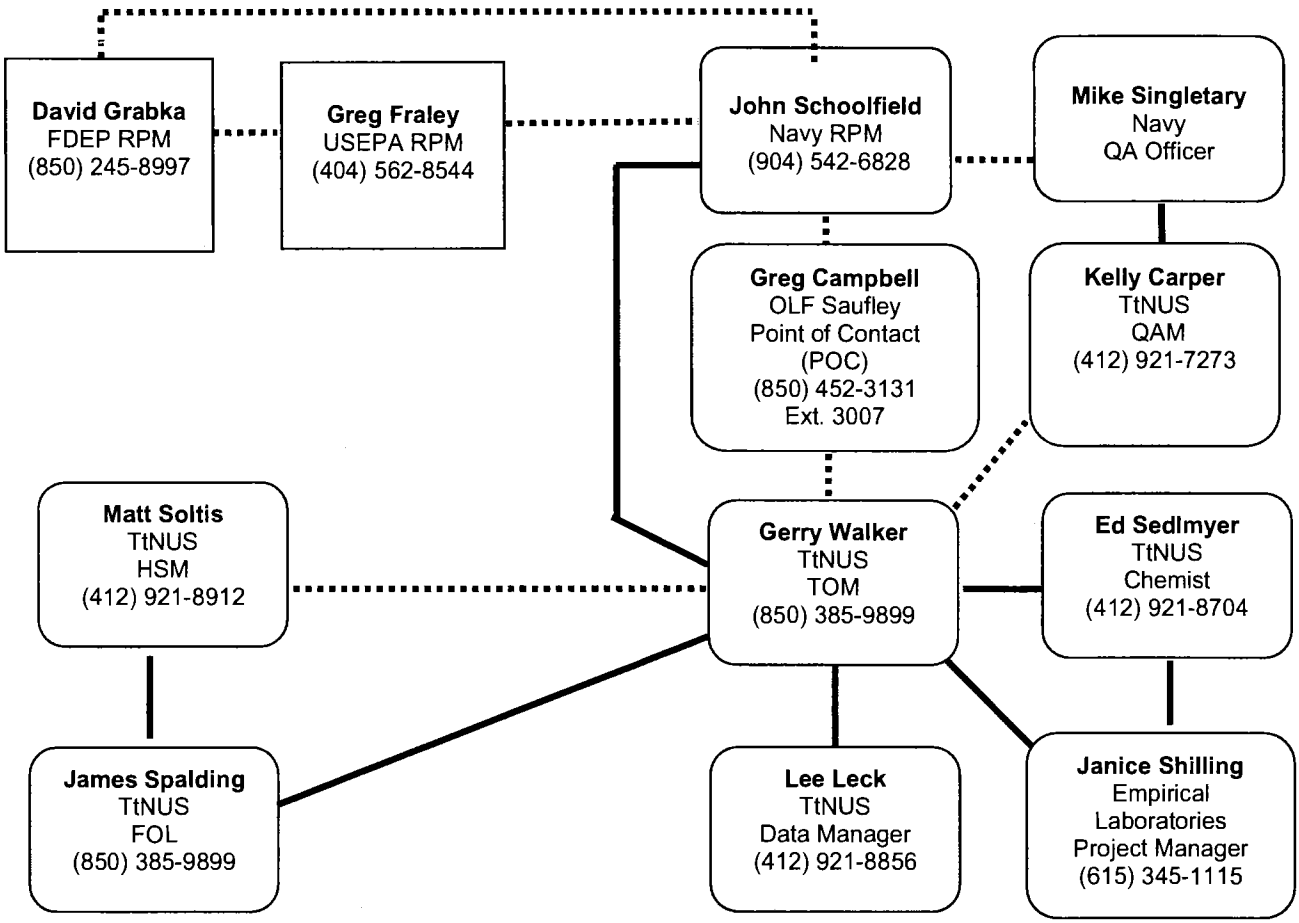
(UFP-QAPP Manual Section 2.3.2)

Name	Title/Role	Telephone Number (Optional)	Signature/E-Mail Receipt	SAP Section Reviewed	Date SAP Read
Navy and Regulator Project Team Personnel					
John Schoolfield	NAVFAC SE MRP Lead/Alternate (RPM)	(904) 542-6828	See Worksheet #1 for signature	All	
Greg Campbell	Navy Local RPM	(850) 452-3131 ext. 3007		All	
David Grabka	FDEP RPM	(850) 245-8997	See Worksheet #1 for signature	All	
TtNUS Project Team Personnel					
Gerry Walker	TOM	(850) 385-9899	See Worksheet #1 for signature	All	
James Spalding	Technical Lead	(850) 385-9899		All	
Kelly Carper	QAM	(412) 921-7273	See Worksheet #1 for signature	All	
Edward Sedlmyer	Project Chemist	(412 921-8704		WS #12, #14, #15, #19, #20, #23-28, #30, #34-37	
Matt Soltis	Health and Safety Manager (HSM)	(412) 921-8912		HASP	
Joseph Samchuck	Data Validation Manager (DVM)	(412) 921-8510		WS #12, #14, #15, #19, #20, #23-28, #30, #34-37	
Subcontractor Personnel					
Janice Shilling	Laboratory (Empirical) PM	(615) 345-1115 ext. 253		WS #12, #14, #15, #19, #20, #23-28, #30, #34-37	

SAP WORKSHEET #5 -- PROJECT ORGANIZATIONAL CHART

(UFP-QAPP Manual Section 2.4.1)

Lines of Authority ——— ..... Lines of Communication



SAP WORKSHEET #6 -- COMMUNICATION PATHWAYS

(UFP-QAPP Manual Section 2.4.2)

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
SAP Amendments	Navy RPM	John Schoolfield	(904) 543-3991	Send scope change to TtNUS Program Management Office within a week.
Schedule Changes	TtNUS TOM	Gerry Walker	(850) 385-9899	Inform Navy via schedule impact letter within 24 hours.
Field issues that require changes in the scope or implementation of field work	TtNUS TOM	Gerry Walker	(850) 385-9899	FOL immediately informs TOM and obtains his approval. If required, TOM informs Navy RPM, TtNUS TOM documents change via Field Task Modification Request (FTMR) Form within 78 hours. If required, Navy RPM issues scope change, if warranted; Scope change to be implemented before work is executed.
	TtNUS FOL	James Spalding	(850) 385-9899	
Stop work recommendations, for example, to protect workers from unsafe conditions or situations or to prevent a degradation in quality of work	TtNUS TOM	Gerry Walker	(850) 385-9899	Responsible party immediately informs subcontractors, Navy, and project team within a week.
	TtNUS FOL	James Spalding	(850) 385-9899	
	TtNUS QAM	Kelly Carper	(412) 921-7273	
	TtNUS HSM	Matt Soltis	(412) 921-8912	
	Navy RPM	John Schoolfield	(904) 543-3991	
Field or laboratory data issues	Analytical Laboratory TtNUS Project Chemist	Janice Shilling	(615) 345-1115	Immediately, within 24 hours, notify TtNUS Project Chemist when issue is related to chemical data. Notify Data Validation Staff and TtNUS TOM if necessary.
		Edward Sedlmyer	(412) 921-8704	

SAP WORKSHEET #7 -- PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
John Schoolfield	RPM	NAVFAC SE	Oversees project, scoping, data review, and evaluation.	Available on request
Greg Campbell	Navy Local RPM	NAVFAC SE	Serves as the on-site point of contact and oversees project, scoping, data review, and evaluation.	Available on request
David Grabka	FDEP RPM	FDEP	Participate in scoping, data review, and evaluation.	Available on request
Gerry Walker	TOM	TtNUS	Oversees project, financial, schedule, and technical day to day management of the project. • Ensures timely resolution of project-related technical, quality, and safety questions associated with TtNUS operations. • Functions as the primary TtNUS interface with the Navy RPM, TtNUS field and office personnel, and laboratory points of contact. • Ensures that TtNUS health and safety issues related to this project are communicated effectively to all personnel and off-site laboratories. • Monitors and evaluates all TtNUS subcontractor performance. • Coordinates and oversees work performed by TtNUS field and office technical staff (including data validation, data interpretation, and report preparation). • Coordinates and oversees maintenance of all TtNUS project records. • Coordinates and oversees review of TtNUS project deliverables. • Prepares and issues final TtNUS deliverables to the Navy.	B.S. Geology, 23 years environmental experience

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
James Spalding	FOL, Site Safety Officer (SSO)	TtNUS	Supervises, coordinates, and performs field sampling activities • Ensures that all health and safety requirements unique to the SI are implemented. • Functions as the on-site communications link between field staff members, NAVFAC SE, and the TtNUS TOM. • Alerts off-site analytical laboratories of any special health and safety hazards associated with environmental samples. • Oversees the mobilization and demobilization of all field equipment and subcontractors. • Coordinates and manages the field technical staff. • Adheres to the work schedules provided by the TtNUS TOM. • Ensures the proper maintenance of site logbooks, field logbooks, and field recordkeeping. • Initiates FTMRs (field change orders) when necessary. • Identifies and resolves problems in the field, resolving difficulties via consultation with the OLF Saufley RPM, implementing and documenting corrective action procedures, and providing communication between the field team and project management.	B.S. Geology, 6 years environmental experience

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Kelly Carper	QAM	TtNUS	Reviews SAP, oversees preparation of laboratory scope, coordinates with laboratory, and data quality review. Ensures quality aspects of the CLEAN program. • Develops, maintains, and monitors quality assurance (QA) policies and procedures. • Provides training to TtNUS staff in QA/Quality Control (QC) policies and procedures. • Conducts systems and performance audits to monitor compliance with environmental regulations, contractual requirements, QAPP requirements, and corporate policies and procedures. • Audits project records. • Monitors subcontractor quality controls and records. • Assists in the development of corrective action plans and ensuring correction of non-conformances reported in internal or external audits. • Ensures that this SAP meets TtNUS, Navy, USEPA, and FDEP requirements. • Oversees the responsibilities of the TtNUS Project QA/QC Advisor. • Prepares QA reports for management.	B.S. Biology, 17 years environmental experience
Matt Soltis	HSM	TtNUS	Oversees CLEAN Program Health and Safety Program • Provides technical advice to the TtNUS TOM on matters of health and safety. • Oversees the development and review of the Health and Safety Plan (HASP). • Conducts health and safety audits. • Prepares health and safety reports for management.	B.S. in Industrial Safety Science, CSP, CIS, 24 years environmental experience

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Edward Sedlmyer	Project Chemist	TtNUS	Coordinates analyses with laboratory chemists, ensures the scope is followed, review data packages, and communicates with TtNUS staff. • Ensures that the project meets objectives from the standpoint of laboratory performance • Provides technical advice to the TtNUS team on matters of project chemistry. • Monitors and evaluates subcontractor laboratory performance. • Ensures timely resolution of laboratory-related technical, quality, or other issues affecting project goals. • Functions as the primary interface with the subcontracted laboratory and the TtNUS TOM. • Coordinates and oversees work performed by the subcontracted laboratory. • Oversees the completion of TtNUS data validation. • Coordinates and oversees review of laboratory deliverables. • Recommends appropriate laboratory corrective actions.	B.S. Environmental Science, 21 years environmental experience
Joseph Samchuck	DVM	TtNUS	• Oversees data validation activities • Serves as communication link between TtNUS and laboratories on data validation and electronic data positing activities. • Establishes TtNUS data validation protocols in support of projects	B.S. Chemistry, MBA, M.S. Finance, 23 years environmental experience
Janice Shilling	Laboratory PM	Empirical Laboratories	Coordinates analyses with laboratory chemists, ensures that scope of work is followed, reviews data packages, and communicates with TtNUS staff.	Available on request

SAP WORKSHEET #8 -- SPECIAL PERSONNEL TRAINING REQUIREMENTS

(UFP-QAPP Manual Section 2.4.4)

All Field personnel will have appropriate training to conduct the field activities to which they are assigned. Additionally, each site worker will be required to have completed a 40-hour course (and 8-hour refresher if applicable) in Health and Safety Training as described under Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(b)(4). Safety requirements are addressed in greater detail in the corporate TtNUS HASP, which is included in Appendix D.

SAP WORKSHEET #9 -- PROJECT SCOPING SESSION PARTICIPANTS SHEET

(UFP-QAPP Manual Section 2.5.1)

Project Name: OLF Saufley Projected Date(s) of Sampling: June 2009 Project Manager: Gerry Walker	Site Name: Site 3 Pistol Range Site Location: OLF Saufley, Pensacola, Florida

Date of Session: November 4, 2008
Scoping Session Purpose: Develop CSM and DQOs

Name	Title	Affiliation	Phone Number	E-Mail Address	Project Role
Tread Kissam	Navy RPM	NAVFAC SE	904-543-3991	benjamin.kissam@navy.mil	Navy NAVFAC SE RPM
Tracie Bolaños	State RPM	FDEP	850-245-8998	tracie.bolanos@dep.state.fl.us	FDEP RPM
Greg Campbell	NAS Pensacola RPM	Navy	850-452-3131 ext 3007	gregory.campbell@navy.mil	NAS Pensacola Facility RPM
Gerry Walker	TOM	TtNUS	850-385-9899	gerry.walker@tetratech.com	TtNUS TOM
Yarissa Martínez	Engineer	TtNUS	850-385-9899	yarissa.martinez@tetratech.com	Technical Support

The November 3, 2008 scoping session addressed the OLF Saufley Site 3 Pistol Range. The purpose of the meeting was to discuss the CSM and to develop the DQOs in consensus.

- The earthen berm found at the pistol range will be sampled.
- Lead is the marker compound for other site-related contamination, as described in guidance document (ITRC, 2003). Need reference concentration, either health-based or risk-based for lead in soil to evaluate samples.
- Emphasis on field analyses, with limited laboratory analysis to confirm lead/other metal concentrations in range soil.
- Additional sample to be collected from sand dunes at the northeast side of range to verify if there could be a source.
- FDEP's 1X 10^{-6} risk benchmark (Residential and Industrial SCTLs and GCTLs) will be set as the goal to achieve a No Further Action (NFA) determination
- Yarissa Martínez, TtNUS, served as the facilitator for the meeting.

SAP WORKSHEET #10 -- PROBLEM DEFINITION, SITE HISTORY AND BACKGROUND

(UFP-QAPP Manual Section 2.5.2)

10.1 INTRODUCTION AND PROBLEM DEFINITION FOR WORKSHEET #10

The general location of OLF Saufley is shown on Figure 10.1. OLF Saufley is located on the Florida panhandle approximately five miles northwest of Pensacola, Florida. The installation currently encompasses approximately 866 acres and includes four airstrips and a number of small buildings, which are located south of the airfield.

Saufley Field, originally built and subsequently developed further to support various military activities including pilot training, is now used primarily to train and educate Navy personnel and to house federal prisoners. Previously, NAS Whiting Field pilots used two of the airstrips for touch and go landing exercises.

The majority of OLF Saufley is covered by paved runway surrounded by mowed open grassy fields and infrastructure for tenant support. Approximately 200 of the 866 acres are undeveloped. South of the airstrips, the majority of the adjacent area is predominantly wooded and supports a wide variety of flora and fauna.

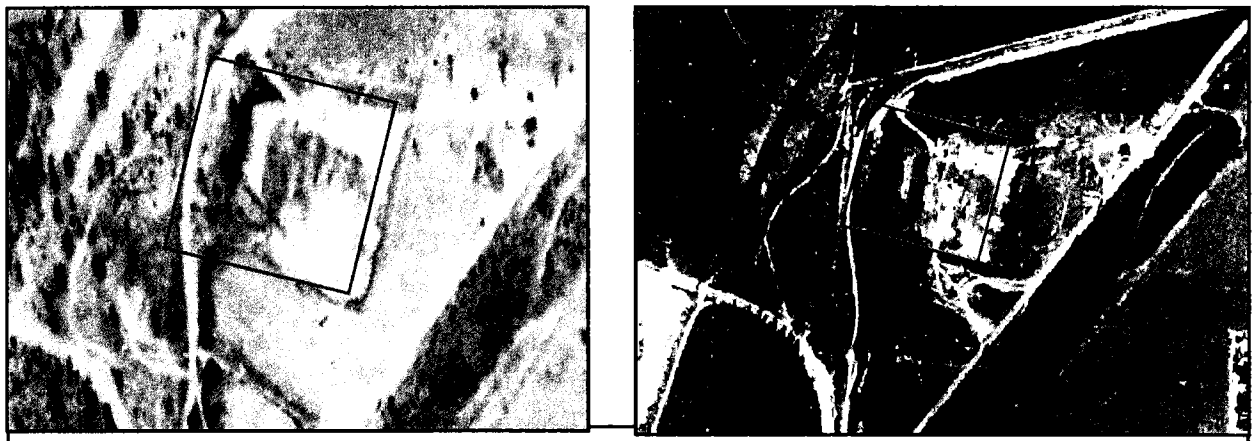


Figure 10.3 – Aerial Pictures of Site 3. The right figure is dated 1951 and the left figure is from 1958.

A PA Report (NEESA, 1992) identified the Site 3 Pistol Range, shown in Figure 10.2. The closure date for the range is not known and information regarding the historical use is scarce; however, aerial photographs from 1951 and 1958 (Figure 10-3, inserted above) show the typical layout for a small arms range that uses munitions most likely limited to small arms ammunition from 12, 16, and 20 gauge and .410 caliber shotguns. The Pistol Range – Site 3 is situated on the northwestern corner of OLF Saufley (Figure 10.2).

10.2 CONCEPTUAL SITE MODEL FOR SITE 3 PISTOL RANGE

Information regarding the Site 3 Pistol Range is limited to the history and site description presented in the PA (NEESA, 1992), which reported that there was evidence that the range was used during and after World War II; however, exact dates of use are unknown. The pistol range is a 2.47 acre area that includes a clay berm that is approximately 100 feet in length, 30 feet wide, and 20 feet high. Large amounts of spent copper- and steel-jacketed bullets are reported to have been scattered around the area (NEESA, 1992)

The locations of the former range and the associated berm were visually confirmed during the site walk visit on July 1, 2008. Though no bullet casings were observed on the range floor or the projectile fallout area during the recent site walk, various sand piles, concrete debris, and poles were observed at the site (Figure 10.4). Photographs were taken to document the current site conditions observed during the site visit and are maintained in the TtNUS project file.

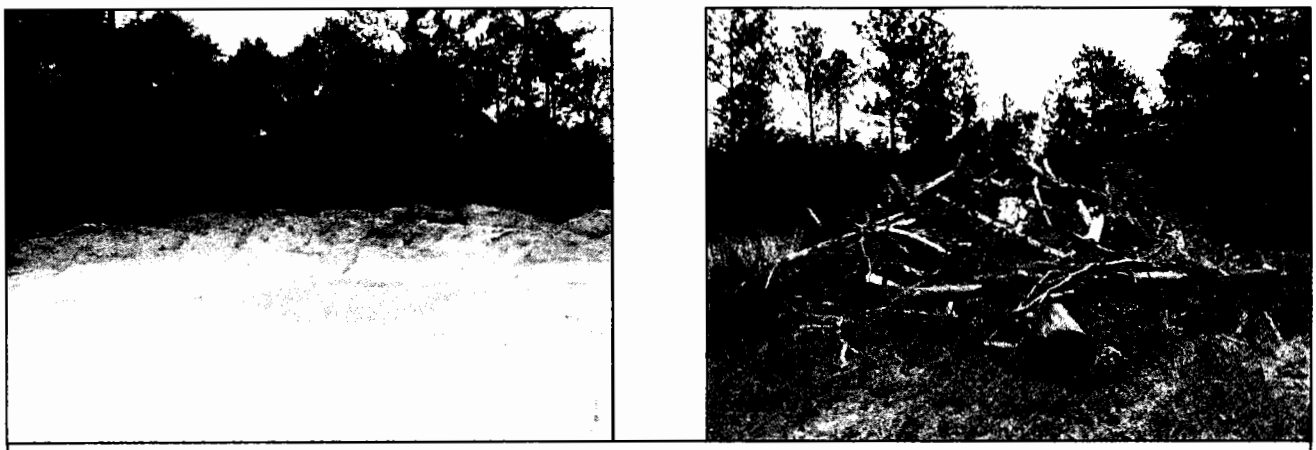


Figure 10.4: Pictures taken on July 1, 2008, during a site walk

10.2.1 Potential or Known Contaminant Sources

Historic aerial photographs were used to estimate the site layout and design of the Site 3 Pistol Range. The Interstate Technical and Regulatory Council (ITRC) Guidance document titled, "Characterization and Remediation of Soils at Closed Small Arms Firing Ranges" (January 2003), provides information on the general layout of pistol ranges, and areas that may be impacted with MC (Figure 10.5). The Site 3 Pistol Range most likely included a primary impact berm, a range floor, side berm and the safety fan, which is a fan-shaped area around the site within which projectiles may fall under a wide range of conditions.

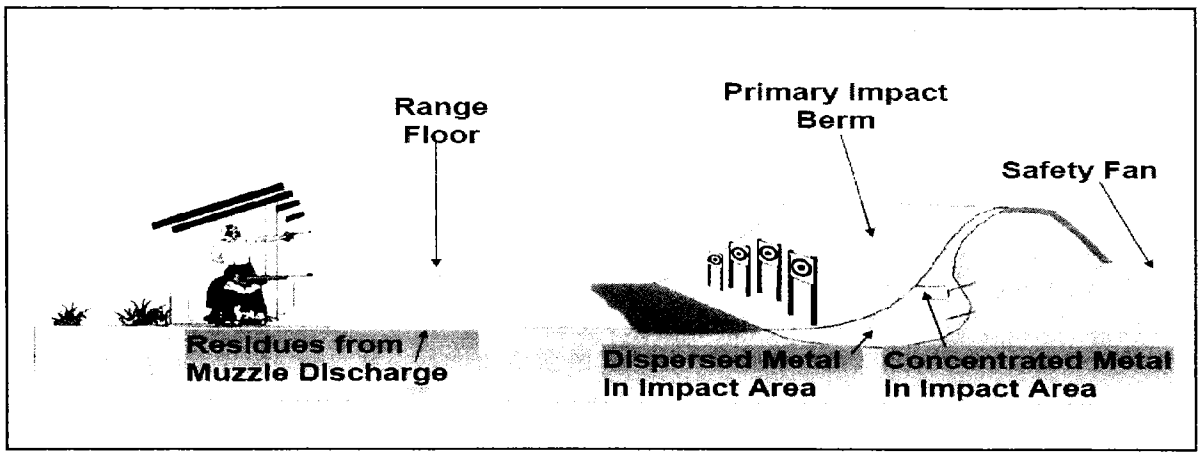


Figure 10.5: General Layout of a Pistol Range

Expended bullets passing through the targets or passing above the targets would continue on a trajectory into the earthen hillside (impact berm) behind the range targets. The downrange earthen hillside directly behind the Pistol Range targets would contain concentrated metal from the expended bullets. Bullets aimed below the range targets would impact the soil near the toe of the berm slope. Range fire that overshot the targets would impact the soil above and behind the targets but most likely within the surficial soil of the impact berm.

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 are typically at 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 side of the hill may vary depending on the soil type and other conditions but are expected to be as deep as 1 foot.

For small arms ranges like the Site 3 Pistol Range, the primary MC of concern is lead from bullets. Other associated MC, but less of a human health concern, is antimony, arsenic, copper, tin, zinc (ITRC, 2003).

10.2.2 Contaminant Migration Routes

Contaminants at the Site 3 Pistol Range have the potential to migrate within soil, groundwater, surface water and sediment through leaching due to precipitation events (FDEP, 2004). As a result of the shooting activities, surface and subsurface soils may be contaminated with metals from bullets that have weathered over time. Precipitation infiltration may mobilize lead and copper into subsurface soil and shallow groundwater, although these metals are generally considered to be nearly immobile in soil. Antimony, arsenic, and zinc are more mobile than lead and copper, but are present in the bullets and shell casings in lower concentrations (FDEP, 2004). Tin, also a minor component of the bullets would have a mobility similar to lead and copper. The leaching process for transferring metals from projectiles to soils is slow because of the relatively low surface area exposed to the elements and the virtual

insolubility of the metals in the environment. This is evident in that the bullets are easily recognizable after decades of weathering. An additional contaminant migration pathway includes storm water run-off that could have transported contaminated surface soil and dissolved chemicals, and may have further impacted nearby surface soil. MC in surface soils may also migrate via plant/animal uptake or via overland flow to lower elevations and Eleven Mile Creek.

10.2.3 Exposure Pathways/Receptors

Potentially complete exposure pathways exist for MC in both surface and subsurface soil (direct contact, ingestion and inhalation during intrusive work activities) for all potential human receptors with the exception of trespassers. It is not anticipated that trespassers would come in contact with subsurface soil. Confining layers and slow migration rates are expected to limit the migration of MC to the lower aquifers used for water supplies. Even though these migration pathways and exposure pathways are potentially complete, the scope of this investigation is limited to surface soil characterization.

10.2.4 Land Use

OLF Saufley is an active military facility. Currently, the primary mission of this facility is tenant support. Additional missions include use as an emergency landing location and support firefighting training and land use is considered to be military/industrial. There are no known future land use/development restrictions identified for the former range.

10.2.5 Access Controls/Restrictions

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.

10.3 PROBLEM STATEMENT

The Site 3 Pistol Range has been identified as a former small arms range were small arms ammunition was historically fired into the pistol range berm during target practice. Contaminants associated with small arms ranges consists of metals, primarily lead, and to a lesser extent, antimony, arsenic, copper, tin, and zinc. Lead is assumed to be the primary MC of concern because it is the primary constituent in the spent munitions. Although no records of historical usage of the site were found, studies of similar pistol ranges indicate that concentrations of MC in surface soil may exceed human health risk based screening values, and thus may pose an unacceptable risk to human health and the environment. Therefore, an SI must be conducted at Site 3 to determine whether MC is present in surface soil at concentration that are of potential concern.

REFERENCES (Worksheet #10)

FDEP 2004, Best Management Practices for Environmental Stewardship of Florida Shooting Ranges.

Geraghty and Miller, Inc. 1986. Characterization Study, Assessment of Potential Ground-water Pollution at Naval Air Station, Pensacola, Florida

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.

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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.

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

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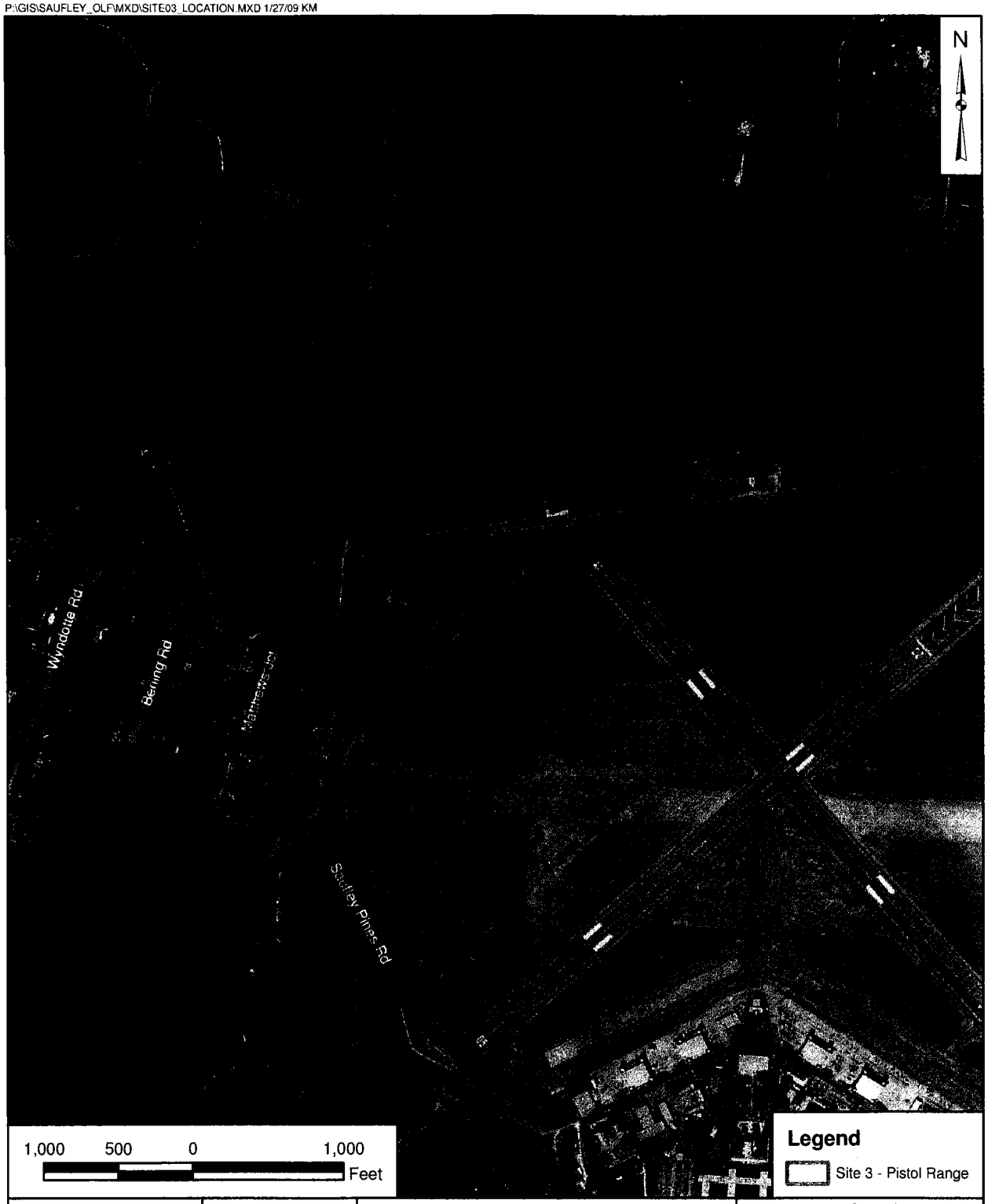

DRAWN BY K. MOORE	DATE 1/28/09	PISTOL RANGE LOCATION OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 0116
CHECKED BY P. CHURCHILL	DATE 1/28/09		APPROVED BY — / DATE —
COST/SCHED AREA			APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. 10.1 / REV 0

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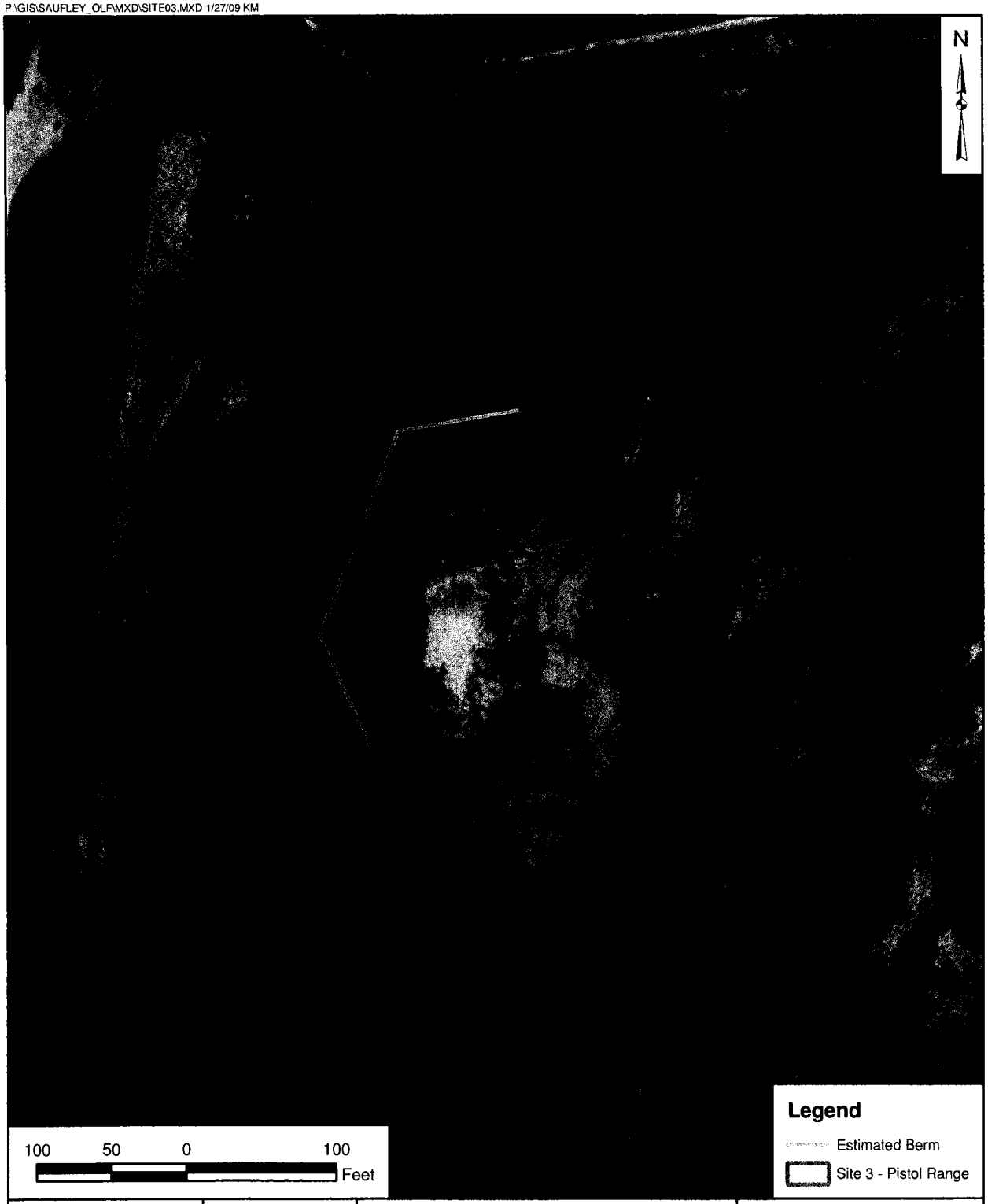

DRAWN BY K. MOORE	DATE 7/15/08	PISTOL RANGE LAYOUT OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 0116
CHECKED BY P. CHURCHILL	DATE 1/28/09		APPROVED BY — DATE —
COST/SCHED AREA			APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. 10.2 / REV 0

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SAP WORKSHEET #11 - PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS FOR THE PISTOL RANGE

STUDY GOALS

1. Determine whether MC metals (antimony, arsenic, lead, copper, tin, and zinc) concentrations in study area surface soil exceed FDEP Soil Cleanup Target Levels (SCTLs). If MC metal 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 SCTLs and Residential 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 SCTLs, then recommend NFA for the site.

2. Determine whether the Synthetic Precipitation Leaching Procedure (SPLP) leachate concentration of any MC metal (antimony, arsenic, lead, copper, 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, lead, copper, 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.

INFORMATION INPUTS

Data required for making the decisions include the following:

1. Field Screening Data: Lead concentrations in surface soil determined with a Field Portable XRF spectrometer. These measurements will be used as a field screening tool for potential contaminant delineation purposes and for locating hot-spots of metals contamination under the assumption that lead concentrations are correlated to other metal concentrations (i.e., high lead concentrations indicates high concentrations of at least one other metal and low lead concentrations are indicators that the other metal concentrations are low). The XRF SOP-01 is included in Appendix A.

2. Laboratory Target Analyte Data: laboratory analyses will be used to determine the concentrations of the six MC metals of concern in surface soil. The data will also be used to determine the potential of contaminated soil to impact groundwater. Soil samples will be analyzed for MC

metals (antimony, arsenic, lead, copper, tin, and zinc) using SW-846-6010B/7471B and SW 846-1312/6010B/7470A.

3. Miscellaneous Laboratory Soil Parameters: Soil Total Organic Carbon (TOC), Cation Exchange Capacity (CEC) and pH will be determined by the laboratory using the Lloyd Kahn, SW-846 9081 and SW 846-9045C methods, respectively. These data are necessary for the evaluation of MC environmental fate and transport, if contamination is detected.

4. Field identification/classification of soil types [i.e., lithology and Unified Soil Classification System (USCS) for grain size, color, plasticity, etc.] will be indentified and used with the SPLP analytical results in order to understand potential contaminant mobility. Worksheet #21 provides relevant SOPs.

5. Project Action Limits: This investigation requires field screening and chemical data that can be used to determine whether further investigation is necessary. To conduct comparisons of site data to screening values, the laboratory quantitation limits must be low enough to measure MC metals concentrations to regulatory or other stringent and conservative values. For this site investigation the screening values, which are also the project action limits (PALs), are as follows:

   - FDEP SCTLs (SCTLs for Residential and Industrial Use [Chapter 62-777 Florida Administrative Code (F.A.C.)].
   - FDEP GCTLs (Chapter 62-777 F.A.C.).
   - XRF Field Screening PAL: A value of 200 mg/kg will be used in the field as a screening value to trigger step-out sample collection. This value represents the lead SCTL divided by half with a conservative margin of error.

DEFINE THE BOUNDARIES OF THE STUDY

The current site investigation is limited to the evaluation of surface soil at the pistol range. An investigation of groundwater and subsurface soil is beyond the scope of this investigation, but may be required later during an RI. The pistol range lateral site boundary is presented in Figure 10.2. Establishing the nature and extent of surface soil contamination will require that both contaminated and non-contaminated soil be sampled (i.e., the perimeter of the impacted area must be established). The following items address the horizontal and vertical boundaries as well as the temporal boundaries for the study:

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

2. The initial horizontal study boundary will encompass the area that is most likely to have been impacted by site activities (the berm face and range floor). Lateral expansion of the horizontal study boundary via XRF Field Screening may be necessary during this investigation. Therefore, contaminant concentrations on both sides of the boundary are of interest.

3. The initial vertical study boundary will be limited to 2 feet below ground surface (bgs) in order to be conservative, 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 0-2 feet bgs and requires data from two intervals including, the 0-6 inch depth and the 6-24 inch depth in order to characterize surface soil. Additionally, receptors are generally exposed to this interval of surface soil when visiting the site.

4. Temporal boundaries are not a significant consideration in this study because MC metals concentrations are anticipated to be relatively unchanged (stable) over the course of time needed to conduct the environmental investigations and into the foreseeable future.

DEVELOP THE ANALYTIC APPROACH

There are two main aspects of this investigation. One is comparison of data to action levels to determine an appropriate course of action designed to mitigate potential unacceptable risks. The other is field delineation of contamination, which requires decisions to be made in the field based on field measurements. This delineation is designed to be a first attempt at delineation of soil contamination and full delineation may not be achieved. Decision making will be conducted using the following approaches for determining the nature and extent of contamination at the site. All of the factors, including field screening and characterization of surface soil contamination, must be considered when planning further studies or response actions for the Site 3 Pistol Range.

<u>XRF Field Screening:</u>

Lead concentrations in surface soil will be determined in the field using a Field Portable XRF spectrometer. A correlation study comparing XRF and off-site analytical data will be completed after the field effort to establish laboratory equivalent lead concentrations based on the field measurements. If a field XRF-measured lead result of a perimeter sample location exceeds 200 milligrams per kilogram (mg/kg), then limited "step-out" sampling will be conducted as follows:

- Step out samples will include screening of both surface soil intervals at 0-6" bgs and 6'-24' bgs.
- If the XRF measured concentration in the first step-out sample is less than 200 mg/kg, no more step-out samples will be collected. If the first step-out sample exceeds 200 mg/kg, a second step-out sample will be collected. No more than two step-out samples will be collected from the initial grid square with the measured reading above 200 mg/kg. The step-out samples will be collected in a location that is equidistant from the previously collected sample and in a direction that is toward anticipated lower contaminant concentrations.

Characterization Approach:

Individual chemical concentrations will be determined in surface soil for each of the MC metals through fixed-base laboratory analysis. These concentrations will be compared to the screening values listed in Worksheet 15.

- If the antimony, arsenic, lead, copper, tin, and zinc (MC metals) concentration is less than its Residential SCTL in all soil samples, then recommend NFA for the site.
- If the MC metal concentration is equal to or greater than its Residential SCTL and less than its Industrial SCTL, then recommend NFA with LUCs as a remedy for the site.,.
- If the MC metal concentration in any sample is greater than its Industrial SCTL, then compute the 95% UCL for that metal using all of the analytical soil data collected for that metal. If the 95% UCL concentration also exceeds the screening value, conduct an Interim Removal Action (IRA) at the site. If the 95% UCL concentration is less than the screening value, conduct a cost-benefit evaluation to determine if further study is necessary to assess risk and complete delineation of contamination at the site. Also considered in the cost benefit analysis is whether an interim removal action would cost-effectively reduce contaminant concentrations and allow rapid closure of the site. Details on the cost-benefit approach will be developed by the project team if this action is implemented. The tendency will be for the team to recommend an interim action if the nature and extent of contamination is well defined, otherwise continue with site characterization.

SPLP will be performed on 6 to 24-inch depth surface soil in order to determine whether any potential contamination on the surface (such as lead bullets) has leached to subsurface soils and groundwater at unacceptable concentrations. Leachate concentrations will be compared to FDEP GCTLs for the MC metals. If leachate concentrations exceed the GCTLs, then further investigation and evaluation of the threat to groundwater will be recommended for the site. Any further studies will be presented in a separate UFP-SAP.

SPECIFY PERFORMANCE OR ACCEPTANCE CRITERIA

The surface soil samples will be collected from areas known to be or most likely to be contaminated plus samples that help to bound the lateral and vertical extent of contamination. The intent is to bound the contamination, if present, within a limited number of step-out rounds and to determine whether further investigation is necessary based on comparison of individual sample results to numerical action levels. This biased selection of sample locations and data use does not support the use of statistics to estimate decision performance as specified in the DQO guidance (USEPA, 2006). Instead, the project team selected locations and numbers of samples which, based on their experience, will support the attainment of the stated project objectives. Biasing the sampling toward areas most likely to have been contamination is a major part of this strategy because only one sample must have one parameter concentration in excess of an action level to conclude that additional evaluation is necessary. The Project Team will use the results of the investigation to determine whether the amount and type of data collected is sufficient to support the attainment of project objectives. This will involve an evaluation of contaminant concentrations and concentrations patterns to ensure that contaminants are likely to have been detected if present, and that enough data have been collected to support the site investigation. The project team will review the field screening and analytical results to ensure that all viewpoints are included in decision making.

DEVELOP THE PLAN FOR OBTAINING DATA

A grid pattern will be extended over the site as shown on Figure 11.1 to aid in the placement of sample locations. The sampling approach will be the following:

- Surface soil samples will be collected from two surface soil intervals (0 – 6" and 6"-24" bgs) at locations indicated on Figure 11.1 and screened for lead by XRF.
- If XRF-measured lead result of a perimeter sample location exceeds the field screening value of 200 milligrams per kilogram (mg/kg), then limited "step-out" sampling of both surface soil intervals will be conducted. If the XRF measured concentration in the first step-out sample is less than 200 mg/kg, no more step-out samples will be collected. If the first step-out sample exceeds 200 mg/kg, a second step-out sample will be collected. No more than two step-out samples will be collected from the initial grid square with the measured reading above 200 mg/kg. The step-out samples will be collected in a location that is equidistant from the previously collected sample.
- 20 surface soil samples representing a range of lead concentrations as determined by XRF will be sent to a fix based laboratory for analysis of lead, arsenic, antimony, zinc, copper and tin. These results will be used to characterize the site through comparison to regulatory criteria and establish the correlation between field and laboratory measurements. An explanation of the correlation study is included in the XRF SOP found in Appendix A.

- At the location of the highest lead concentration indicated by XRF field analysis, a sample will be collected and sent to a fixed-base laboratory for SPLP analysis of lead, arsenic, antimony, zinc and tin.
- One sample, in an area determined to be uncontaminated with lead via XRF analysis, will be analyzed for pH, TOC, and CEC analysis.
- Several stockpiles of sand were observed during a recent site visit. A stockpile soil sample will be collected from the sand stockpiles to determine whether this material contains any of the MC metals being investigated at Site 3.

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DRAWN BY K. MOORE	DATE 1/28/09	PISTOL RANGE SAMPLE GRID OLF SAUFLEY PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 0116
CHECKED BY P. CHURCHILL	DATE 6/23/09		APPROVED BY — DATE —
COST/SCHED AREA			APPROVED BY — DATE —
SCALE AS NOTED			FIGURE NO. 11.1 / REV 0

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SAP WORKSHEET #12 -- MEASUREMENT PERFORMANCE CRITERIA TABLE – FIELD QUALITY CRONTROL SAMPLES

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Field Blank	All Fractions	One per source water	Bias/Contamination	Detections ≤ Quantitation Limit (QL).	S&A
Equipment Rinsate Blanks	All Fractions	One per 20 field samples per matrix per sampling equipment	Bias/Contamination	Detections ≤ QL	S&A
Field Duplicate	All Fractions	One per 10 field samples collected	Precision	Soil samples Relative Percent Difference (RPD) RPD 50	S
Cooler Temperature Blank	All Fractions	One per cooler	Accuracy / Representativeness	Between 2 and 6 ° C	S&A

SAP WORKSHEET #13 -- SECONDARY DATA CRITERIA AND LIMITATIONS TABLE

(UFP-QAPP Manual Section 2.7)

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation / collection dates)	How Data Will Be Used	Limitations on Data Use
Aerial Photographs	State University System of Florida	1941, 1951, and 1958	Show range layout when during active period	None
Historical information	PA Report May 1992	NEESA February 1992	Basis for UFP-SAP and site history	None

SAP WORKSHEET #14 -- SUMMARY OF PROJECT TASKS

(UFP-QAPP Manual Section 2.8.1)

FIELD INVESTIGATION TASKS

The field activities include:

- Mobilization and demobilization
- Health and Safety Training
- Utility clearance
- Field XRF measurements
- Surface Soil Sampling
- Field Decontamination Procedures
- Field documentation QA/QC Tasks
- Sample Custody and Shipment Task

14.1 MOBILIZATION/DEMOBILIZATION

Mobilization shall consist of the delivery of all equipment, materials, and supplies to the site, the complete assembly in satisfactory working order of all such equipment at the site, and the satisfactory storage at the site of all such materials and supplies. TtNUS will coordinate with the base to identify locations for the storage of equipment and supplies.

Demobilization shall consist of the prompt and timely removal of all equipment, materials, and supplies from the site following completion of the work. Demobilization includes the cleanup and removal of waste generated during the investigation.

14.2 HEALTH AND SAFETY TRAINING

Site-specific Health and Safety Training to all TtNUS field staff and subcontractors will be provided as part of the site mobilization.

14.3 UTILITY CLEARANCE

Prior to the commencement of any intrusive activities TtNUS will coordinate with the base. The base will identify and mark-out utilities that may be present within the proposed surface sampling areas and contact with these utilities will be avoided during sample collection.

14.4 SURFACE SOIL SAMPLING

After a field walkthrough, the sampling grid will be laid out. Sampling grid locations are shown in Figure 11.1. The soil will be described by the site geologist. Any qualitative visual signs of potential contamination (such as soil staining or bullet casings) will be noted. Soil sampling procedures are discussed in SOP SA-1.3, and soil logging procedures are documented in SOP GH-1.5. These SOPs are included in Appendix A of this SAP.

The samples will be obtained via hand auger and a field portable XRF will be used to analyze the samples for lead, a portion of which will be analyzed at a fixed-base laboratory (see Worksheet #18 for analytical methods). Field and laboratory QC samples will also be collected in accordance with Worksheet #12 of this SAP.

14.5 FIELD DECONTAMINATION PROCEDURE

Sample containers will be provided certified-clean from the analytical laboratories. Decontamination of sampling equipment (e.g., non-disposable hand trowels, hand augers) will be conducted prior to and between sampling at each location, following TtNUS SOP SA-7.1. At each site, an abbreviated decontamination procedure consisting of a soapy water (laboratory-grade detergent) rinse followed by a deionized (DI) water rinse will be performed.

14.6 FIELD DOCUMENTATION PROCEDURES

Field documentation will be performed in accordance with SOP SA-6.3 presented in Appendix A. All Field Forms are provided in Appendix C.

14.7 SAMPLE COLLECTION DOCUMENTATION, HANDLING, TRACKING AND CUSTODY PROCEDURES

The following sections outline the procedures that will be used to document project activities and sample collection, handling, tracking, and custody procedures during performance monitoring tasks. Detailed and accurate documentation is necessary to ensure data integrity, authenticity, and defensibility.

14.7.1 Sample Collection Documentation

Samples will be collected following procedures outlined in SOP SA-1.3 and SOP GH-1.5 (Appendix A). The equipment used to collect the sample shall be noted in the logbook, along with date and time of sampling, sampler's name, sample description, depth at which the sample was collected, and the volume and number of containers collected. QC sample information shall be appropriately recorded.

Measurements made shall be recorded. All instruments used to make measurements shall be identified, along with the date of calibration.

Standard log sheets will be used to record data and will include:

- Soil sample log
- Chain-of-custody (COC) record.

Log sheets shall include entries in every blank, with appropriate use of the abbreviations NA (not applicable) and NR (not recorded). All "NR" entries must be accompanied by an explanation. All entries will be recorded in waterproof ink and signed and dated by the person making the entry. No erasures may be made. If an incorrect entry is made, the information shall be crossed out with a single strike mark, the correct entry recorded, and the change initialed and dated by the person making the correction.

14.7.2 Sample Handling and Tracking System

Sample handling, custody, and delivery will be implemented in accordance with TtNUS SOP SA-6.1 and described in Worksheet #27.

SAP WORKSHEET #15 -- REFERENCE LIMITS AND EVALUATION TABLE

15.1 Matrix: Soil

Analytical Group: Inorganics - MC Metals (Fixed-Base Laboratory)

Analyte	CAS Number	Project Action Limit [1] (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Empirical Laboratory [2]	
					Quantitation Limit (mg/kg)	Method Detection Limit (mg/kg)
Antimony	7440-36-0	27	FDEP Residential SCTL	0.27	0.75	0.25
Arsenic	7440-38-2	3.2	FDEP Residential SCTL	0.5	0.50	0.15
Copper	7440-50-8	150	FDEP Residential SCTL	5	5	1
Lead	7439-92-1	400	FDEP Residential SCTL	0.5	0.6	0.3
Tin	7439-92-1	47,000	FDEP Residential SCTL	2.5	2.5	0.5
Zinc	7440-06-66	26,000	FDEP Residential SCTL	4	4	1

Abbreviations
CAS = Chemical Abstracts Service
FDEP = Florida Department of Environmental Quality
SCTL = Florida Soil Cleanup Target Level (Residential) (http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableII_SoilCTLs.pdf)
mg/kg = milligrams per kilogram

Footnotes:
1 Project Action limits are risk based human health criteria.
2 The Quantitation Limit and Method Detection Limit for Empirical Laboratory are presented.

15.2 Matrix: Soil

Analytical Group: Lead (Field Data Collected via Field Portable X-Ray Fluorescence Analyzer)

Analyte	CAS Number	Project Action Limit (1) (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Method Detection Limit (2) (mg/kg)
Lead	7439-92-1	200	FDEP Residential SCTL	60	20

Notes:
CAS = Chemical Abstracts Service
FDEP = Florida Department of Environmental Quality
SCTL = Florida Soil Cleanup Target Level (Residential) (http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableII_SoilCTLs.pdf)
mg/kg = milligrams per kilogram

Footnotes:
1 Project Action limit was determined by dividing the SCTL for lead by half as discussed by the partnering team.
2 *"XRF Technologies for Measuring Soil and Sediment"* - USEPA/540/R-06/002. February 2006

15.3 Matrix: Leachate

Analytical Group: SPLP MC Metals (Fixed-Base Laboratory)

Analyte	CAS Number	Project Action Limit [1] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific [2]	
					Quantitation Limit (µg/L)	Instrument Detection Limit (MDL) (µg/L)
Antimony	7440-36-0	6.0	FDEP MCL	1.0	1.0	0.12
Arsenic	7440-38-2	50.0	FDEP MCL	5.0	5.0	1.47
Copper	7440-50-8	100	FDEP Secondary Drinking Water Criteria	1.0	1.0	0.28
Lead	7439-92-1	15.0	FDEP MCL	1.0	1.0	0.11
Tin	7439-92-1	4200	FDEP GCTL	1.0	1.0	0.30
Zinc	7440-06-66	500	FDEP Secondary Drinking Water Criteria	10	10	0.90

Notes:
CAS = Chemical Abstracts Service
FDEP = Florida Department of Environmental Quality
GCTL= Groundwater Cleanup Target Level (http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableI_GroundwaterCTLs.pdf)
MCL = Maximum Contaminant Level (http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf)
µg/L = micrograms per liter

Footnotes:
1 Project Action limits are GCTLs as presented in FDEP 62-777.
2 The Quantitation Limit and Method Detection Limit for Empirical Laboratory are presented.

SAP WORKSHEET # 16 -- PROJECT SCHEDULE / TIMELINE TABLE (OPTIONAL FORMAT)

(UFP-QAPP Manual Section 2.8.2)

Activities	Organization	Dates		Deliverable
		Anticipated Date(s) of Initiation	Anticipated Date of Completion	
Prepare Rough Draft SI Work Plan & Appendices	TtNUS	08/08	03/08	
Submit Rough Draft SI Work Plan & Appendices	TtNUS	03/09	03/09	
Navy Review	Navy	03/09	06/09	
Prepare Draft SI Work Plan & Appendices	TtNUS	06/09	06/09	
Submit Draft SI Work Plan & Appendices	TtNUS	06/09	06/09	Draft SI Work Plan
Regulator Review	USEPA & FDEP	07/09	07/09	
Receive Comments/Comment Resolution	TtNUS	07/09	07/09	
Prepare Final SI Work Plan & Appendices	TtNUS	07/09	07/09	
Submit Final SI Work Plan & Appendices	TtNUS	07/09	07/09	Final SI Work Plan
Mobilization and Field Investigation	TtNUS	07/09	07/09	
Complete Field Investigation and Demobilization	TtNUS	07/09	07/09	
Laboratory Analysis	Empirical Laboratories	07/09	7/09	
Data Validation	TtNUS	8/09	8/9	
Database Entry	TtNUS	8/9	9/09	
Prepare Rough Draft SI Report	TtNUS	02/10	03/10	

Activities	Organization	Dates		Deliverable
		Anticipated Date(s) of Initiation	Anticipated Date of Completion	
Submit Rough Draft SI Report	TtNUS	03/10	03/10	
Navy Review	Navy	03/10	04/10	
Prepare Draft SI Report	TtNUS	04/10	04/10	
Submit Draft SI Report	TtNUS	04/10	04/10	Draft SI Report
Regulator Review	USEPA & FDEP	04/10	06/10	
Receive Comments/Comment Resolution	TtNUS	06/10	06/10	
Prepare Final SI Report	TtNUS	06/10	07/10	
Submit Final SI Report	TtNUS	07/10	07/10	Final SI Report

SAP Worksheet #17 – Sampling Design and Rationale

(UFP-QAPP Manual Section 3.1.1)

The sampling design consists of samples spaced in a grid pattern along transects extending from the face of the berm and along the range floor. The grid is centered over and extends beyond the area expected to contain the highest concentration of spent bullets. This area is immediately behind the targets, and at the toe of the berm behind the targets. The sampling objective is to determine whether specific metals, associated with the use of the site as a small arms range, are present in soil at concentrations that exceed SCTLs. All field visual observations including physical observation of lead shot and bullets, topography, debris encountered and the geology of the site, will be recorded on sample log sheets. Any bullets, bullet fragments, or lead shot observed in a sample will be removed in accordance with the SOP for the Field Portable XRF. Any encounters with metallic objects or other objects that indicate a potential contaminant source or hazard will be reported to the FOL and SSO, and appropriate actions will be taken as specified in this UFP-SAP and associated HASP.

All sampled locations will be marked with a wooden or plastic stake or pin flag. The FOL may use professional judgment to implement to sampling plan. Sample locations may be adjusted due to field observations and conditions. Coordinates will be determined by global positioning system (GPS) at each individual sample location. The coordinate system used for this shall be recorded on the field log sheet

In order to meet the FDEP requirements for the characterization of surface soil, two soil samples will be collected from each location shown on Figure 11.1, including one sample from the 0" to 6" bgs interval and another sample from 6" to 24" inch bgs interval. A clean decontaminated hand auger will be used to collect each sample interval. Each soil sample will be placed in a bowl and thoroughly homogenized prior to containerization. Each surface soil sample from both intervals will be screened with the XRF spectrometer. If XRF-measured lead result of a perimeter sample location exceeds the field screening value of 200 milligrams per kilogram (mg/kg), then limited "step-out" sampling of both surface soil intervals will be conducted. If the XRF measured concentration in the first step-out sample is less than 200 mg/kg, no more step-out samples will be collected. If the first step-out sample exceeds 200 mg/kg, a second step-out sample will be collected. No more than two step-out samples will be collected from the initial grid square with the measured reading above 200 mg/kg. The step-out samples will be collected in a location that is equidistant from the previously collected sample.

Twenty surface soil samples representing a range of lead concentrations as determined by XRF will be sent to a fixed-base laboratory for analysis of lead, arsenic, antimony, zinc, copper and tin. The analytical results will be used to determine if MC concentrations in surface soil exceed regulatory criteria. A secondary use of the analytical data is to begin delineation of potential contamination. To meet this goal, the XRF data will be correlated with off-site laboratory results. The samples for off site analysis will be

selected to span the entire range of lead concentrations as determined using field XRF measurements. An explanation of the correlation study is included in the SOP-01 found in Appendix A.

Additionally, the sample with the highest lead concentration, according to the XRF results, from the 6 to 24 inch bgs interval, will be selected for SPLP analysis. One sample will be also be collected and sent to the laboratory for pH, TOC, and CEC analysis in an area determined to be uncontaminated via XRF analysis, to provide data for further evaluation of potential impact to groundwater.

There are several stockpiles of sand located at the site. These stockpiles are visible on Figure 11.1. One surface soil sample will be collected from a sand stockpile to ensure this material does not contain any of the MC metals being investigated at Site 3.

SAP WORKSHEET #18 -- SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE

(UFP-QAPP Manual Section 3.1.1)

Surface Soil Sample Location[1]	Sample ID[2]	Metals	
		Field Portable XRF (Lead Only)	SW-846 - 6010B (Sb, As, Cu, Pb, Sn, Zn) [3]
PRSBC4	PRSBC4-0/0.5	1	TBD
PRSBC4	PRSBC4-0.5/2.0	1	TBD
PRSBC5	PRSBC5-0/0.5	1	TBD
PRSBC5	PRSBC5-0.5/2.0	1	TBD
PRSBC6	PRSBC6- 0/0.5	1	TBD
PRSBC6	PRSBC6-0.5/2.0	1	TBD
PRSBC7	PRSBC7-0/0.5	1	TBD
PRSBC7	PRSBC7-0.5/2.0	1	TBD
PRSBD4	PRSBD4-0/0.5	1	TBD
PRSBD4	PRSBD4-0.5/2.0	1	TBD
PRSBD5	PRSBD5-0/0.5	1	TBD
PRSBD5	PRSBD5-0.5/2.0	1	TBD
PRSBD6	PRSBD6- 0/0.5	1	TBD
PRSBD6	PRSBD6-0.5/2.0	1	TBD
PRSBD7	PRSBD7-0/0.5	1	TBD
PRSBD7	PRSBD7-0.5/2.0	1	TBD
PRSBE4	PRSBE4-0/0.5	1	TBD
PRSBE4	PRSBE4-0.5/2.0	1	TBD
PRSBE5	PRSBE5-0/0.5	1	TBD
PRSBE5	PRSBE5-0.5/2.0	1	TBD
PRSBE6	PRSBE6- 0/0.5	1	TBD
PRSBE6	PRSBE6-0.5/2.0	1	TBD
PRSBE7	PRSBE7-0/0.5	1	TBD
PRSBE7	PRSBE7-0.5/2.0	1	TBD
PRSBF4	PRSBF4-0/0.5	1	TBD
PRSBF4	PRSBF4-0.5/2.0	1	TBD
PRSBF5	PRSBF5-0/0.5	1	TBD

Surface Soil Sample Location[1]	Sample ID[2]	Metals	
		Field Portable XRF (Lead Only)	SW-846 - 6010B (Sb, As, Cu, Pb, Sn, Zn) [3]
PRSBF5	PRSBF5-0.5/2.0	1	TBD
PRSBF6	PRSBF6- 0/0.5	1	TBD
PRSBF6	PRSBF6-0.5/2.0	1	TBD
PRSBF7	PRSBF7-0/0.5	1	TBD
PRSBF7	PRSBF7-0.5/2.0	1	TBD
PRSBG4	PRSBG4-0/0.5	1	TBD
PRSBG4	PRSBG4-0.5/2.0	1	TBD
PRSBG5	PRSBG5-0/0.5	1	TBD
PRSBG5	PRSBG5-0.5/2.0	1	TBD
PRSBG6	PRSBG6- 0/0.5	1	TBD
PRSBG6	PRSBG6-0.5/2.0	1	TBD
PRSBG7	PRSBG7-0/0.5	1	TBD
PRSBG7	PRSBG7-0.5/2.0	1	TBD
Field Duplicate		1	TBD
Total Soil Samples – Pistol Range		20	TBD
SPLP Sample[4]		1	TBD
Step-out Samples[5]		TBD	TBD
pH, TOC, and CEC Sample[6]		1	TBD

Notes:

As = Arsenic
Cu = Copper
Pb = Lead
Sb = Antimony
Sn = Tin
Zn = Zinc

XRF = X-ray fluorescence
ID = Identification
CEC = Cation exchange capacity
TBD = To be determined
TOC = Total organic carbon
SPLP = Synthetic Precipitation Leaching Procedure

1 PR = Pistol Range
2 Sample depth to a maximum of 2 feet bgs for surface soil. Samples will be collected in accordance with SOP-05.
3 Dependent on field XRF screenings, up to 20 soil samples will be selected for specific metals analysis at a fixed-base laboratory.
4 Dependent on field XRF screenings, one soil sample will be selected for SPLP analysis at a fixed-base laboratory.
5 Based on field observations and conditions at the time of sampling, up to 2 step-out soil samples may be collected.
6 One sample will be also be collected and send to the laboratory for pH, TOC, and CEC analysis in an area determined to be uncontaminated via XRF analysis.

SAP WORKSHEET #19 -- ANALYTICAL SOP REQUIREMENTS TABLE

Fixed-Base Laboratory Analysis

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Container (number, size, and type)	Sample Volume (units)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time[1] (preparation / analysis)
Solid	Select Metals (Sb, As, Cu, Pb, Sn, Zn)	SW-846 6010B, 3050/SOP-100/105	One 4 ounce glass soil jar	1-2 grams	Cool to between 2 and 6 ° C	6 months to analysis
	SPLP Metals (Sb, As, Cu, Pb, Sn, Zn)	SW-846 1312, 6010B, 3010/SOP-147/100/105	Two 4 ounce glass soil jar	100 grams	Cool to between 2 and 6 ° C	14 days to SPLP/6 months to analysis
	TOC	Lloyd Kahn/ SOP-221	One 4 ounce glass soil jar	100 grams	Cool to between 2 and 6 ° C	14 days to analysis
	pH	SW-846 9045C/ SOP-187	One 4 ounce glass soil jar	100 grams	Cool to between 2 and 6 ° C	As soon as possible
	CEC	EPA 9081	One 4 ounce glass soil jar	100 grams	Cool to between 2 and 6 ° C	14 days until extractions /7 days to analysis

Field Portable XRF

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Container (number, size, and type)	Sample Volume (units)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time[1] (preparation / analysis)
Solid	Lead	TtNUS SOP (SOP-01) and manufacturer SOP	One 4 ounce glass soil jar	1-2 grams	Cool to 4° C	6 months to analysis

Notes:

[1] Maximum holding time is calculated from the time the sample is collected to the time the sample is prepared/extracted.

As = Arsenic

Cu = Copper

Pb = Lead

Sb = Antimony

Sn = Tin

Zn = Zinc

SAP WORKSHEET #20 -- FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Fixed-Base Laboratory Analyses

Matrix	Analytical Group	Concentration Level	No. of Sampling Locations	No. of Field Duplicates	No. of Equip. Blanks	Total No. of Samples to Laboratory
Solid (Soil)	Metals (Sb, As, Cu, Pb, Sn, Zn)	Low to Moderate	20	1	1	22
Solid (Soil)	pH, CEC, TOC	Low to Moderate	1	0	0	1
Solid (Soil)	SPLP Metals	Low to Moderate	1	0	0	1

As = Arsenic

Cu = Copper

Pb = Lead

Sb = Antimony

Sn = Tin

Zn = Zinc

SAP WORKSHEET #21 -- PROJECT SAMPLING SOP REFERENCES TABLE

(UFP-QAPP Manual Section 3.1.2)

Reference Number	Title, Revision Date and/or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP-SA-6.3	Sample Labeling	TtNUS	NA	N	Contained in Appendix A
SOP-CT-04	Sample Identification Nomenclature	TtNUS	NA	N	Contained in Appendix A
SOP-SA-6.3	Sample Custody and Documentation of Field Activities	TtNUS	Field log book, sample log sheets, boring logs	N	Contained in Appendix A
SOP-SA-7.1	Decontamination of Field Sampling Equipment	TtNUS	Decontamination equipment, scrub brushes, 5-gallon buckets, spray bottles, phosphate-free detergent, deionized (DI) water	N	Contained in Appendix A
SOP-SA-1.3	Soil Sampling	TtNUS	Stainless steel auger bucket, extension rods, and T-handle	N	Contained in Appendix A
SOP-SA-7.1	Management of Investigation-Derived Waste	TtNUS	NA	N	Contained in Appendix A
SOP-GH-1.5	Borehole and Soil Sample Logging	TtNUS	USCS Card, Logbook	N	Contained in Appendix A
SOP-SA-6.1	Non-Radiological Sample Handling	TtNUS	NA	N	Contained in Appendix A
SOP-01	Standard Operating Procedures for Analyzing Lead Using Field Portable X-Ray Fluorescence	TtNUS	Portable X-ray fluorescence analyzer and accessories	N	Contained in Appendix A

SAP WORKSHEET #22 -- FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION TABLE

(UFP-QAPP Manual Section 3.1.2.4)

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
XRF	Verification/ standardization check in accordance with manufacturer instructions.	Prior to daily use and after every 20 samples throughout the day.	Lead recovery to be between 60 and 135 percent of standard.	Re-standardize. If still unacceptable, contact manufacturer for possible replacement.	FOL	SOP-01	

SAP WORKSHEET #23 -- ANALYTICAL SOP REFERENCES TABLE

Include preparation, analytical, chain of custody, sample receipt and storage SOP. All SOPs that apply to a sample from the time it is received until it is disposed of.

Lab SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SOP-100	Metals Digestion/Preparation Methods 3005A,3010A, 3020A, 3030, 3040A, 3050B, USEPA CLP ILMO 4.1 Aqueous & Soil/Sediment, USEPA Method 200.7 (Standard Methods) 3030C. Rev. 19	Definitive	Soil and Aqueous blanks/Metals	NA	Empirical Laboratories	N
SOP-105	Metals Analysis by ICP Technique Methods 200.7, SW846 6010B, SM 19th Edition 2340B, USEPA ILMO 4.1, 09/09/08, Rev. 14	Definitive	Soil and Aqueous blanks/Metals	ICP-AES	Empirical Laboratories	N
SOP-147	Synthetic Precipitation Leaching Procedure Method 1312, Rev. 0	Definitive	Soil/Wet Chemistry	NA	Empirical Laboratories	N

Lab SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SOP-187	Electrometric Determination of pH, Methods 150.1, Standard Methods 4500H+B and 9040B for Waters, Liquids and Liquid Wastes, 9045C for Soils and Sloid Wastes, Rev. 6	Definitive	Soil/Wet Chemistry	pH Meter	Empirical Laboratories	N
SOP-221	Total Organic Carbon SM5310C, USEPA 415.1 and SW846 9060 and Lloyd Kahn Method, Rev. 7	Definitive	Soil/Wet Chemistry	TOC	Empirical Laboratories	N
SOP-231	GC/MS Low Level PAH's by EPA Method 625 and SW-846 Method 8270C, Rev. 3	Definitive	Soil and Aqueous blanks/GC/MS	GC/MS	Empirical Laboratories	N
SOP-300	GC/MS- Semivolatile BNA-Aqueous Matrix Extraction Using SW-846 Method 3510C for 8270C/625 Analysis, Rev. 17	Definitive	Aqueous blanks/Extraction	NA	Empirical Laboratories	N
SOP-329	Soxhlet Extraction-BNA and Pest/PCB Using SW-846 Method 3541, Rev. 16	Definitive	Soil/Extraction	NA	Empirical Laboratories	N

Lab SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SOP-404	Laboratory Sample Receiving Log-in and Storage Standard Operating Procedures, Rev. 12	Definitive	Soil and Aqueous blanks/Login	NA	Empirical Laboratories	N
SOP-405	Analytical Laboratory Waste Disposal, Rev. 4	Definitive	Soil and Aqueous blanks/Login	NA	Empirical Laboratories	N
SOP-410	Standard Operating Procedures for Laboratory Sample Storage, Secure Areas, and Sample Custody, Rev. 6	Definitive	Soil and Aqueous blanks/Login	NA	Empirical Laboratories	N
TA SOP No. 9081/NV06-91	Cation Exchange Capacity of Soils (Sodium Acetate) SW-846 Method 9081, Rev. 4	Definitive	Soil/Wet Chemistry, Metals	ICP	Test America	N

Field Portable XRF

TtNUS SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SOP-01	SOP for Field Portable XRF	Screening	Solid - Pb	Field Portable XRF	TtNUS	N

Notes:

CLP = Contract Laboratory Program
SOP = Standard Operating Procedure
ICP = Inductively Coupled Plasma
XRF = X-ray fluorescence
Pb = Lead

SAP WORKSHEET #24 -- ANALYTICAL INSTRUMENT CALIBRATION TABLE

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
Inductively Coupled Plasma (Metals and CEC)	Initial Calibration	The instrument is calibrated at the beginning of each day or if the QC is out of criteria.	The instrument is calibrated by a one point calibration per manufacturer's guidelines. Analytes ran at their calibration levels must fall within 90-110% of the true values.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/Supervisor	SOP-105 and EPA 9081
	Initial Calibration Blank (ICB)	Before beginning a sample sequence.	No analytes detected > 2x MDL.	Correct the problem, then re-prepare and reanalyze.	Analyst/Supervisor	
	Continuing Calibration(CCV)	Analyze a standard at the beginning and end of the sequence and after every 10 samples.	The acceptance criterion for the continuing calibration standard is 90-110% recovery of true value.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/Supervisor	
	Continuing Calibration Blank (CCB)	After every 10 samples and at the end of the sequence.	No analytes detected > 2x MDL.	Correct the problem, then re-prepare and reanalyze calibration blank and previous 10 samples.		
Field Portable XRF (Field Analysis)	Initial calibration per manufacturer's recommendations.	Per manufacturer's recommendations.	Per manufacturer's recommendations.	Repeat calibration and/or contact instrument manufacturer.	Analyst/supervisor	Instrument Manufacturer Operator's Manual TBD

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
Field Portable XRF (Field Analysis)	CCV - Per manufacturer's recommendations	One set per 20 samples analyzed after the instrument and method blanks	70%R to 130%R	Per manufacturer's recommendations	Analyst/supervisor	Instrument Manufacturer Operator's Manual TBD
pH Meter	Calibration	Calibrate before use with two buffers in the area to be measured. Check with a third buffer.	0.05 pH units.	Recalibrate and/or perform necessary equipment maintenance.	Analyst/Supervisor	SOP 187
Soil TOC Analyzer	Five point initial calibration including blank.	Instrument receipt, instrument change, when CCV does not meet criteria.	Correlation coefficient > 0.995	Recalibrate and/or perform necessary equipment maintenance. Check calibration standards.	Analyst/ Supervisor	SOP 221
	Continuing calibration	After every 5 samples.	80-120%	Recalibrate and/or perform necessary equipment maintenance. Check calibration standards.	Analyst/ Supervisor	

SAP WORKSHEET #25 -- ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP
Inductively Coupled Plasma Spectrometer	Clean the torch assembly and the spray chamber when they become discolored or when degradation in data quality is observed. Clean the nebulizer, and check the argon supply. Replace the peristaltic pump tubing as needed.	Metals and CEC	Inspect the torch, nebulizer chamber, pump, and tubing.	Maintenance is performed prior to initial calibration as necessary.	The acceptance criteria for the continuing calibration standard are 90-110% of true value.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/Supervisor	SOP-105
TOC Combustion Analyzer	Check gas pressure, check permeation tube and scrubbers, clean and condition sample cups.	TOC	Visual/ Analytical	Prior to initial calibration or as necessary	Midpoint CCV 20% difference.	Recalibrate and/or perform necessary equipment maintenance. Check calibration standards. Reanalyze affected data.	Analyst/ Supervisor	SOP-221
pH meter	Clean, drain, refill reference electrode as needed.	pH	Reference electrode for white crystals, Inspect electrode for damage.	Before use	+ 0.09 units	Recalibrate and/or perform necessary equipment maintenance. Check buffers. Reanalyze affected data.	Analyst/ Supervisor	SOP-187

SAP WORKSHEET #26 -- SAMPLE HANDLING SYSTEM

(UFP-QAPP Manual Appendix A)

SAMPLE HANDLING SYSTEM

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Field Operations Leader/TtNUS
Sample Packaging (Personnel/Organization): Field Operations Leader/TtNUS
Coordination of Shipment (Personnel/Organization): Field Operations Leader/TtNUS
Type of Shipment/Carrier: Overnight via Federal Express
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Receipt Personnel/Empirical Laboratories
Sample Custody and Storage (Personnel/Organization): Sample Receipt Personnel/Empirical Laboratories
Sample Preparation (Personnel/Organization): Extractions Personnel/Empirical Laboratories
Sample Determinative Analysis (Personnel/Organization): Analytical Personnel/Empirical Laboratories
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): At least 60 days
Sample Extract/Digestate Storage (number of days from extraction/digestion): /60 days
Biological Sample Storage (number of days from sample collection): Not Applicable
SAMPLE DISPOSAL
Personnel/Organization: Environmental Health and Safety Officer\ /Empirical Laboratories
Number of Days from Analysis: Empirical Laboratories. : 30 days from submittal of final report or 60 days from receipt, whichever is longer.

SAP WORKSHEET #27 – SAMPLE CUSTODY REQUIREMENTS TABLE

(UFP-QAPP Manual Section 3.3.3)

SAMPLE CUSTODY REQUIREMENTS

Laboratory Custody Procedures

Field Sample Custody Procedures (sample collections, packaging, ship, and delivery to laboratory): Following sample collections in the appropriate bottle ware, all samples will be immediately placed on ice in a cooler. The glass sample containers shall be enclosed in bubble wrap in order to protect the bottle ware during shipment and to prevent cross contamination should a bottle break in transit. The cooler shall be secured using duct tape or clear packaging tape along with two signed custody seals. Sample coolers will be delivered to a local courier location for priority overnight delivery to the selected laboratory for analysis.

Laboratory Sample Custody Procedures: Empirical SOPs 404,405,410

Sample Identification Procedures: TtNUS CT-04

Chain-of-Custody Procedures: TtNUS SA-6.3

SAMPLE NOMENCLATURE

Sample Identification

Refer to Worksheet #18 for how the samples will be labeled.

Also, refer to Worksheet #20 for how the field QA/QC samples will be labeled.

SAMPLE COLLECTION DOCUMENTATION, HANDLING, TRACKING, AND CUSTODY PROCEDURES

Sample Collection Documentation

Documentation of field observations will be recorded in a field logbook and/or on field log sheets including sample collection logs. Bound, water-resistant field logbooks will be utilized for this project. All pages of each logbook will be numbered sequentially, and observations will be recorded with indelible ink.

Field sample log sheets will be used to document sample collection details, and other observations and activities will be recorded in the field logbook. Daily instrument calibration will be recorded on instrument calibration logs. Example field forms are included in Appendix C.

For sampling and field activities, the following types of information will be recorded in the field logbook as appropriate:

- Site name and location
- Date and time of logbook entries
- Personnel and their affiliations
- Weather conditions
- Activities associated with sampling
- Site observations including site entry and exit times
- Site sketches made on site
- Visitor names, affiliations, and arrival and departure times
- Health and safety issues including personal protective equipment (PPE)

Sample Handling and Tracking System

Procedures that will be used by field and laboratory personnel to document project activities and sample collection procedures during this SI are outlined in the following subsections. All forms will be filled in as completely as possible.

Sample Handling

Sample handling is described in SAP Worksheet #26.

Sample Delivery

Samples will be delivered to the laboratory via a public courier (i.e., Federal Express). Samples will be sent to the laboratory within 48 hours of being collected. Under no circumstances should sample holding times be exceeded.

Sample Custody

To ensure the integrity of a sample from collection through analysis, it is necessary to have an accurate, written record that traces the possession and handling of the sample. This documentation is referred to as the COC form. Chain of custody begins at the time of sample collection.

A sample is under custody if:

- It is in your actual possession, or
- It is in your view, after being in your physical possession, or
- It was in your possession and then you locked or sealed it up to prevent tampering, or
- It is in a secure area.

Custody documentation is designed to provide documentation of preparation, handling, storage, and shipping of all samples collected. A multi-part COC form is used with each page of the form signed and dated by the recipient of a sample or portion of sample. The person releasing the sample and the person receiving the sample each will retain a copy of the COC form each time a sample transfer occurs.

Preservation of the integrity of the samples collected during the site investigation will be the responsibility of identified persons from the time the samples are collected until the samples, or their derived data, are incorporated into the final report.

The FOL is responsible for the care and custody of the samples collected until they are delivered to the laboratory or are entrusted to a carrier. When transferring samples, the individuals relinquishing and receiving them will sign, date, and note the time on the COC form. This form documents the sample custody transfer from the sampler to the laboratory, often through another person or agency (common carrier). Upon arrival at the laboratory, internal sample custody procedures will be followed as defined in the laboratory SOPs included in Appendix B.

SAP WORKSHEET #28 -- LABORATORY QC SAMPLES TABLE

Matrix	SPLP Leachate
Analytical Group	Metals
Analytical Method / SOP Reference	SW-846 3005A, 6010B/SOP-100/105

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples.	Contaminants in the method blank must be less than ½ the QL.	1) Investigate the source of the contamination. Redigest and reanalyze all associated samples if the sample concentration ≥ the QL and <10x the blank concentration.	Analyst, Laboratory Supervisor and Data Validator	Bias / Contamination	Contaminants in the method blank must be less than ½ the QL.
Laboratory Control Sample(LCS)	One per digestion batch of 20 or fewer samples.	Recovery must be within ± 20% of the true value, unless vendor-supplied or statistical limits have been established.	1) Investigate source of problem. 2) Redigest and reanalyze all associated samples.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias / Contamination	Recovery must be within ± 20% of the true value, unless vendor-supplied or statistical limits have been established.
Duplicate Sample	One per digestion batch of 20 or fewer samples.	The relative percent difference should be within ≤20% for duplicate spikes.	Flag results	Analyst, Laboratory Supervisor and Data Validator	Precision	The relative percent difference should be within ≤20% for duplicate spikes.
Matrix Spike (MS)	One per digestion batch of 20 or fewer samples.	Recovery should be ± 25% of the true value, if sample < 4x spike added.	Flag results.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	Recovery should be ± 25% of the true value, if sample < 4x spike added.
ICP Serial Dilution	One per digestion batch.	If original sample result is at least 50x the instrument detection limit, 5-fold dilution must agree within ± 10% of the original result.	Flag result or dilute and reanalyze sample to eliminate interference.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	If original sample result is at least 50x the instrument detection limit, 5-fold dilution must agree within ± 10% of the original result.

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	SW-846 3050B, 6010B/SOP-100/105

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples.	Contaminants in the method blank must be less than ½ the QL.	Investigate the source of the contamination. Re-digest and reanalyze all associated samples if the sample concentration ≥ the reporting limit and <10x the blank concentration.	Analyst, Laboratory Supervisor and Data Validator	Bias / Contamination	Contaminants in the method blank must be less than ½ the QL.
Laboratory Control Sample(LCS)	One per digestion batch of 20 or fewer samples.	Recovery must be within ± 20% of the true value, unless vendor-supplied or statistical limits have been established.	Investigate source of problem. Redigest and reanalyze all associated samples.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias / Contamination	Recovery must be within ± 20% of the true value, unless vendor-supplied or statistical limits have been established.
Duplicate Sample	One per digestion batch of 20 or fewer samples.	The relative percent difference should be within ≤20% for duplicate spikes.	Flag results.	Analyst, Laboratory Supervisor and Data Validator	Precision	The relative percent difference should be within ≤20% for duplicate spikes.
Matrix Spike	One per digestion batch of 20 or fewer samples.	Recovery should be ± 25% of the true value, if sample < 4x spike added.	Flag results.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	Recovery should be ± 25% of the true value, if sample < 4x spike added.
ICP Serial Dilution	One per digestion batch.	If original sample result is at least 50x the instrument detection limit, 5-fold dilution must agree within ± 10% of the original result.	Flag result or dilute and reanalyze sample to eliminate interference.	Analyst, Laboratory Supervisor and Data Validator	Accuracy / Bias	If original sample result is at least 50x the instrument detection limit, 5-fold dilution must agree within ± 10% of the original result.

Matrix	Soil
Analytical Group	Total Organic Carbon
Analytical Method / SOP Reference	Lloyd Kahn/ SOP-221

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch of 20 or fewer samples.	No TOC detected > 1/2 QL.	Investigate source of contamination and re-analyze all affected samples.	Analyst, Supervisor, and QA Manager	Accuracy/bias-Contamination	No TOC detected > 1/2 QL
Laboratory Duplicate	One per preparation batch of 10 or fewer samples.	≤Relative percent difference ≤ 50%	Narrate any results that are outside control limits.	Analyst, Supervisor, and QA Manager	Precision	Relative percent difference ≤ 50%
Matrix Spike	One per preparation batch of 10 or fewer samples.	50-150 % recovery	No corrective action will be taken for samples where recoveries are outside acceptance limits and LCS criteria are met. Narrate noncompliance.	Analyst, Supervisor, and QA Manager	Accuracy/bias	50-150 % recovery
Laboratory Control Sample	One per preparation batch of 20 or fewer samples.	80-120% recovery	Re-analyze associated samples. If the sample is within holding time, re-analyze affected sample batch. If the LCS recovery is high but the sample results are < the QL, narrate. Otherwise, re-prepare the blank and affected sample batch.	Analyst, Supervisor, and QA Manager	Accuracy/bias	80-120% recovery

Matrix	Soil
Analytical Group	pH
Analytical Method / SOP Reference	SW-846 9045C/ SOP-187

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Duplicate	One per preparation batch of 10 or fewer samples.	± 0.09 units	Recalibrate and reanalyze samples.	Analyst, Supervisor, and QA Manager	Precision	± 0.09 units
Laboratory Control Sample	Once per 20 samples.	± 0.25 units	Re-analyze associated samples. If sample is within holding time, re-analyze affected sample batch.	Analyst, Supervisor, and QA Manager	Accuracy/bias	± 0.25 units

Matrix	Soil
Analytical Group	CEC
Analytical Method / SOP Reference	SW-846 9081

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation batch of 10 or fewer samples.	Less than the QL.	Correct and reanalyze batch	Analyst, Supervisor, QA Manager	Accuracy/bias-Contamination	Less than the QL.
Laboratory Duplicate	One per preparation batch of 10 or fewer samples.	Relative percent difference < 20%	Report	Analyst, Supervisor, QA Manager	Precision	Relative percent difference < 20%

SAP WORKSHEET #29 -- PROJECT DOCUMENTS AND RECORDS TABLE

(UFP-QAPP Manual Section 3.5.1)

Document	Location and Maintenance
Sample Collection Documents and Records Field logbook (and sampling notes) Field sample forms (e.g. boring logs, sample log sheets, drilling logs, etc.) Chain-of-custody records Sample shipment air bills Equipment calibration logs Photographs Field Task Modification Forms Sampling and Analysis Plan Field Sampling SOPs	TtNUS project file, results will be discussed in subject document.
Laboratory Documents and Records Sample receipt/log-in form Sample storage records Sample preparation logs Standard traceability logs Equipment Calibration logs Sample analysis run logs Equipment maintenance, testing, and inspection logs Field Task Modification Reports Reported field sample results Reported results for standards, quality control checks, and quality control samples Data completeness checklists Sample storage and disposal records Telephone logs Extraction/clean-up records Raw data	TtNUS Project File, Long-term data package storage at third-party professional document storage firm (BRM), results will be discussed in subject document.

Document	Location and Maintenance
Data Assessment Documents and Records Field Sampling Audit Checklist (if an audit is conducted) Analytical Audit Checklist (if an audit is conducted) Data Validation Memoranda Site Investigation report	TtNUS project file, results will be discussed in subject document.

SAP Worksheet #30 -- Analytical Services Table

Matrix	Analytical Group	Sample Locations/ID Numbers	Analytical Method	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Solid	Select Metals (Sb, As, Cu, Pb, Sn, Zn)	See Worksheet #18	SW-846 6010B	21 calendar days	Empirical Laboratories 227 French Landing Drive, Ste 550 Nashville, TN 37228 Janice Shilling (615) 345-1115 ext.246	NA
	pH, CEC, TOC	See Worksheet #18	SW846 9045C/9081/ Lloyd Khan	21 calendar days		
Leachate	SPLP Select Metals (Sb, As, Cu, Pb, Sn, Zn)	See Worksheet #18	SW-846 1312/6010B	21 calendar days		

Notes:

As = Arsenic
Zn = Zinc
Cu = Copper
NA = Not applicable
Pb = Lead
Sb = Antimony
Sn = Tin

SAP WORKSHEET #31 -- PLANNED PROJECT ASSESSMENTS TABLE

(UFP-QAPP Manual Section 4.1.1)

Assessment Type	**Frequency**	**Internal or External**	**Organization Performing Assessment**	**Person(s) Responsible for Performing Assessment** (title and organizational affiliation)	**Person(s) Responsible for Responding to Assessment Findings** (title and organizational affiliation)	**Person(s) Responsible for Identifying and Implementing Corrective Actions (CA)** (title and organizational affiliation)	**Person(s) Responsible for Monitoring Effectiveness of CA** (title and organizational affiliation)
Field Supervision	Daily during sampling events	Internal	TtNUS	FOL TtNUS	FOL TtNUS	FOL and Field Crew TtNUS	TOM, QAM, and FOL TtNUS
Project Supervision	Every sampling	Internal	TtNUS	TOM TtNUS	FOL TtNUS	TOM and FOL TtNUS	TOM and FOL TtNUS
Field Sampling System Audit	1 per contract year	Internal	TtNUS	TBD	TOM and FOL TtNUS	Auditor and TOM TtNUS	CLEAN QAM
Laboratory System Audit	Every 18 months	External	NFESC	NFESC	Laboratory QAM or Laboratory Manager	Laboratory Manager and Laboratory QAM	NFESC

SAP WORKSHEET #32 -- ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES

(UFP-QAPP Manual Section 4.1.2)

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Timeframe for Response
Field Supervision	Site Log Book and sample collection logs	Gerry Walker, TOM, TtNUS TBD, FOL, TtNUS	Immediately	Entry in site log book	Linda Klink, TOM, TtNUS TBD, FOL, TtNUS	24 hours
Project Supervision	Written report	Debra Humbert, Program Manager, TtNUS and Mark Perry, Deputy Program Manager, TtNUS	Monthly	Written memo	Debra Humbert, Program Manager, TtNUS and Mark Perry, Deputy Program Manager, TtNUS	Within a week of notification
Field Sampling System Audit	Audit checklist and written audit finding summary	Gerry Walker, TOM, TtNUS James Spaulding, FOL, TtNUS Debra Humbert, Program Manager, TtNUS and Mark Perry, Deputy Program Manager, TtNUS	Dependant on the finding, if major, a stop work may be issue immediately, however if minor within 1 week of audit	Written memo	Kelly Carper, CLEAN QAM, TtNUS Designee, Field Auditor, TtNUS Debra Humbert, Program Manager, TtNUS and Mark Perry, Deputy Program Manager, TtNUS	Within 48 hours of notification
Laboratory System Audit	Written audit report	Rick Davis, Laboratory Manager, Empirical Laboratory Randy Ward, Laboratory QAM Empirical Laboratories	Not specified by NFESC	Letter	NFESC	Specified by NEFSC

SAP WORKSHEET #33 -- QA MANAGEMENT REPORTS TABLE

(UFP QAPP Manual Section 4.2)

Type of Report	**Frequency** (daily, weekly monthly, quarterly, annually, etc.)	**Projected Delivery Date(s)**	**Person(s) Responsible for Report Preparation** (title and organizational affiliation)	**Report Recipient(s)** (title and organizational affiliation)
Data validation report	Per SDG	Completion of data validation	DVM and Staff Chemists TtNUS	TOM and project file TtNUS
Major analysis problem identification (internal memo)	When persistent analysis problems are detected	Immediately	CLEAN QAM TtNUS	TOM, CLEAN QAM, Program Manager, and project file TtNUS
Project monthly progress report	Monthly for duration of project	Monthly	TOM TtNUS	Navy, project file
Field progress reports	Daily, oral, during the course of sampling	Every day that field sampling is occurring	FOL TtNUS	TOM TtNUS
Laboratory QA report	When significant plan deviations result from unanticipated circumstances	Immediately	Empirical Laboratories PM	TtNUS project file
Audit reports	In conjunction with audits	After completion of audits (usually 3 weeks)	Auditor(s)	TOM and QAM TtNUS, and audited entity

SAP WORKSHEET #34 -- VERIFICATION PROCESS TABLE

(UFP-QAPP Manual Section 5.2.1)

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
Chain-of-custody forms	The TtNUS FOL or designee will review and sign the chain-of-custody form to verify that all samples listed are included in the shipment to the laboratory and the sample information is accurate. The forms will be signed by the sampler and a copy will be retained for the project file, the TOM, and the data validators. See SOP SA-6.3	Internal	TtNUS sampler and FOL
SAP Sample tables	Verify that all proposed samples listed in the SAP tables have been collected.	Internal	TtNUS, FOL or designee
Sample log sheets	Verify that information recorded in the log sheets is accurate and complete.	Internal	TtNUS, FOL or designee
Sample coordinates	Verify that sample locations are correct and in accordance with the SAP proposed locations.	Internal	TtNUS, FOL or designee
Field QC samples	Check that field QC samples listed in Worksheet #20 were collected as required.	Internal	TtNUS, FOL or designee
Chain-of-custody forms	The laboratory sample custodian will review the sample shipment for completeness and integrity, and then will sign accepting the shipment. The data validators will check that the chain-of-custody form was signed/dated by the TtNUS FOL or designee relinquishing the samples and also by the laboratory sample custodian receiving the samples for analyses.	Internal/ External	1 - Laboratory sample custodian 2 - TtNUS, data validators
Analytical data package	All analytical data packages will be verified internally for completeness by the laboratory performing the work. The laboratory QAM will sign the case narrative for each data package.	Internal	Randy Ward Empirical Laboratory QAM
Analytical data package	The data package will be verified for completeness by TtNUS data validators. Missing information will be requested from the laboratory and validation will be suspended until missing data are received.	External	TtNUS, data validators
Electronic data deliverables	The electronic data will be verified against the chain-of-custody and hard copy data package for accuracy and completeness.	External	TtNUS, data validators

Verification includes field data verification and laboratory data verification. Verification inputs as per SAP Worksheet #34 will be checked.

SAP WORKSHEET #35 -- VALIDATION (STEPS IIA AND IIB) PROCESS TABLE

(UFP-QAPP Manual Section 5.2.2) (Figure 37, page 110 UFP-QAPP Manual) (Table 9 UFP-QAPP Manual)

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Field SOPs/Field Logs/Sample Collection	Ensure that all sampling SOPs were followed. Verify that deviations have been documented and MPCs have been achieved. Particular attention should be given to verify that samples were correctly identified, that sampling location coordinates are accurate, and that documentation establishes an unbroken trail of documented chain of custody from sample collection to report generation. Verify that the correct sampling and analytical methods/SOPs were applied. Verify that the sampling plan was implemented and carried out as written and that any deviations are documented.	TOM, FOL, or designee (TtNUS)
IIa	Analytical SOPs	Ensure that all laboratory SOPs were followed. Verify that the correct analytical methods/SOPs were applied.	Randy Ward Empirical Laboratory QAM
IIa	Documentation of Method QC Results	Establish that all method QC samples were analyzed and in control as listed in the analytical SOPs. If method QA is not in control, the laboratory will contact TtNUS for guidance prior to report preparation.	TOM or designee (TtNUS)
IIa, IIb	SAP QC Sample Documentation	Verify that all QC samples specified in the SAP were collected and analyzed and that the associated results were within prescribed SAP acceptance limits. Verify that QC samples and standards prescribed in analytical SOPs were analyzed and within the prescribed control limits. If any significant QC deviations occur, the laboratory shall have contacted the TtNUS TOM.	TOM or designee (TtNUS)

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa, IIb	Documentation of Analytical Reports for Completeness	Ensure that the chain-of-custody form generated in the field to delivery of analytical data that the required analytical samples have been collected, appropriate sample identifications have been used, and correct analytical methods have been applied. Validator will verify that elements of the data package required for validation are present, and if not, the laboratory will be contacted and the missing information will be requested. Validation will be performed as per Worksheet #36. Verify all data have been transferred correctly and completely to the final Structured Query Language (SQL) database.	Data Validator (TtNUS)
IIb	Project Quantitation Limits	Verify that detection and quantitation limits prescribed in SAP Worksheet #15 were achieved or that deviations are documented and justified.	Data Validator (TtNUS)
IIa/IIb	Project Action Limits	Review and add project action limits to the laboratory electronic data deliverable. Flag samples and notify TOM of samples that exceed project action limits as listed on Worksheet #15.	TOM or designee (TtNUS)

SAP WORKSHEET #36 –ANALYTICAL DATA VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE

(UFP-QAPP Manual Section 5.2.2.1) (Figure 37, page 110 UFP-QAPP Manual)

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIa and IIb	Soil and Aqueous	Metals	100% Full data validation will be performed. SW-846 6010B method specific criteria and those listed in Worksheets #12, #15, 24, and #28. If not included in Worksheet #12, #15 or #28, the logic outlined in USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review EPA 540-R-04-004, October 2004 will be used to apply qualifiers to data.	TtNUS Data Validation Specialist

Notes:

** pH, TOC, and CEC will not be validated **

SAP WORKSHEET #37 -- USABILITY ASSESSMENT

(UFP-QAPP Manual Section 5.2.3)

Data Usability Assessment
The usability of the data directly affects whether project objectives can be achieved. The following characteristics will be evaluated at a minimum. The results of these evaluations will be included in the project report. The characteristics will be evaluated for multiple concentration levels if the evaluator determines that this is necessary. To the extent required by the type of data being reviewed, the assessors will consult with other technically competent individuals to render sound technical assessments of these data characteristics: **Completeness** o For each matrix that was scheduled to be sampled, the FOL acting on behalf of the project team will prepare a table listing planned samples/analyses to collected samples/analyses. If deviations from the scheduled sample collection or analyses are identified the TtNUS PM and risk assessor will determine whether the deviations compromise the ability to meet project objectives. If they do, the TtNUS PM will consult with the Navy RPM and other project team members, as necessary (determined by the Navy RPM), to develop appropriate corrective actions. **Precision** o The Project Chemist acting on behalf of the project team will determine whether precision goals for field duplicates and laboratory duplicates were met. This will be accomplished by comparing duplicate results to precision goals identified in Worksheets 12 and 28. This will also include a comparison of field and laboratory precision with the expectation that field duplicate results will be no less precise than laboratory duplicate results. If the goals are not met, or data have been flagged as estimated (J qualifier), limitations on the use of the data will be described in the project report. **Accuracy** o The Project Chemist acting on behalf of the project team will determine whether the accuracy/bias goals were met for project data. This will be accomplished by comparing percent recoveries of LCS, LCSD, MS, MSD, and surrogate compounds to accuracy goals identified in Worksheet 28. This assessment will include an evaluation of field and laboratory contamination; instrument calibration variability; and analyte recoveries for matrix spike, and laboratory control samples. If the goals are not met, limitations on the use of the data will be described in the project report. Bias of the qualified results and a description of the impact of identified non-compliances on a specific data package or on the overall project data will be described in the project report. **Representativeness** o A project scientist identified by the TtNUS PM and acting on behalf of the project team will determine whether the data are adequately representative of intended populations, both spatially and temporally. This will be accomplished by verifying that samples were collected and processed for analysis in accordance with the SAP, by reviewing spatial and temporal data variations, and by comparing these characteristics to expectations. The usability report will describe the representativeness of the data for each matrix and analytical fraction. This will not require quantitative comparisons unless the project scientist indicates that a quantitative analysis is required.

Comparability

- The Project Chemist and statistician acting on behalf of the project team will determine whether the data generated by XRF and laboratory analyses are comparable in quality. This will be accomplished by comparing overall precision and bias between data sets for lead. This will not require quantitative comparisons unless the Project Chemist indicates that such quantitative analysis is required.

Sensitivity

- The Project Chemist acting on behalf of the project team will determine whether project sensitivity goals listed in Worksheet #15 are achieved. If sensitivity goals are not achieved, the limitations on the data will be described.

Field XRF/Laboratory Lead Data Correlation

- The project statistician will evaluate the correlation of field XRF data to laboratory data. Factors considered in this evaluation will include the magnitude of the slope and intercept of the correlation equation, the distribution of data points across the plotted concentration range, and the value of the correlation coefficient. If the coefficient is less than 0.65 or the plotted data do not appear to be well correlated in accordance with standard statistical principles, limitations on the use of the data will be described in the project report.

Project Assumptions and Data Outliers

- The TtNUS Project Manager and designated team members will evaluate whether project assumptions are valid. This will typically be a qualitative evaluation but may be supported by quantitative evaluations. The type of evaluation depends on the assumption being tested. Quantitative assumptions include assumptions related to data distributions (e.g., Normal versus log-normal) and estimates of data variability such as are considered when evaluating data correlations. Potential outliers will be removed if a review of the associated indicates that the results have an assignable cause the renders them inconsistent with the re of the data.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

After completion of the data validation, the data and data quality will be reviewed to determine whether sufficient data of acceptable quality are available for decision making. In addition to the evaluations described above, a series of inspections and statistical analyses will be performed to estimate these characteristics. The statistical evaluations will include simple summary statistics for target analytes, such as maximum concentration, minimum concentration, number of samples exhibiting non-detected results, number of samples exhibiting positive results, and the proportion of samples with detected and non-detected results. The project team members identified by the project manager will assess whether the data collectively support the attainment of project objectives. They will consider whether any missing or rejected data have compromised the ability to make decisions or to make the decisions with the desired level of confidence. The data will be evaluated to determine whether missing or rejected data can be compensated by other data. Although rejected data will generally not be used, there may be reason to use them in a weight of evidence argument, especially when they supplement data that have not been rejected. If rejected data are used, their use will be supported by technically defensible rationales.

For statistical comparisons and mathematical manipulations, non-detected values will be represented by a concentration equal to one-half the sample-specific reporting limit. Duplicate results (original and duplicate) wi

be averaged for the purpose of representing the range of concentrations. However, the average of the original and duplicate samples will be used to represent the concentration at a particular sampled location.

Identify the personnel responsible for performing the usability assessment:

The TtNUS Project Manager, Project Chemist, FOL, and Project Scientist will be responsible for conducting the listed data usability assessments. The data usability assessment will be reviewed with the Navy RPM, Project Manager, the EPA Remedial Project Manager, and the state of Florida Project Manager. If deficiencies affecting the attainment of project objectives are identified, the review will take place either in a face to face meeting or a teleconference depending on the extent of identified deficiencies. If no significant deficiencies are identified, the data usability assessment will simply be documented in the project report and reviewed during the normal document review cycle.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The data will be presented in tabular format, including data qualifications such as estimation (J, UJ) or rejection (R). Written documentation will support the non-compliance estimated or rejected data results. The project report will identify and describe the data usability limitations and suggest re-sampling or other corrective actions, if necessary.

APPENDICES PROVIDED ELECTRONICALLY ON ENCLOSED CD