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NAS PENSACOLA
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SAMPLING AND ANALYSIS PLAN FOR CONTAMINATION ASSESSMENT UNDERGROUND STORAGE TANK 2 (UST2) BUILDING 2662 NAS PENSACOLA FL

1/1/2010

TETRA TECH

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)

CONTAMINATION ASSESSMENT
FOR
UNDERGROUND STORAGE TANK SITE 2 (BUILDING 2662)

NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Southeast
Building 103
NAS Jacksonville
Jacksonville, Florida 32212-0030

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

CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0119

JANUARY 2010

Document Title: Sampling and Analysis Plan, (Field Sampling Plan and Quality Assurance Project Plan), January 2010, Contamination Assessment for Underground Storage Tank Site 2 (Building 2662), Naval Air Station (NAS) Pensacola, Pensacola, Florida

Lead Organization: Naval Facilities Engineering Command Southeast (NAVFAC SE)

Preparer's Name and Organizational Affiliation: Katie Newman, Tetra Tech NUS, Inc.

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

Preparation Date (Day/Month/Year): December 11, 2009

Investigative Organization's Project Manager:

Signature/Date
Gerald Walker, P.G., Tetra Tech NUS, Inc.

Investigative Organization's Project Quality Assurance Manager:

Signature/Date
Kelly Carper, Tetra Tech NUS, Inc.

Lead Organization's Project Manager:

Signature/Date
Patty Marajh- Whittemore, NAVFAC SE
Remedial Project Manager

Navy Quality Assurance Officer:

Signature/Date
Jonathan Tucker
NAVFAC Atlantic

Approval Signatures:

Signature/Date
Greg Fraley
U.S. Environmental Protection Agency Region 4

Signature/Date
David Grabka
Florida Department of Environmental Protection

EXECUTIVE SUMMARY

This Sampling and Analysis Plan (SAP) encompasses Field Sampling Plan (FSP) requirements and Quality Assurance Project Plan (QAPP) requirements for contamination assessment at Underground Storage Tank (UST) Site 2, Building 2662, at Naval Air Station (NAS) Pensacola, Pensacola, Florida. This document constitutes the planning document, addressing specific protocols for sample collection, sample handling and storage, chain-of-custody procedures, laboratory and field analyses, data validation, and data reporting.

This SAP has been prepared by Tetra Tech NUS, Inc. (TtNUS) on behalf of Naval Facilities Engineering Command Southeast (NAVFAC SE) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62467-04-D-0055, Contract Task Order (CTO) 0119. This SAP was generated for and complies with applicable United States Navy, Florida Department of Environmental Protection (FDEP), and United States Environmental Protection Agency (USEPA) Region 4 requirements, regulations, guidance and technical standards, especially USEPA (1999) and Department of Defense and Department of Energy (DoD/DOE)/EPA (2005). To comply with DoD/DOE/EPA (2005) requirements, this SAP is presented in the format of standard worksheets specified in the Uniform Federal Policy (UFP) QAPP.

NAS Pensacola is an active facility in Escambia County in the northwest panhandle area of Florida. Chevalier Field is located on about 190 acres of the eastern edge of NAS Pensacola. In recent years, it has functioned as a Naval Aviation Depot (NADEP) used for repairs, maintenance, and testing of military helicopters. Located on the southeast corner of Chevalier Field, UST Site 2 includes the area around former Building 2662, a rigid frame steel building once used as a hanger in which aircraft maintenance and repairs were performed.

A Contamination Assessment Report (CAR) was conducted by ABB Environmental Services, Inc. (ABB-ES) in April of 1994, in which petroleum contaminated soil and a benzene plume were identified at UST Site 2. The contaminated soil was most likely related to activities once carried out at the site, which included loading aircraft with fuel stored in the Building 2662 (UST Site 2). Additionally, disposal of industrial waste through the trench, bilge line, and oil water separator was carried out at UST Site 2, Building 627, and adjacent sites. An Interim Remedial Action (IRA) was conducted at the Site in which Building 2662 and Building 3380 were demolished and removed. Approximately 4,650 cubic yards (yd^3) of contaminated soil was excavated from the site as well as a small area near Building 607. The excavation was three feet deep in the petroleum plume areas which extended to or slightly below the water table. About 3,160 yd^3 of the contaminated soil was treated on site by low temperature thermal

desorption and used along with clean borrow soil to backfill the area. The remaining contaminated soil was transported to an offsite facility for thermal treatment.

When the Removal Report was submitted, it came to the attention of FDEP that one-third of the 3,160 yd^3 of treated soil used as backfill at UST Site 2 exceeded the 108 parts per million (ppm) total lead criteria specified in 62-775.410 Florida Administrative Code (F.A.C.), which is applied to any treated soil. None of the treated soil samples exceeded the Toxicity Characteristic Leaching Procedure (TCLP) limit of 5.0 mg/L per 62-775.410 F.A.C. Only one of the original post-thermal treatment samples from the soil that was backfilled exhibited total lead levels in excess of the 400 ppm Soil Cleanup Target Level (SCTL). As a result, Confirmatory Sampling was conducted in March of 1995 (Bechtel Environmental, Inc). Of the twelve samples collected, none of the measured concentrations were in exceedance of the Residential SCTL of 400 ppm. Because there were no exceedances, TCLP analysis was not performed on these samples. Following the Confirmatory Sampling, FDEP requested groundwater sampling from approximately 10 wells and analysis for lead (FDEP, 1998). The purpose of this investigation is to sample the wells for lead, as the previous sampling plan and the results of the sampling are not included in the current site record.

Insert figure ES -1 here

Insert figure ES2 here

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SAP WORKSHEETS **PAGE**

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LIST OF FIGURES

APPENDICES

ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
bgs	below ground surface
BRM	Business Records Management
CA	Corrective Action
CAR	Contamination Assessment Report
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
COC	Contaminant of concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
CTL	Cleanup Target Level
CTO	Contract Task Order
°C	Degrees Celsius
DI	Deionized
DoD	Department of Defense
DoE	Department of Energy
DOT	Department of Transportation
DPT	Direct Push Technologies
DQI	Data Quality Indicator
DQO	Data Quality Objective
DVM	Data Validation Manager
ECD	Electron Capture Device
EDD	Electronic Data Deliverables
EPA	United States Environmental Protection Agency
ERH	Electrical Resistive Heating
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FOL	Field Operations Leader
FS	Feasibility Study
FSP	Field Sampling Plan
FTMR	Field Task Modification Request

ACRONYMS (CONTINUED)

GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
GCTL	Groundwater Cleanup Target Level
GIS	Geographic Information System
HASP	Health and Safety Plan
HSM	Health and Safety Manager
ICAL	Initial calibration
ICP	Inductively Coupled Plasma
ICS	Interference Check Standards
ICV	Initial Calibration Verification
IDW	Investigation-Derived Waste
IRA	Interim Remedial Action
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LEL	Lower Explosive Limit
LIMS	Laboratory Information Management System
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/L	Milligram(s) Per Liter
mL	Milliliter
MPC	Measurement Performance Criterion
MS/MSD	Matrix Spike/Matrix Spike Duplicate
µg/L	Micrograms Per Liter
NA	Not Applicable
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center
NIRIS	Naval Installation Restoration Information Solutions
NR	Not Recorded
NWS	Naval Weapons Station
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment

ACRONYMS (CONTINUED)

PAH	Polynuclear Aromatic Hydrocarbons
PAL	Project Action Limit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCB	Polychlorinated biphenyl
PDF	Portable Document Format
PQL	Project Quantitation Limit
PM	Project Manager
PPE	Personal protective equipment
ppm	Parts Per Million
PT	Proficiency Testing (previously known as performance evaluation [PE] sample)
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
QSM	Quality Systems Manual
%R	Percent Recovery
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
RPD	Relative Percent Difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SC DHEC	South Carolina Department of Health and Environment
SCTL	Soil Cleanup Target Level
SDG	Sample Delivery Group
SI	Site Investigation
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedure
SQL	Structured Query Language

ACRONYMS (CONTINUED)

SVOC	Semivolatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Total Contaminant List
TCLP	Toxicity Characteristic Leaching Procedure
TBD	To Be Determined
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper Confidence Limit
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
USNA	United States Naval Academy
UST	Underground Storage Tank
VOA	Volatile Organic Analytes
VOC	Volatile Organic Compound
yd^3	Cubic Yards

SAP WORKSHEET #2 -- SAP IDENTIFYING INFORMATION
(UFP-QAPP Manual Section 2.2.4)

Site Name/Number:	**Underground Storage Tank Site 2 (Building 2662)**
Contractor Name:	**Tetra Tech NUS, Inc.**
Contract Number:	**N62472-04-D-0055**
Contract Title:	**Comprehensive Long-Term Environmental Action Navy**
Work Assignment Number:	**Contract Task Order 0119**

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

2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

3. This SAP is a project-specific SAP.

4. List dates of scoping sessions that were held:

SCOPING SESSION	DATE
DQO Scoping Meeting (Project Team)	July 21, 2009

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

TITLE	DATE
Project Completion Report For Petroleum Contaminated Soil under Delivery Orders 0006 and 0017 at 2662W and PSC 36 Chevalier Field, NAS Pensacola Bechtel Environmental Inc.	January 1996

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

   NAS Pensacola – Property Owner

   FDEP – Regulatory Stakeholder

7. Lead organization

   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:

   Not Applicable

Cross walk table not applicable because all 37 worksheets are utilized in this UFP-SAP.

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)
Patty Whittemore	Navy Remedial Project Manager (RPM)	NAVFAC SE	(904) 542-3991 Ext. 4601	patty.whittemore@navy.mil	Not Applicable (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
Peggy Churchill	Technical Lead	TtNUS	(321) 636-6470 Ext. 1300	peggy.churchill@tetratech.com	NA
Bill Olson	Field Operations Lead (FOL)	TtNUS	(850) 385-9899	William.Olson@tetratech.com	NA
Kelly Carper	Quality Assurance Manager (QAM)	TtNUS	(412) 921-7273	kelly.carper@tetratech.com	NA
Kim Kostzer	Laboratory Project Manager	Empirical	(615) 345-1115	kkostzer@empirilabs.com	NA

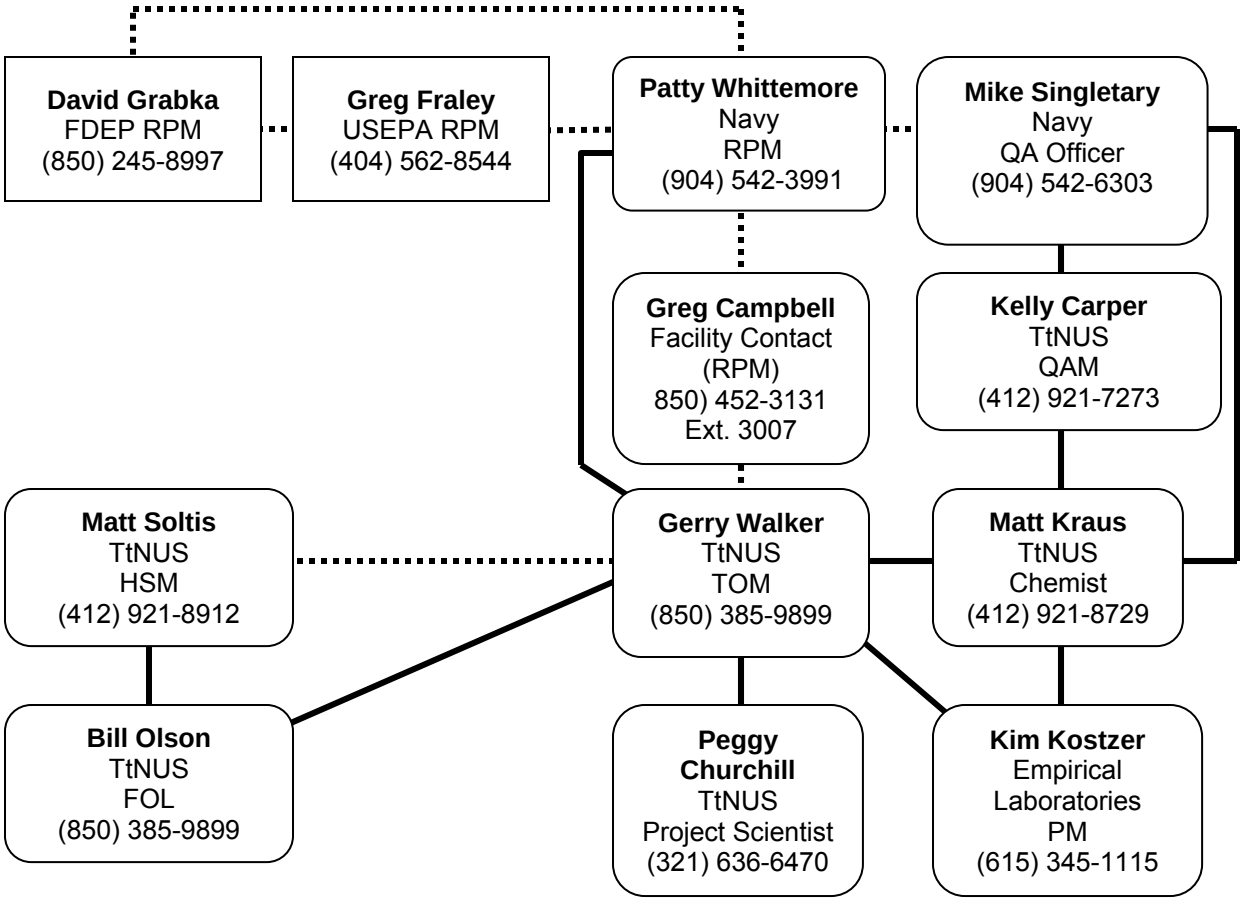
SAP WORKSHEET #4 -- PROJECT PERSONNEL SIGN-OFF SHEET
(UFP-QAPP Manual Section 2.3.2)

NAME	ORGANIZATION/TITLE/ROLE	TELEPHONE NUMBER (OPTIONAL)	SIGNATURE/E-MAIL RECEIPT	SAP SECTION REVIEWED	DATE SAP READ
Patty Whittemore	Navy RPM	(904) 542-3991 Ext. 4601	patty.whittemore@navy.mil	All	
Greg Campbell	Facility Contact RPM	(850) 452-3131 Ext. 3007	gregory.campbell@navy.mil	All	
David Grabka	FDEP RPM	(850) 245-8997	david.grabka@dep.state.fl.us	All	
Gerry Walker	TtNUS, TOM	(850) 385-9899	gerry.walker@tetratech.com	All	
Peggy Churchill	TtNUS, Technical Lead	(321) 636-6470 Ext. 1300	peggy.churchill@tetratech.com	All	
Bill Olson	TtNUS, FOL	(850) 385-9899	William.Olson@tetratech.com	All	
Kelly Carper	QAM	(412) 921-7273	kelly.carper@tetratech.com	All	
Matt Kraus	Project Chemist	(412) 921-8729	matthew.kraus@tetratech.com	Worksheet (WS) #12, #14, #15, #19, #20, #23-28, #30, and #34-37	
Matt Soltis	Health and Safety Manager (HSM)	(412) 921-8912	matt.soltis@tetratech.com	Health and Safety Plan (HASP)	

NAME	ORGANIZATION/TITLE/ROLE	TELEPHONE NUMBER (OPTIONAL)	SIGNATURE/E-MAIL RECEIPT	SAP SECTION REVIEWED	DATE SAP READ
Joseph Samchuck	Data Validation Manager (DVM)	(412) 921-8510	joseph.samchuck@tetratech.com	WS #12, #14, #15, #19, #20, #23-28, #30, and #34-37	
Kim Kostzer	Empirical Laboratories PM	(615) 345-1115	kkostzer@empirilabs.com	WS #12, #14, #15, #19, #20, #23-28, #30, and #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 and/or e-mail	Procedure
QAPP amendments	TtNUS TOM NAVFAC SE RPM	Gerry Walker Patty Marajh-Whittemore	(850) 385-9866 ext. 1362 (904) 542-6964	After realizing an amendment is needed, TOM will send NAVFAC SE RPM a concurrence letter within 7 days. The NAVFAC SE RPM will sign the letter within 5 days of receipt.
Schedule changes	TtNUS TOM	Gerry Walker	(850) 385-9866 ext. 1362	When impact is realized, send NAVFAC SE a schedule concurrence letter within 7 days or prior to the first affected deliverable date.
Field issues that require changes in scope or implementation of field work	TtNUS FOL NAVFAC SE RPM TtNUS TOM	Bill Olson Patty Marajh-Whittemore Gerry Walker	(850) 385-9866 ext. 1359 (904) 542-6964 (850) 385-9866 ext. 1362	FOL informs TOM verbally the day the issue is realized. TOM informs the NAVFAC SE RPM of the issue verbally within 1 day of the FOL's notification. TOM also sends a concurrence letter to the NAVFAC SE within 7 days, if project scope is affected. The NAVFAC SE RPM will sign the letter within 5 days of receipt. Document changes on a Field Task Modification Request (FTMR) form. Place the form in the project file, with signatures as determined by the TOM
Stop work recommendations, for example, to protect workers from unsafe conditions/situations or to prevent a degradation in quality of work	TtNUS FOL/SSO TtNUS TOM TtNUS QAM	Bill Olson Gerry Walker Kelly Carper	(850) 385-9866 ext. 1359 (850) 385-9866 ext. 1362 (412) 921-7372	On the day the problem is identified, FOL, SSO, or QAM verbally informs TOM and documents problem on a FTMR. On the same day of the notification from the FOL, TOM informs NAVFAC SE and Installation RPMs via email.
Field or laboratory data issues	Laboratory PM TtNUS Project Chemist	Kim Kostzer Matt Kraus	(615) 345-1115 (412) 921-8729	When issue is related to chemical data, Laboratory PM notifies Project Chemist verbally within 2 days of identification of problem. Project Chemist notifies TtNUS TOM verbally within 1 day.

SAP WORKSHEET #7 -- PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities
Patty Marajh-Whittemore	RPM/Manages project	NAVFACSE	Oversees project implementation, including scoping, data review, and evaluation.
David Grabka	RPM/Manages Project	State Agency	Participates in scoping, data review, evaluation, and approves the SAP.
Greg Campbell	Site Manager/Manages daily site activities related to this project	Facility POC	Oversees site activities and participates in scoping, data review, evaluation, and reviews the SAP.
Greg Fraley	RPM/Manages Project	USEPA Region 4	Participates in scoping, data review, and evaluation.
Gerry Walker	TOM/Manages project on a daily basis	TtNUS	Oversees project, financial, schedule, and technical day to day management of the project. Specific responsibilities include: • Ensures timely resolution of project-related technical, quality, and safety questions associated with Tetra Tech operations. • Functions as the primary Tetra Tech interface with the NAVFAC RPM, regulators, Tetra Tech field and office personnel, and laboratory points of contact. • Ensures that Tetra Tech health and safety issues related to this project are communicated effectively to all personnel and off-site laboratories. • Monitors and evaluates all Tetra Tech subcontractor performance. • Coordinates and oversees work performed by Tetra Tech field and office technical staff (including data interpretation, and report preparation). • Coordinates and oversees maintenance of all Tetra Tech project records. • Coordinates and oversees review of Tetra Tech project deliverables. • Prepares and issues final Tetra Tech deliverables to NAVFAC.

Name	Title/Role	Organizational Affiliation	Responsibilities
Bill Olson	FOL/Manages field operations	TtNUS	Supervises, coordinates, and performs field sampling activities. Specific responsibilities include: • Functions as the on-site communications link between field staff members, subcontractors, and Tetra Tech TOM. • 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 Tetra Tech 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, implements and documents corrective action (CA) procedures, and provides communication between the field team and project management. Alerts off-site analytical laboratories of any special health and safety hazards associated with environmental samples. • Ensures that all health and safety requirements for the investigation are implemented. • Alerts off-site analytical laboratories of any special health and safety hazards associated with environmental samples. • FOL responsibilities include initiating and conducting equipment inventories to ensure equipment is available, purchasing equipment as required, staging equipment for efficient loading and transport from the Tetra Tech office to the site, and, after field activities are completed, demobilizing the equipment.

Name	Title/Role	Organizational Affiliation	Responsibilities
Bill Olson	SSO/Oversees site activities to ensure safety requirements are met	TtNUS	The SSO will be responsible for training and monitoring site conditions. Details of these responsibilities are presented in the HASP and include: • Controlling specific health and safety-related field operations such as personnel decontamination, monitoring of worker heat or cold stress, and distribution of safety equipment. • Conducting and documenting a daily health and safety briefing each day while on site. • Assuring that field personnel comply with all procedures established in the HASP. • Identifying SSOs in their absence. • Terminating work in an imminent safety hazard, emergency situation, or other potentially dangerous situation is encountered. • Assuring the availability and the condition of health and safety monitoring equipment. • Coordinating with the FOL and Tetra Tech TOM to institute and document any necessary HASP modifications. • Ensuring that facility personnel and subcontractors are adequately advised and kept clear of potentially contaminated materials.
Kelly Carper NAVAFC SE	QAM/Oversees program and project quality assurance activities	TtNUS	Reviews the SAP, oversees preparation of lab scope, and data quality review. Ensures quality aspects of the CLEAN program are implemented. Specific responsibilities include: • Develops, maintains, and monitors 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, SAP requirements, and corporate policies and procedures. • Audits project records. • Monitors subcontractor quality controls and records. • Assists in the development of CA plans and ensuring correction of non-conformances reported in internal or external audits. • Ensures that this SAP meets TtNUS, DON, and U.S. EPA QA requirements. • Prepares QA reports for management.

Name	Title/Role	Organizational Affiliation	Responsibilities
Joseph Samchuck	DVM/Oversees data validation activities	TtNUS	Manages data validation activities within Tetra Tech, including: • Ensure quality assurance of data validation deliverables. • Provide technical advice on data usability. • Coordinate and maintain data validation review schedule.
Matt Soltis	HSM/Oversees health and safety activities	TtNUS	Oversees TtNUS CLEAN Program Health and Safety Program including: • Provides technical advice to the TtNUS TOM on matters of health and safety. • Oversees the development and review of the HASP. • Conducts health and safety audits. • Prepares health and safety reports for management.
Matt Krause	Project Chemist/Conducts data validation and reporting	TtNUS	Provide support to the project including: • Assists in preparation of SAP. • Prepares laboratory scopes of work, coordinates analyses with laboratory chemists, ensures that the laboratory scope of work is followed, and communicates with TtNUS staff. • Provides technical advice to the TtNUS team on matters of project chemistry. • Reviews laboratory data. • Evaluates data usability. • Functions as the primary interface between the subcontracted laboratory and TtNUS staff.
Kim Kostzer	Laboratory PM/Manages project	Empirical	Coordinates analyses with lab chemists, ensures that scope of work is followed, provides QA of data packages, and communicates with TtNUS project staff.

SAP WORKSHEET #8 -- SPECIAL PERSONNEL TRAINING REQUIREMENTS TABLE
(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 site-specific TtNUS HASP.

SAP WORKSHEET #9 -- PROJECT SCOPING SESSION PARTICIPANTS SHEET
(UFP-QAPP Manual Section 2.5.1)

Project Name: Building 2662 UFP-SAP Projected Date(s) of Sampling: February 2010 Project Manager: Gerry Walker	Site Name: UST Site 2 (Building 2662) Site Location: NAS Pensacola, Pensacola, FL
Date of Session: July 21, 2009 **Scoping Session Purpose:** Discuss UFP-SAP content and begin scoping of verification sampling.	

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Patty Whittemore	Navy RPM	NAVFAC SE	(904) 542-3991	patty.whittemore@navy.mil	RPM
Tracie Bolanos	FDEP RPM	FDEP	(850) 245-8998	tracie.bolanos@dep.state.fl.us	RPM
Greg Campbell	Facility Contact (RPM)	NAVFAC SE	(850) 452-3131	gregory.campbell@navy.mil	Base Point of Contact
Gerry Walker	TOM	TtNUS	(850) 385-9899	gerry.walker@tetratech.com	TtNUS PM
Yarissa Martínez	Scribe	TtNUS	(850) 385-9899	yarissa.martinez@tetratech.com	Support
Peggy Churchill	Environmental Scientist	TtNUS	(321) 636-6470	peggy.churchill@tetratech.com	DQO Facilitator

COMMENTS/DECISIONS:

Post remediation, the thermally treated soil samples yielded TCLP lead results that exceeded the FDEP Groundwater Cleanup Target Level (GCTL) for lead of 15 micrograms per liter (µg/L). As a result, FDEP requested that nine monitoring wells be installed, sampled and analyzed for lead and that the results be submitted as a CAR Addendum. The wells were installed, but current records indicate the requested sampling event did not occur. As a result, groundwater must be investigated to determine if lead concentrations exceed the FDEP lead GCTL. The decision rules agreed to during this meeting are presented in Worksheet 11. There was agreement that there are enough wells to address the site.

Because these wells are placed within and adjacent to the area of excavation, the well locations are suitable to achieve the project objectives. Agreement was reached that Synthetic Precipitation Leaching Procedure (SPLP) samples are not needed unless the groundwater samples detect lead above GCTLs.

ACTION ITEMS:

Action Item 01 - TtNUS will distribute the 1994 Completion Report to the team.

Action Item 02 - Greg Campbell will verify the buildings that appear in the picture shown. *This was completed during the meeting*. The buildings presented in the photograph were buildings 3912 and 3927.

Action Item 03 - TtNUS will send WS #10 and #11 to the team by mid-August.

SAP WORKSHEET #10 -- CONCEPTUAL SITE MODEL
(UFP-QAPP Manual Section 2.5.2)

10.1 SITE BACKGROUND

NAS Pensacola is an active facility in Escambia County in the northwest panhandle area of Florida. Chevalier Field is located on about 190 acres of the eastern edge of NAS Pensacola. In recent years, it has functioned as a NADEP used for repairs, maintenance, and testing of military helicopters. Located on the southeast corner of Chevalier Field, UST Site 2 includes the area around former Building 2662, a rigid frame steel building once used as a hanger in which aircraft maintenance and repairs were performed.

A CAR was conducted by ABB-ES in April of 1994, in which petroleum contaminated soil and a benzene plume were identified at UST Site 2. The contaminated soil was most likely related to activities once carried out at the site, which included loading aircraft with fuel stored in the Building 2662 UST (UST Site 2). Additionally, disposal of industrial waste through the trench, bilge line, and oil water separator was carried out at UST Site 2, Building 627, and adjacent sites. An IRA was conducted at the site in which Buildings 2662 and 3380 were demolished and removed. Approximately 4,650 yd^3 of contaminated soil was excavated from the site as well as a small area near Building 607. The excavation was three feet deep in the petroleum plume areas which extended to or slightly below the water table. About 3,160 yd^3 of the contaminated soil was treated on site by low temperature thermal desorption and used along with clean borrow soil to backfill the area. The remaining contaminated soil was transported to an offsite facility for thermal treatment.

When the removal report was submitted, it came to the attention of FDEP that one-third of the 3,160 yd^3 of treated soil used as backfill at UST Site 2 exceeded the 108 ppm total lead criteria specified in 62-775.410 F.A.C., which is applied to any treated soil. None of the treated soil samples exceeded the TCLP lead limit of 5.0 mg/L per 62-775.410 F.A.C. Only one of the original post-thermal treatment samples from the soil that was backfilled exhibited total lead levels in excess of the 400 ppm SCTL. As a result, Confirmatory Sampling was conducted in March of 1995 (Bechtel Environmental, Inc). Of the twelve samples collected, none of the measured concentrations were in exceedance of the Residential SCTL of 400 ppm. Because there were no exceedances, TCLP with subsequent lead analysis was not performed on these samples. Following the confirmatory sampling, FDEP requested sampling and analysis of approximately 10 groundwater wells for lead (FDEP, 1998). Neither the sampling plan for this event or the results are included in the current site record. As a result, the wells will be sampled at this time and analyzed for lead.

10.2 CONCEPTUAL SITE MODEL

The previously contaminated soil at UST Site 2 was excavated, thermally treated, and used as backfill at the site in 1994. Surface soil lead concentrations in excess of the 108 ppm criteria for thermally treated soil may remain at the site and may have migrated during precipitation events, thereby impacting both subsurface soils and groundwater within the site. The potentially impacted groundwater may have migrated, thereby contaminating down-gradient subsurface soils and expanding the impact to groundwater. There are no drinking water wells at NAS Pensacola, so groundwater is not a complete exposure pathway, however, any contaminated groundwater must be remediated to current regulatory criteria. An additional migration pathway includes storm water run-off that could have transported contaminated surface soil and dissolved contaminants further impacting nearby surface soil, which, over time, may have leached lead to adjacent subsurface soil and groundwater. The site itself is currently covered with a maintained lawn and sidewalks used by base personnel. Storm water run off is collected in gutters and drop inlets that are located in a parking lot to the east of the site.

Insert figure 10-1 here

Insert figure 10-2 here

SAP WORKSHEET #11 -- PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS

(UFP-QAPP Manual Section 2.6.1)

PROBLEM DEFINITION

Post remediation, the thermally treated soil samples yielded TCLP lead results that exceeded the FDEP GCTL for lead of 15 µg/L. As a result, FDEP requested that ten monitoring wells be installed, sampled, and analyzed for lead and that the results be submitted as a CAR Addendum. The wells were installed, but current records indicate the requested sampling event did not occur. As a result, groundwater must be investigated to determine if lead concentrations exceed the FDEP lead GCTL.

IDENTIFY INFORMATION INPUTS

In order to meet the study goals of the investigation, the physical and chemical data to be collected at UST Site 2 are described below:

1. Previously Collected Data: This data was used by the project team to assist with the selection of sample locations.

2. Groundwater Field investigation parameters: groundwater elevation, groundwater dissolved oxygen, conductivity, pH, temperature, turbidity, and oxidation-reduction potential. These data will assist with site characterization and, when combined with groundwater analytical data, will assist with understanding the nature and extent of site contamination. These groundwater measurements will be used to determine when groundwater samples are representative of the groundwater being investigated. Standard field screening SOPs (identified in Worksheet #21) will be used for collecting these data.

3. Chemical Analysis: groundwater analytical data will be used to determine the nature and extent of lead at UST Site 2. The list of all chemical analytes is presented in Worksheet #15. The sampling methods are presented in Worksheet #18 and the analytical methods are presented in Worksheet #19. The selected target analytes represent those analytes that are likely to be associated with historic site operations and the CSM.

4. Site Survey: A site survey will be conducted the site. The survey will include site features and groundwater monitoring wells. The information collected will be sent and stored in TtNUS' Geographic Information System (GIS) database.

5. Project Action Limits (PALs): This investigation requires analytical chemical data that can be used to characterize the site and to conduct a screening level human health risk assessment by comparison to conservative screening values (i.e., PALs). In order to compare site data to screening values, the selected laboratory must be able to achieve quantitation limits (QLs) that are low enough to measure constituent concentrations below the PALs. For this investigation the PALs are listed and described below.

6. FDEP Groundwater Cleanup Target Levels (GCTLs) - Residential (GCTLs) as per Chapters 62-770, and 62-777, F.A.C.

DEFINE THE BOUNDARIES OF THE STUDY

The horizontal study area boundary includes the area of excavation and the associated previously installed groundwater wells as presented in Figure 17-1. The wells were screened between 2 and 12 feet below ground surface (bgs) in order to capture contamination that may be present in the sand and gravel aquifer. The 2 to 12 foot interval includes the water table interval which was encountered at 1 to 3 feet bgs during the contamination assessment.

DEVELOP THE ANALYTIC APPROACH

If any lead concentration from any groundwater sample exceeds 15 µg/L, then the project team will develop a monitoring plan and will continue to monitor annually until lead groundwater concentrations are no longer in exceedance of the lead GCTL, or the project team will determine if a response action is required at the site. If all of the sample results include concentrations less than the GCTL, then no further investigation or action is required at the site.

SPECIFY PERFORMANCE OR ACCEPTANCE CRITERIA

Pre-existing monitoring wells will be sampled during this investigation. Because these wells are placed within and adjacent to the area of excavation, samples will be collected from groundwater that is most likely to be contaminated if lead in soil has leached to the groundwater. The project team selected locations and numbers of samples which, based on their experience, will support the attainment of the stated project objectives. The project team will use the results of the investigation to ensure all proposed samples were collected, that the data meets quality specifications, and that the overall data quality is sufficient for decision making. This will involve a review of contaminant concentrations to ensure that contaminants are likely to have been detected if present, and that enough data have been collected to support this site investigation. The project team will review the field measurement and fixed-base laboratory data screening and analytical results to ensure that all viewpoints are included in decision making.

SAP WORKSHEET #12 -- MEASUREMENT PERFORMANCE CRITERIA TABLE FIELD QUALITY CONTROL SAMPLE – GROUNDWATER LEAD
(UFP-QAPP Manual Section 2.6.2)

QUALITY CONTROL (QC) SAMPLE	ANALYTICAL GROUP	FREQUENCY	DATA QUALITY INDICATORS (DQIs)	MEASUREMENT PERFORMANCE CRITERIA (MPC)	QC SAMPLE ASSESSES ERROR FOR SAMPLING (S), ANALYTICAL (A), OR BOTH (S&A)
Equipment Rinsate Blank	All analytical groups	One per 20 field samples per matrix per sampling equipment [1]	Accuracy/Bias/ Contamination	No analytes > ½ quantitation limit (QL), except common laboratory contaminants, which must be < QL.	S&A
Field Duplicate	All analytical groups	One per 20 field samples collected	Precision	Values > 5x QL: Relative Percent Difference (RPD) ≤30% [2] (aqueous).	S
Cooler Temperature Blank	All analytical groups	One per cooler	Representativeness	Temperature between 2 and 6 degrees Celsius (4 ± 2 °C).	S

Footnotes:
[1] Equipment rinsate blanks will be collected if non-dedicated submersible pumps or other equipment are used.
[2] If duplicate values are < 5x QL for aqueous samples, absolute difference should be < 2x QL.

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)	**DATA USE**	**LIMITATIONS ON DATA USE**
Aerial Photographs	Google Earth	TtNUS, Geographic Information System (GIS) Department, June 2008.	Data will be used to determine approximate sample area and sample locations.	None
Project Completion Report	Bechtel Environmental Inc; *Project Completion Report for Petroleum Contaminated Soil Under Delivery Orders 0006 and 0017 at 2662-W and PSC-36*; January 1996	Bechtel Environmental, Inc.; Removal Action; January 1996	Data will be used to support decisions made at the site.	None
Confirmatory Sampling Report	Bechtel Environmental, Inc.; *Supplemental Confirmatory Soil Sampling Report: Lead in Thermally Treated Soils Site 2662*; May 1995	Bechtel Environmental, Inc.; Sampling Report; March 1995	Data will be used to determine approximate sample area and sample locations.	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
- Well Re-development
- Groundwater Sampling
- Field Decontamination Procedures
- Field Documentation QA/QC Procedures
- Analytical Tasks
- Data Management and Review Procedures
- Investigation Derived Waste (IDW) Management and Disposal

14.1 MOBILIZATION AND 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 conduct of 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 WELL RE-DEVELOPMENT

Prior to sampling, existing wells will be re-developed with a centrifugal pump to clear well screens and any debris from the wells that might have accumulated over time. In order to conduct groundwater sampling at the site, all wells are required to be developed. Field parameters including water table level,

dissolved oxygen, conductivity, pH, turbidity, and oxidation-reduction potential measurements will be collected during groundwater investigation activities.

14.4 GROUNDWATER SAMPLING

A total of 15 groundwater samples will be collected from existing wells installed. Wells will be sampled at a minimum of 24 hours following well re-development. Samples will be collected according to TtNUS Standard Operating Procedure (SOP) SA-1.1.

14.5 FIELD DECONTAMINATION PROCEDURES

Sample containers will be provided certified-clean from the analytical laboratory. Decontamination of sampling equipment will be conducted prior to and between sampling at each location. At each site, an abbreviated decontamination procedure consisting of a soapy water (laboratory-grade detergent) rinse followed by a deionized water rinse will be performed. However, if free product is encountered, a more elaborate decontamination of equipment will be conducted in accordance with TtNUS SOP SA-7.1.

14.6 FIELD DOCUMENTATION QA/QC PROCEDURES

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

14.7 SAMPLE COLLECTION DOCUMENTATION, HANDLING AND TRACKING

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 the SOPs (Appendix A). The equipment used to collect the sample will 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 will be appropriately recorded. Measurements made will be recorded. All instruments used to make measurements will be identified, along with the date of calibration.

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

- Groundwater Level Measurement Log
- Groundwater Sampling Log
- Chain of Custody Record.

Log sheets will include entries in every blank, with appropriate use of the abbreviations NA (not applicable) and NR (not recorded). All NR entries should 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 will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark, the correct entry will be recorded, and the change will be initialed and dated by the person making the correction.

14.7.2 Sample Handling and Tracking System

The following subsections outline the procedures that will be used by field and laboratory personnel to document sample collection activities during the performance monitoring sampling event. Detailed and accurate documentation is necessary in order to ensure data integrity.

14.8 ANALYTICAL TASKS

Lead analysis will be performed by Empirical Laboratories. Empirical is Department of Defense Environmental Laboratory Program (DOD ELAP) accredited. A copy of the laboratory certification for can be found in Appendix C. Analyses will be performed in accordance with the analytical methods identified in Worksheet #19. Empirical will meet the PAL (15 µg/L) as shown in Worksheet #15. Empirical will perform lead analysis following laboratory-specific SOPs (Worksheets #19 and #23) developed based on the analytical methods listed in Worksheets #19 and #30. Copies of the laboratories SOPs are included in Appendix C and are included on the attached compact disk (CD).

14.9 DATA MANAGEMENT

Project documentation and records

- Field sample collection and field measurement records are described in Worksheets #27 and #29.
- Laboratory data package deliverables are described in the analytical specifications in Appendix C.
- Data assessment documents and records are listed in Worksheet #29.

Data Handling and Management - After the field investigation is completed, the field sampling log sheets will be organized by date and media and filed in the project files. The field logbooks for this project will be used only for these sites, and will also be categorized and maintained in the project files after the completion of the field program. Project personnel completing concurrent field sampling activities may maintain multiple field logbooks. When possible, logbooks will be segregated by sampling activity. The field logbooks will be titled based on date and activity. The data handling procedures to be followed by the laboratories will meet the requirements of the technical specification. The electronic data results will be automatically downloaded into the TtNUS database in accordance with proprietary TtNUS processes.

Data Tracking and Control. The TtNUS TOM (or designee) is responsible for the overall tracking and control of data generated for the project.

- **Data Tracking**. Data is tracked from its generation to its archiving in the TtNUS project-specific files. The TTNUS Project Chemist (or designee) is responsible for tracking the samples collected and shipped to the subcontracted laboratory. Upon receipt of the data packages from the analytical laboratory, the Project Chemist will oversee the data validation effort, which includes verifying that the data packages are complete and results for all samples have been delivered by the analytical laboratory.

- **Data Storage, Archiving, and Retrieval**. The data packages received from the subcontracted laboratory are tracked in the data validation logbook. After the data are validated, the data packages are entered into the TtNUS CLEAN file system and archived in secure files. The field records including field logbooks, sample logs, chain-of-custody records, and field calibration logs will be submitted by the FOL to be entered into the CLEAN file system prior to archiving in secure project files. The project files are audited for accuracy and completeness. At the completion of the Navy contract the records will be stored by TtNUS and eventually handed over to NAVFAC.

- **Data Security**. The TtNUS project files are restricted to designated personnel only. Records can only be borrowed temporarily from the project file using a sign-out system. The TtNUS Data Manager maintains the electronic data files. Access to the data files is restricted to qualified personnel only. File and data backup procedures are routinely performed.

Assessment and Oversight – Refer to Worksheet #32 for assessment findings and corrective actions and Worksheet #33 for QA management reports.

Data Review

- Data verification is described in Worksheet #34.
- Data validation is described in Worksheets #35 and #36.
- Usability assessment is described in Worksheet #37.

14.8 INVESTIGATION DERIVED WASTE MANAGEMENT AND DISPOSAL

IDW will be containerized according to matrix by TtNUS in Department of Transportation (DOT)-approved (DOT specification 17C) 55-gallon drums and stored in a centralized location. The drums will be labeled, sealed, and temporarily stored at NAS Pensacola pending completion of analytical results. TtNUS will provide NAS Pensacola with the analytical results upon receipt. NAS Pensacola will then be responsible for IDW disposal and the associated manifesting paperwork.

Under oversight by TtNUS, the drilling subcontractor(s) will be responsible for providing, filling, sealing, and moving the drums to a centralized area specified by the base point of contact designated during mobilization. The drums must be generally clean prior to moving to the centralized storage area. The drums will be labeled by TtNUS as soon as possible after they are filled. The drums shall be arranged into rows by the drilling subcontractor(s), no more than two drums deep, by liquids and contaminated personal protective equipment (PPE) for easy access.

SAP WORKSHEET #15 -- REFERENCE LIMITS AND EVALUATION TABLE
(UFP-QAPP Manual Section 2.8.1)

Matrix: Groundwater

Analytical Group: Lead

ANALYTE	CAS NUMBER	PAL (µg/L)	PAL REFERENCE	PROJECT QL GOAL (µg/L)	EMPIRICAL	
					QL (µg/L)	METHOD DETECTION LIMIT (MDL) (µg/L)
Lead	7439-92-1	15	FDEP Residential GCTL	5.0	10	5

SAP WORKSHEET #16 -- PROJECT SCHEDULE / TIMELINE TABLE (OPTIONAL FORMAT)
(UFP-QAPP Manual Section 2.8.2)

ACTIVITIES	ORGANIZATION	DATES (MM/DD/YY)		DELIVERABLE	DELIVERABLE DUE DATE
		ANTICIPATED DATE(S) OF INITIATION	ANTICIPATED DATE OF COMPLETION		
Field Team Mobilization	TtNUS	02/02/10	02/03/10	Not applicable	Not applicable
Well development	TtNUS	02/03/10	02/04/10	Not applicable	Not applicable
Groundwater Sampling	TtNUS	02/05/10	02/11/10	Not applicable	Not applicable
Demobilization	TtNUS	02/12/10	02/13/10	Not applicable	Not applicable
Report Draft Submittal	TtNUS	04/15/10	06/01/10	RFI Report Draft Submittal	06/01/10

SAP WORKSHEET #17 -- SAMPLING DESIGN AND RATIONALE
(UFP-QAPP Manual Section 3.1.1)

PLANNED GROUNDWATER SAMPLING

To monitor groundwater for potential lead contamination above the Residential GCTL from historical activities at the site, groundwater samples will be collected from 15 previously installed monitoring wells. The wells were installed following an IRA in 1994. The total number of samples for groundwater was selected based on the number of intact monitored wells, which were installed in 1994. In order to conduct groundwater sampling at the site, all wells are required to be developed. Field parameters including water table level, dissolved oxygen, conductivity, pH, turbidity, and oxidation-reduction potential measurements will be collected during groundwater investigation activities.

Sample Locations:	See Worksheet #11 and Figure 17.1
Matrix and sample numbers:	Groundwater: 15 groundwater samples will be collected from previously installed monitoring wells.
Field Parameters:	Field parameters including groundwater level, dissolved oxygen, conductivity, pH, temperature, turbidity, and oxidation-reduction potential measurements will be collected during groundwater investigation activities.
Chemical Analyte Group:	Lead.
Analytical Method/SOPs:	See Worksheet #23.
Number of QC Samples:	See Worksheet #20.
Sample Dates:	See Worksheet #16. Field team mobilization will occur on February 2, 2010. The groundwater sampling and will occur over eight days. Demobilization will occur on February 12, 2010.

Insert figure 17-1 here

SAP WORKSHEET #18 -- SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE
(UFP-QAPP Manual Section 3.1.1)

SAMPLING LOCATION	ID NUMBER	MATRIX	DEPTH (feet bgs)	ANALYTICAL GROUP	NUMBER OF SAMPLES (identify field duplicates)	SAMPLING SOP REFERENCE[1]
GW1	UST-02-MW-1-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW2	UST-02-MW-2-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW3	UST-02-MW-3-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW4	UST-02-MW-4-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW5	UST-02-MW-5-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW6	UST-02-MW-6-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW7	UST-02-MW-7-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1

SAMPLING LOCATION	ID NUMBER	MATRIX	DEPTH (feet bgs)	ANALYTICAL GROUP	NUMBER OF SAMPLES (identify field duplicates)	SAMPLING SOP REFERENCE[1]
GW8	UST-02-MW-8-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW9	UST-02-MW-9-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW10	UST-02-MW-10-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW11	UST-02-MW-11-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW12	UST-02-MW-12-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW13	UST-02-MW-13-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW14	UST-02-MW-14-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW15	UST-02-MW-15-XXXX (1)	Groundwater	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1

SAMPLING LOCATION	ID NUMBER	MATRIX	DEPTH (feet bgs)	ANALYTICAL GROUP	NUMBER OF SAMPLES (identify field duplicates)	SAMPLING SOP REFERENCE[1]
GWXX-DUP01	UST-02-MW-15-XXXX (1)	Groundwater Duplicate	~10	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW-FB01	UST-02-FB-01-XXXX (1)	Groundwater Field Blank	NA	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
GW-EB01	UST-02-EB-01-XXXX (1)	Groundwater Equipment Blank	NA	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1
IDW-01	UST-02-IDW-XXXX (1)	Groundwater (2)	NA	Lead	1	CT-04, GH-2.5, SA-1.1, SA-6.3, SA-7.1

Footnotes:
[1] XXXX: Date sample was collected in four digits in the format of MMYY.

SAP WORKSHEET #19 -- ANALYTICAL SOP REQUIREMENTS TABLE
(UFP-QAPP Manual Section 3.1.1)

MATRIX	**ANALYTICAL GROUP**	**ANALYTICAL AND PREPARATION METHOD/SOP REFERENCE**	**CONTAINERS** (number, size, and type)	**SAMPLE VOLUME** (units)	**PRESERVATION REQUIREMENTS** (chemical, temperature, light protected)	**MAXIMUM HOLDING TIME** (preparation/analysis)
Groundwater and Aqueous Field Quality Control Samples	Lead	SW-846 3005A/6010B Empirical SOP-100/105	500-milliliter (mL) plastic bottles	50 mL	Nitric acid to a pH<2; Cool to 4º C ± 2º C	180 days to analysis; 28 days to analysis for mercury

SAP WORKSHEET #20 -- FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE – ANALYTICAL SAMPLES
(UFP-QAPP Manual Section 3.1.1)

MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	FIELD SAMPLES	FIELD DUPLICATES	MS/MSDS (1)	RINSATE BLANKS (2)	TOTAL SAMPLES TO LAB
Groundwater	Lead	Low	15	1	1	1	18

[1] Although the MS/MSD is not typically considered a field QC, it is included here because location determination is often established in the field. MS/MSDs are not included in the total number of samples sent to the laboratory.

[2] Rinsate blanks will be collected at a frequency of one per piece of equipment per media.

SAP WORKSHEET #21 -- PROJECT SAMPLING SOP REFERENCES TABLE
(UFP-QAPP Manual Section 3.1.2)

REFERENCE NUMBER	TITLE, REVISION DATE AND/OR NUMBER (1)	ORIGINATING ORGANIZATION OF SAMPLING SOP	EQUIPMENT TYPE	MODIFIED FOR PROJECT WORK? (Y/N)	COMMENTS
CT-04	Sample Nomenclature Rev. 1, September 2003	TtNUS	NA	N	SOP is included in Appendix A
CT-05	Database Records and Quality Assurance Rev. 2, January 29, 2001	TtNUS	NA	N	SOP is included in Appendix A
DV-04	Data Validation – Non-CLP Inorganics for Solid and Aqueous Matrices Rev. 0, August 13, 2001	TtNUS	NA	N	SOP is included in Appendix A
GH-2.5	Groundwater Contour Maps and Flow Determination, Rev. 1, 1999	TtNUS	NA	N	SOP is included in Appendix A
SA 1.1	Groundwater Sample Acquisition and Water Quality Testing, Rev. 6, September 2008	TtNUS	Pump, multi-parameter meter, turbidimeter	N	SOP is included in Appendix A
SA-6.3	Field Documentation Rev. 2, September 2003	TtNUS	Field Logbook, Field Sample Forms, Boring Logs	N	SOP is included in Appendix A

REFERENCE NUMBER	TITLE, REVISION DATE AND/OR NUMBER [(1)]	ORIGINATING ORGANIZATION OF SAMPLING SOP	EQUIPMENT TYPE	MODIFIED FOR PROJECT WORK? (Y/N)	COMMENTS
SA-7.1	Decontamination of Field Equipment Rev. 3, September 2003	TtNUS	Decontamination Equipment (scrub brushes, phosphate free detergent, de-ionized water)	Y	Decontamination of sampling equipment is not anticipated however if required, Nitric acid removed from decontamination procedure. Isopropyl Alcohol to be used if field conditions warrant SOP is included in Appendix A

Footnote:

[1] The TtNUS SOPs are currently in review. TtNUS will review, update, or revise these SOPs on a periodic basis. (e.g., every two to three years).

SAP WORKSHEET #22 -- FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION TABLE
(UFP-QAPP Manual Section 3.1.2.4)

FIELD EQUIPMENT	ACTIVITY [1]	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	RESPONSIBLE PERSON	SOP REFERENCE [2]	COMMENTS
Water Quality Meter	Visual Inspection Calibration/ Verification	Daily Beginning and end of day	Manufacturer's guidance	Operator correction or replacement	FOL	SA-1.1	
Turbidity Meter	Visual Inspection Calibration/ Verification	Daily Beginning and end of day	Manufacturer's guidance	Operator correction or replacement	FOL	SA-1.1	
Water Level Indicator	Visual Inspection Field checks as per manufacturer	Daily Once upon receiving from vendor	0.01 foot accuracy	Operator correction or replacement	FOL	SA-1.1	

Footnotes:

[1] Activities may include: calibration, verification, testing, maintenance, and/or inspection.
[2] Specify the appropriate reference letter or number from the Project Sampling SOP References table (Worksheet #21).

SAP WORKSHEET #23 -- ANALYTICAL SOP REFERENCES TABLE
(UFP-QAPP Manual Section 3.2.1)

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 and Soil/Sediment USEPA CLP ILMO 5.2 Aqueous and Soil/Sediment, USEPA Method 200.7 (Standard Methods) 3030C (Revision 19, 4/20/09).	Definitive	Groundwater and Aqueous Field QC Samples/Lead	NA	Empirical	N
SOP-105	Metals Analysis by ICP Technique Methods 200.7, SW846 6010B, SM 19th Edition 2340B, USEPA CLP ILMO 4.1 (Revision 15, 5/8/09).	Definitive	Groundwater, and Aqueous Field QC Samples /Lead	Inductively Coupled Plasma (ICP)	Empirical	N
SOP-404	Laboratory Sample Receiving Log-In and Storage Standard Operating Procedures (Revision 12, 1/5/09)	NA	NA	NA	Empirical	N
SOP-405	Analytical Laboratory Waste Disposal (Revision 5, 06/23/09)	NA	NA	NA	Empirical	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-410	Standard Operating Procedures for Laboratory Sample Storage, Secure Areas, and Sample Custody (Revision 7, 06/23/09)	NA	NA	NA	Empirical	N

SAP WORKSHEET #24 -- ANALYTICAL INSTRUMENT CALIBRATION TABLE
(UFP-QAPP Manual Section 3.2.2)

INSTRUMENT	CALIBRATION PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	PERSON RESPONSIBLE FOR CORRECTIVE ACTION	SOP REFERENCE
ICP - Lead	Initial Calibration - the instrument is calibrated by a one point calibration per manufacturer's guidelines.	At the beginning of each day, or if the QC is out of criteria.	None; only one high standard and a calibration blank must be analyzed. If more than one calibration standard is used, correlation coefficient ≥ 0.995.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/ Supervisor	Empirical SOP-105
	Initial Calibration Verification (ICV) – from a source different than that used for calibration curve.	Following initial calibration prior to the analysis of samples.	Recoveries must be 90-110% of the true value.	Investigate reasons for failure, reanalyze once. If still unacceptable, repeat calibration.	Analyst/ Supervisor	Empirical SOP-105
	Initial Calibration Blank (ICB)	Before beginning a sample sequence.	No analytes detected > 2x MDL.	Correct the problem, then re-prepare and reanalyze.	Analyst/ Supervisor	Empirical SOP-105

INSTRUMENT	CALIBRATION PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	PERSON RESPONSIBLE FOR CORRECTIVE ACTION	SOP REFERENCE
ICP - Lead	Continuing Calibration Verification (CCV)	Analyze a standard at the beginning and end of the sequence and after every 10 samples.	Recoveries must be 90-110% of the true value..	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/ Supervisor	Empirical SOP-105
	Continuing Calibration Blank (CCB)	After the initial CCV, 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.	Analyst/ Supervisor	Empirical SOP-105
	Low-Level Check Standard	Daily after ICAL and before samples.	Recoveries must be 80-120% of the true value.	Investigate and perform necessary equipment maintenance. Recalibrate and reanalyze all affected samples.	Analyst/ Supervisor	Empirical SOP-105

INSTRUMENT	CALIBRATION PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	PERSON RESPONSIBLE FOR CORRECTIVE ACTION	SOP REFERENCE
ICP - Lead	Interference Check Standards (ICS – ICS A and ICS B)	At the beginning and end of an analytical run and after each batch of 20 samples.	ICS A recoveries must be within the absolute value of the QL and ICS B recoveries must be within 80-120% of the true value.	Investigate and perform necessary equipment maintenance. Recalibrate and reanalyze all affected samples.	Analyst/ Supervisor	Empirical SOP-105

SAP WORKSHEET #25 -- ANALYTICAL INSTRUMENT AND EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE
(UFP-QAPP Manual Section 3.2.3)

INSTRUMENT/ EQUIPMENT	MAINTENANCE ACTIVITY	TESTING ACTIVITY	INSPECTION ACTIVITY	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	RESPONSIBLE PERSON	SOP REFERENCE[1]
ICP	Clean the torch assembly and 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.	Lead	Inspect the torch, nebulizer chamber, pump, and tubing.	Maintenance is performed prior to initial calibration or as necessary.	The acceptance criterion for the continuing calibration standard is 90 to 110% of true value.	Recalibrate and/or perform the necessary equipment maintenance. Check the calibration standards. Reanalyze the affected data.	Analyst/ Supervisor	Empirical SOP-105

Footnotes:
[1] Specify the appropriate reference letter or number from the Analytical SOP References Table (Worksheet #23).

SAP WORKSHEET #26 -- SAMPLE HANDLING SYSTEM
(UFP-QAPP Manual Appendix A)

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): FOL/TtNUS
Sample Packaging (Personnel/Organization): To be decided (TBD)/ TtNUS
Coordination of Shipment (Personnel/Organization): TBD/ TtNUS
Type of Shipment/Carrier: Express mail courier
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodians/Empirical
Sample Custody and Storage (Personnel/Organization): Sample Custodians/Empirical
Sample Preparation (Personnel/Organization): Metals Preparation Lab/Empirical
Sample Determinative Analysis (Personnel/Organization): Metals Lab/ Empirical
SAMPLE ARCHIVING
Field Sample Storage: 60 days from receipt of collection.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): 3 months from sample digestion/extraction
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Sample Custodians/ Empirical

SAP WORKSHEET #27 – SAMPLE CUSTODY REQUIREMENTS TABLE
(UFP-QAPP Manual Section 3.3.3)

27.1 Field Sample Custody Procedures (Sample Collection, Packaging, Shipment, and Delivery to Laboratory)

Following sample collection into the appropriate bottle ware, all samples will be immediately placed on ice in a cooler. The glass sample containers will be enclosed in bubble-wrap in order to protect the bottle ware during shipment. The cooler will be secured using duct or clear packaging tape along with a signed custody seal. Sample coolers will be delivered to a local courier location for priority overnight delivery to the selected laboratory for analysis. Samples will be preserved as appropriate based on the analytical method. Laboratories will provide pre-preserved sample containers for sample collection. Samples will be maintained at 4°C until delivery to the laboratories. Proper custody procedures will be followed throughout all phases of sample collection and handling. Chain of custody protocols will be used throughout sample handling to establish the evidentiary integrity of sample containers. These protocols will be used to demonstrate that the samples were handled and transferred in a manner that would eliminate possible tampering. Samples for the laboratory will be packaged and shipped in accordance with TtNUS SOP SA-6.1.

27.1.1 Sample Handling

Sample handling is described in Worksheet #26.

27.1.2 Sample Delivery

The shipment of samples to the laboratory will be made by a shipping courier service (e.g., Federal Express), unless the laboratory is close enough to the site to provide a pickup service. After samples have been collected, they will be sent to the laboratory within 24 to 72 hours depending on the analyte holding time. Under no circumstances will sample holding times be exceeded.

27.1.3 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 chain of custody form. The chain of custody begins at the time of sample collection. The laboratory will provide forms that will be used for chain of custody documentation.

A sample is under custody if:

- The sample is in the physical possession of an authorized person.

- The sample is in view of an authorized person after being in his/her possession.
- The sample is placed in a secure area by an authorized person after being in his/her possession.
- The sample is in a secure area, restricted to authorized personnel only.

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

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 analytical 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 shipping courier. When transferring samples, the individuals relinquishing and receiving the samples will each sign the chain-of-custody form and the date and time will be recorded to document the sample custody transfer from the sampler to the shipping courier, and finally to the laboratory. Upon arrival at the laboratory, internal sample custody procedures will be followed as defined in the laboratory SOPs included in Appendix C.

27.2 LABORATORY CHAIN OF CUSTODY – EMPIRICAL

Laboratory sample custody procedures (receipt of samples, archiving, and disposal) will be used according to Empirical SOPs (Appendix C). Coolers are received and checked for proper temperature. A sample cooler receipt form will be filled out to note conditions and any discrepancies. The chain of custody will be checked against the sample containers for correctness. Samples will be logged into the laboratory information management system (LIMS) and given a unique log number which can be tracked thru processing. The Empirical Laboratory PM will notify the TtNUS FOL of any problems on the same day that the issue is identified.

SAP WORKSHEET #28 -- LABORATORY QC SAMPLES TABLE
(UFP-QAPP Manual Section 3.4)

Matrix	Groundwater and Aqueous Field QC
Analytical Group	Lead
Analytical Method / SOP Reference	SW-846 3050B/ 3005A, 6010B Empirical SOP-100/103/104/105

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/ SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DATA QUALITY INDICATOR (DQI)	MPC
Method Blank	One per digestion batch of 20 or fewer samples.	Contaminants in the method blank must be < ½ QLs.	Investigate the source of the contamination. If the sample concentration ≥ the QL and <10x the blank concentration, then Redigest and reanalyze all associated samples	Analyst, Laboratory Supervisor, and Data Validator	Bias/ Contamination	Contaminants in the method blank must be < ½ QLs.

Matrix	Groundwater and Aqueous Field QC
Analytical Group	Lead
Analytical Method / SOP Reference	SW-846 3050B/ 3005A, 6010B Empirical SOP-100/103/104/105

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/ SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DATA QUALITY INDICATOR (DQI)	MPC
LCS	One per digestion batch of 20 or fewer samples.	%R must be within 80-120 % of the true value.	(1) Investigate source of problem. (2) Re-digest and reanalyze all associated samples.	Analyst, Laboratory Supervisor, and Data Validator	Accuracy/Bias/ Contamination	%R must be within 80-120 % of the true value.
Duplicate Sample	One per digestion batch of 20 or fewer samples.	DoD QSM QC acceptance criteria, at a minimum. RPD ≤20%, if both results are >5x QL.	Flag results.	Analyst, Laboratory Supervisor, and Data Validator	Precision	DoD QSM QC acceptance criteria, at a minimum. RPD ≤20%, if both results are >5x QL.

Matrix	Groundwater and Aqueous Field QC
Analytical Group	Lead
Analytical Method / SOP Reference	SW-846 3050B/ 3005A, 6010B Empirical SOP-100/103/104/105

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/ SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DATA QUALITY INDICATOR (DQI)	MPC
Matrix Spike	One per 20 samples or similar matrix.	DoD QSM QC acceptance criteria, at a minimum. %R must be within 75-125 % of the true value, if sample < 4x spike added.	Flag results.	Analyst, Laboratory Supervisor, and Data Validator	Accuracy/Bias	DoD QSM QC acceptance criteria, at a minimum. %R must be within 75-125 % of the true value, if sample < 4x spike added.

Matrix	Groundwater and Aqueous Field QC
Analytical Group	Lead
Analytical Method / SOP Reference	SW-846 3050B/ 3005A, 6010B Empirical SOP-100/103/104/105

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/ SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DATA QUALITY INDICATOR (DQI)	MPC
ICP Serial Dilution	One per digestion batch.	If original sample result is at least 50x the instrument detection limit, then 5-fold dilution must agree within ± 10% RPD 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, then five-fold dilution must be ≤10 %RPD.
Post Digestion Spike	One is performed when serial dilution fails or analyte concentration(s) in all samples < 50x MDL.	Recovery must be between 85-115%.	Flag results of samples of same matrix as estimates in data package narrative.	Analyst, Laboratory Supervisor, and Data Validator	Accuracy & Precision	Recovery must be between 85-115%.

SAP WORKSHEET #29 -- PROJECT DOCUMENTS AND RECORDS TABLE
(UFP-QAPP Manual Section 3.5.1)

DOCUMENT	LOCATION MAINTAINED
Sample Collection Documents and Records Project Personnel Sign-off 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 airbills Equipment calibration logs Photographs FTMR forms This SAP Field sampling SOPs	TtNUS project file (may include hard-copy as well as electronic information) results will be discussed in subject document.
Laboratory Documents and Records Sample receipt/log-in forms Sample storage records Sample preparation logs Standard traceability logs Equipment calibration logs Sample analysis run logs Equipment maintenance, testing, and inspection logs Reported field sample results Reported results for standards, QC checks, and QC samples Data completeness checklists Sample storage and disposal records Telephone logs Extraction/clean-up records Raw data	TtNUS project file (may include hard-copy as well as electronic information) long-term data package storage at third-party professional document storage firm (BRM), results will be discussed in subject document. Electronic data results will be maintained in a database on a password- protected Structured Query Language (SQL) server.

DOCUMENT	LOCATION MAINTAINED
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 (includes tabulated data summary forms)	TtNUS project file (may include hard-copy as well as electronic information) long-term data package storage at third-party professional document storage firm (BRM), results will be discussed in subject document. Electronic data results will be maintained in a database on a password- protected SQL server.
Other Documents HASP All versions of SAP All versions of reports (e.g., SI, RI, FS, etc.)	All versions of the subject document and all support documents will be stored in hard-copy in the TtNUS project file and electronically in the server library.

SAP WORKSHEET #30 -- ANALYTICAL SERVICES TABLE
(UFP-QAPP Manual Section 3.5.2.3)

MATRIX	ANALYTICAL GROUP	SAMPLE LOCATIONS/ ID NUMBER	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)
Groundwater and aqueous QC samples	Lead	See Worksheet #18	SW-846 6010B	21 days	Kim Kostzer, Laboratory PM, Empirical Laboratories, LLC 227 French Landing Drive, Suite 550 I Nashville, Tennessee 37228 kkostzer@empirlabs.com 1 (877) 345-1113	NA

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 CA** (title and organizational affiliation)	**PERSON(S) RESPONSIBLE FOR MONITORING EFFECTIVENESS OF CA** (title and organizational affiliation)
Field Sampling System Audit	One per contract year	Internal	TtNUS	Auditor, TtNUS	TOM and FOL, TtNUS	Auditor and TOM, TtNUS	QAM, TtNUS
Laboratory System Audit [1]	Every 18 months	External	DOD ELAP accrediting body	DOD ELAP accrediting body	Laboratory QAM or Laboratory Manager Empirical Laboratories	Laboratory QAM or Laboratory Manager Empirical Laboratories	DOD and TtNUS

Footnotes: 1 Empirical Laboratories is DOD ELAP accredited. The accreditation letter is included in Appendix C.

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 Sampling System Audit (1)	Audit checklist (as per Navy Installation Restoration Chemical Data Quality Manuel [IRCDQM]) and written audit report	Gerry Walker, TOM, TtNUS Bill Olson, FOL, TtNUS Debra Humbert, Program Manager, TtNUS 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 Mark Perry, Deputy Program Manager, TtNUS	Within 48 hours of notification
Laboratory System Audit	Written audit report	Laboratory Manager or Laboratory QAM Empirical Laboratories	Not specified by DOD	Letter	DOD ELAP Accrediting Body	Specified by DOD

1 Audits are scheduled at the Tetra Tech program level and may or may not include this project.

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	Within 3 weeks after receiving the data from the laboratory	DVM and Staff Chemists, TtNUS	TOM and project file, TtNUS
Major Analysis Problem Identification (Internal Memorandum)	When persistent analysis problems are detected	Immediately upon detection of a problem; on the same day	CLEAN QAM, TtNUS	TOM, QAM, Program Manager, and project file, TtNUS
Project Monthly Progress Report	Monthly for duration of project	Monthly	TOM, TtNUS	TOM, QAM, Program Manager, and project file, TtNUS
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 upon detection of a problem; on the same day	Laboratory PM, Empirical	TOM and project file, TtNUS

SAP WORKSHEET #34 -- VERIFICATION (STEP I) 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 (sampler) will review and sign each chain of custody form to verify that all samples listed are included in the shipment to the laboratory and that sample information is accurate. The chain-of-custody forms will be signed by the sampler and a copy will be retained for the project file, TtNUS TOM, and TtNUS Data Validators. See SA-6.3 (Appendix A). The Laboratory Sample Custodian will review the sample shipment for completeness and integrity and will sign accepting the shipment. The TtNUS Data Validators will check that the chain-of-custody form was signed and dated by the TtNUS FOL or designee relinquishing the samples and also by the Laboratory Sample Custodian receiving the samples for analyses.	Internal Internal/ External	Sampler and FOL, TtNUS Laboratory Sample Custodian, Empirical Project Chemist or Data Validators, TtNUS
Sample Tables	Verify that all proposed samples listed in the SAP tables have been collected.	Internal	FOL or designee, TtNUS
Sample Log Sheets	Verify that information recorded in the log sheets is accurate and complete.	Internal	FOL or designee, TtNUS

VERIFICATION INPUT	DESCRIPTION	INTERNAL/ EXTERNAL	RESPONSIBLE FOR VERIFICATION (name, organization)
Sample Coordinates	Verify that sample locations are correct and in accordance with the SAP proposed locations (compare map of proposed locations to map of actual locations).	Internal	FOL or designee, TtNUS
Field QC Samples	Check that field QC samples listed in Worksheet 20 were collected as required.	Internal	FOL or designee, TtNUS
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. 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. This occurs as part of the data validation process.	Internal External	Laboratory QAM, Empirical Data Validators, TtNUS

VERIFICATION INPUT	DESCRIPTION	INTERNAL/ EXTERNAL	RESPONSIBLE FOR VERIFICATION (name, organization)
Analytical Data Packages and Electronic Data Deliverables (EDD)	The electronic data will be verified against the chain-of-custody form and hard copy data package for accuracy and completeness. Laboratory analytical results will be verified and compared to the electronic analytical results for accuracy. Sample results will be evaluated for laboratory contamination and will be qualified for false positives using the laboratory method/preparation blank summaries. Results reported between the MDL and reporting limit will be qualified as estimated. Extraneous laboratory qualifiers will be removed from the validation qualifier.	External	Data Validators, TtNUS

Notes:
Verification includes field data verification and laboratory data verification. Verification inputs as per 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.	TtNUS TOM or designee
IIa	Chain of Custody	Ensure that the custody and integrity of the samples was maintained from collection to analysis and the custody records are complete and any deviations are recorded.	TtNUS project chemist or data validators
IIa	Holding times	Review that the samples were shipped and store at the required temperature and sample pH for chemically-preserved samples meet the requirements listed in Worksheet #19. Ensure that the analyses were performed within the holding times listed in Worksheet #19.	TtNUS project chemist or data validators

STEP IIa / IIb	VALIDATION INPUT	DESCRIPTION	RESPONSIBLE FOR VALIDATION (name, organization)
IIa/IIb	Laboratory data results for accuracy	Ensure that the laboratory QC samples listed in Worksheet #28 were analyzed and that the measurement performance criteria listed in Worksheet #12 were met for all field samples and QC analyses. Check that specified field QC samples were collected and analyzed and that the analytical quality control criteria set up for this project were met.	TtNUS project chemist or data validators
IIa/IIb	Field and laboratory duplicate analyses for precision	Check the field sampling precision by calculating the relative percent difference (RPD) for field duplicate samples. Check the laboratory precision by reviewing the RPD or percent difference values from laboratory duplicate analyses; matrix spike/matrix spike duplicates; and laboratory control sample/laboratory control sample duplicate. Ensure compliance with the methods and project MPC accuracy goals listed in Worksheet #12.	TtNUS project chemist or data validators
IIa/IIb	Sample results for representativeness	Check that the laboratory recorded the temperature at sample receipt and the pH of the chemically preserved samples to ensure sample integrity from sample collection to analysis.	TtNUS project chemist or data validators
IIa/IIb	Project action limits	Discuss the impact on matrix interferences or sample dilutions performed because of the high concentration of one or more contaminants on the other target compounds reported as non-detected. Document this usability issue and inform the TOM.	TtNUS project chemist or data validators

STEP IIa / IIb	VALIDATION INPUT	DESCRIPTION	RESPONSIBLE FOR VALIDATION (name, organization)
IIa/IIb	Data validation report	Summarize deviations from methods, procedures, or contracts. Qualify data results based on method or QC deviation and explain all the data qualifications. Print a copy of the project data base qualified data depicting data qualifiers and data qualifiers codes that summarize the reason for data qualifications. Determine whether the data met the MPCs and determine the impact of any deviations on the technical usability of the data.	TtNUS project chemist or data validators
IIa, IIb	SAP QC Sample Documentation	Ensure that all QC samples specified in the SAP were collected and analyzed and that the associated results were within prescribed SAP acceptance limits. Ensure 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.	TtNUS TOM or designee

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. Check that all data have been transferred correctly and completely to the final Structured Query Language (SQL) database.	TtNUS project chemist or data validators
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.	TtNUS TOM or designee
IIb	Project Quantitation Limits for sensitivity	Ensure that the project quantitation limits listed in Worksheet #15 were achieved.	TtNUS project chemist or data validators
IIb	Analytical data Deviations	Determine the impact of any deviation from sampling or analytical methods and SOPs requirements and matrix interferences effect on the analytical results.	TtNUS project chemist or data validators

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	Groundwater	Lead	SW-846 6010B method-specific criteria, the DoD QSM, and those criteria listed in Worksheets 12, 15, 24, and 28 will be used to evaluate the data. If not included in these worksheets, the logic outlined in and 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.	Data Validation Specialist, TtNUS

SAP WORKSHEET #37 -- USABILITY ASSESSMENT
(UFP-QAPP Manual Section 5.2.3)

The usability of the data directly affects whether project objectives can be achieved. The project team will perform the data usability assessment to ensure that the data is representative and able to support decisions. The following activities will be conducted and evaluated at a minimum. The results of these evaluations will be included in the project report.

COMPLETENESS

For each matrix that was scheduled to be sampled the TtNUS TOM and risk assessor will determine whether the deviations (holding times, chain of custody, etc) compromise the ability to meet project objectives. If they do, the TtNUS TOM will consult with the Navy RPM and other project team members to develop appropriate corrective actions.

PRECISION

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.

ACCURACY

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 laboratory control samples (LCS), laboratory control sample duplicates MS 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 surrogates, 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

A project scientist and risk assessor identified by the TtNUS TOM and acting on behalf of the project team will determine whether the data are adequately representativeness 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 professional judgment of the project scientist indicates that a quantitative analysis is required.

COMPARABILITY

The Project Chemist acting on behalf of the project team will determine whether the data generated under this project are sufficiently comparable to background and historical site data generated by different methods and for samples collected using different procedures and under different site conditions. This will be accomplished by comparing overall precision and bias among data sets for each matrix and analytical fraction.

SENSITIVITY

The Project Chemist acting on behalf of the project team will determine whether project sensitivity goals listed in Worksheet #15 are achieved. The overall sensitivity and quantitation limits from multiple data sets for each matrix and analysis will be compared. If sensitivity goals are not achieved, the limitations on the data will be described. The Project Chemist will enlist the help of the project risk assessor to evaluate deviations from planned sensitivity goals.

PROJECT ASSUMPTIONS AND DATA OUTLIERS

The TtNUS TOM 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. Any outliers will be realized using standard statistical techniques appropriate for this task and 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 rest of the data. During this evaluation, the team will consider whether outliers could be indications of unanticipated site conditions. Consideration will be given to whether outliers represent an unanticipated site condition.

EVALUATIVE PROCEDURES TO ASSESS OVERALL MEASUREMENT ERROR

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) will not 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.

USABILITY ASSESSMENT DOCUMENTATION

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.

REFERENCES

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Department of the Navy, 1994. Letter to Ensafe/Allen & Hoshall: Contamination Assessment Report Site 2662W Naval Air Station Pensacola, Florida.

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