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EXTENDED SITE INSPECTION PLAN FOR MAGAZINE POINT BOMBING TARGET NAS
PENSACOLA FL
11/1/2011
TETRA TECH

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055



Rev. 0
9/11

Extended Site Inspection Plan for NAS Pensacola - Magazine Point Bombing Target

Naval Air Station Pensacola
Pensacola, Florida

Contract Task Order 0148

November 2011



NAS Jacksonville
Jacksonville, Florida 32212-0030

SAP Worksheet #1 – Title and Approval Page

(UFP-QAPP Manual Section 2.1)

DRAFT FINAL

TIER II SAMPLING AND ANALYSIS PLAN

November 2011

**EXTENDED SITE INSPECTION OF MAGAZINE POINT BOMBING TARGET
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**

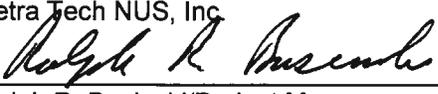
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John Tucker/Government Chemist Date
NAVFAC QA Review

SAP Worksheet #1 – Title and Approval Page

(UFP-QAPP Manual Section 2.1)

INTERNAL-DRAFT FINAL

TIER II SAMPLING AND ANALYSIS PLAN

NovemberSEPTMBER 2011

**EXTENDED SITE INSPECTION OF MAGAZINE POINT BOMBING TARGET
NAVAL AIR STATION PENSACOLA
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**Prepared for:
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CONTENTS

<u>SECTION</u>	<u>PAGE NO.</u>
TITLE AND APPROVAL PAGE	1
1.0 PROJECT ORGANIZATIONAL CHART	7
2.0 COMMUNICATION PATHWAYS	8
3.0 PROJECT PLANNING SESSION PARTICIPANTS SHEET	12
4.0 CONCEPTUAL SITE MODEL	14
4.1 SITE DESCRIPTION	14
4.2 SITE INSPECTION RESULTS	15
4.3 CONCEPTUAL SITE MODEL (CSM)	16
5.0 DATA QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS	19
5.1 PROBLEM STATEMENT	19
5.2 DECISION INPUTS	20
5.3 STUDY BOUNDARIES	21
5.4 ANALYTIC APPROACH	22
6.0 FIELD QUALITY CONTROL SAMPLES	23
7.0 SAMPLING DESIGN AND RATIONALE	24
8.0 FIELD PROJECT IMPLEMENTATION (FIELD PROJECT INSTRUCTIONS)	28
8.1 FIELD PROJECT TASKS	28
8.2 FIELD SOPS REFERENCE TABLE	36
8.3 SAMPLE DETAILS TABLE	37
8.4 FIELD QUALITY CONTROL SAMPLE SUMMARY	38
8.5 ANALYTICAL SOP REQUIREMENTS	39
9.0 REFERENCE LIMITS AND EVALUATION TABLES	40
10.0 ANALYTICAL SOP REFERENCE TABLE	42
11.0 LABORATORY QC SAMPLES TABLES	43
12.0 DATA VERIFICATION AND VALIDATION (STEPS I AND IIA/IIB) PROCESS TABLE	47
12.1 VALIDATION SUMMARY	52
REFERENCES	53

APPENDICES

Appendix A	Field Standard Operating Procedures
Appendix B	Empirical Laboratories DoD ELAP Accreditation

FIGURES

Figure 1	Area Location Map
Figure 2	Site Location Map
Figure 3	Range Site Details
Figure 4	Incremental Sample Layout

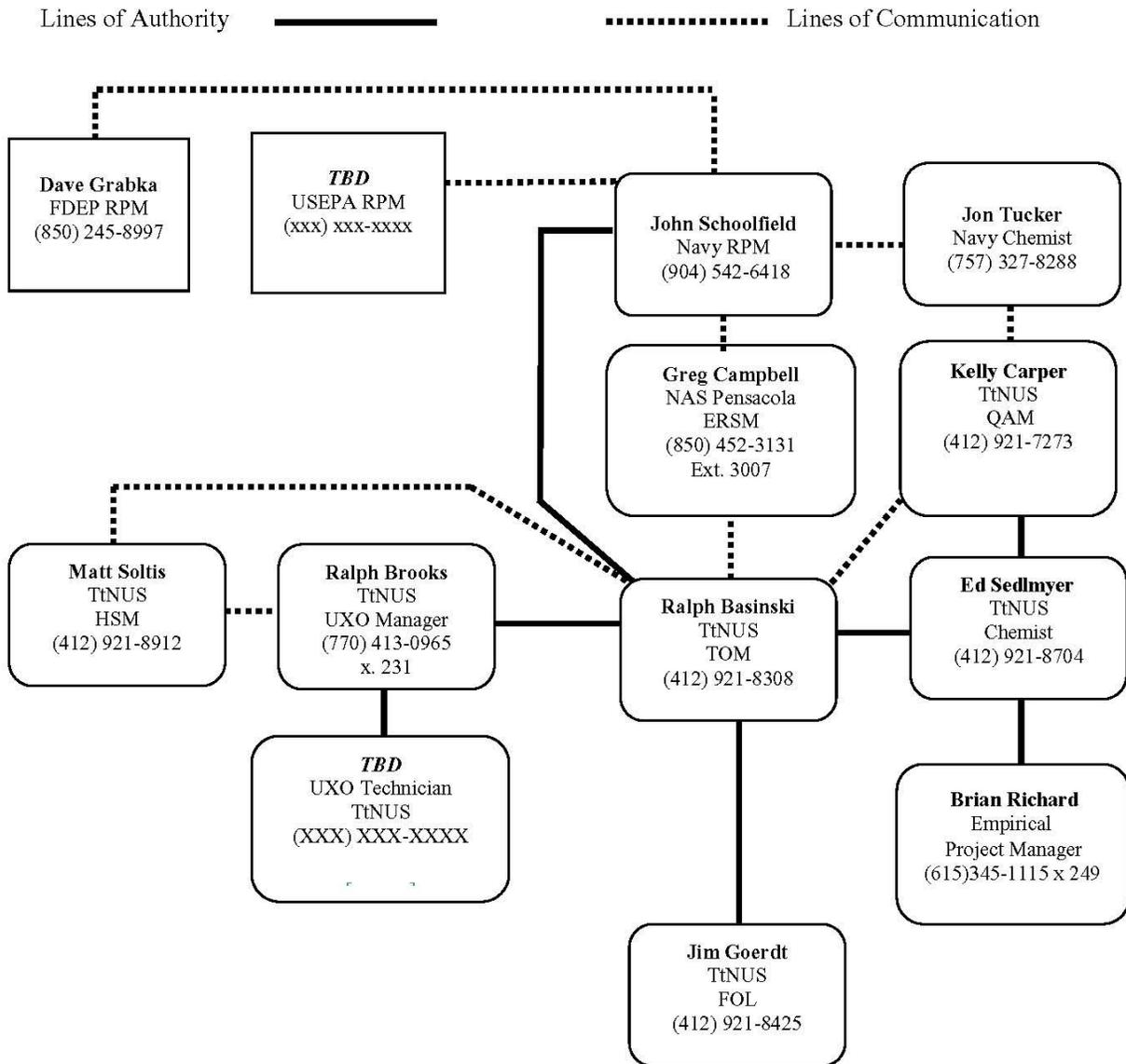
ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CRREL	Cold Regions Research Engineering Laboratory
CSM	Conceptual site model
CTO	Contract task order
DAF	Dilution attenuation factor
DL	Detection Limit
DMM	Discarded military munitions
DoD	Department of Defense
DQI	Data Quality Indicator
DQO	Data Quality Objective
DVM	Data Validation Manager
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
ERSM	Environmental Remediation Site Manager
FBL	Fixed Base Laboratory
FDEP	Florida Department of Environmental Protection
FOL	Field operations leader
FTMR	Field task modification request
GPS	Global Positioning System
HASP	Health and Safety Plan
HPLC	High Performance Liquid Chromatography
HSM	Health and Safety Manager
ICP-AES	Inductively coupled plasma atomic emission spectroscopy
IDW	Investigation-derived waste
kg	kilogram
LCS	Laboratory control sample
LOD	Limit of Detection
LOQ	Limit of Quantitation
MC	Munitions constituents
MCL	Maximum contaminant level
MCS	Media Cleanup Standards

MD	Munitions debris
mm	millimeter
MEC	Munitions and explosives of concern
MMRP	Military Munitions Response Program
MPPEH	Munitions potentially presenting explosive hazard
MRP	Munitions Response Program
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NEDD	NIRIS Electronic Data Deliverable
NFA	No further action
NIRIS	Naval Installation Restoration Information Solution
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAL	Project Action limit
PM	Project manager
PPE	Personal protective equipment
PQLG	Practical Quantitation Limit Goal
PT	Proficiency test
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
RPD	Relative percent difference
RPM	Remedial Project Manager
RSD	Relative standard deviation
RSL	Regional screening level
SAP	Sampling and Analysis Plan
SCTL	Soil cleanup target level
SI	Site inspection
SOP	Standard operating procedure
SPLP	Synthetic precipitation leaching procedure
SSO	Site Safety Officer
TCLP	Toxicity characteristic leaching procedure
Tetra Tech NUS, Inc.	Tetra Tech
TOM	Task Order Manager

UFP-SAP	Uniform Federal Policy-Sampling and Analysis Plan
UXO	Unexploded ordnance
USEPA	United States Environmental Protection Agency
WWTP	Wastewater treatment plant

1.0 Project Organizational Chart
 (UFP-QAPP Manual Section 2.4.1 – Worksheet #5)



2.0 Communication Pathways

(UFP-QAPP Manual Section 2.4.2 – Worksheet #6)

The communication pathways for the Sampling and Analysis Plan (SAP) are shown below.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Regulatory Agency Interface	USEPA RPM FDEP PM Navy RPM	Tim Woolheater Dave Grabka John Schoolfield	404-562-8510 850-245-8997 904-542-6418	The Navy RPM will contact the regulatory agency via phone and/or e-mail within 24 hours of recognizing the issue whenever issues arise.
Field Progress Reports	Tetra Tech NUS, Inc. (Tetra Tech) FOL Tetra Tech PM	Jim Goerd Ralph Basinski	412-921-8425 412-921-8308	The Tetra Tech FOL will contact the Tetra Tech PM on a daily basis via phone, and submit progress summaries daily via e-mail.
Gaining site access	Tetra Tech FOL NAS Pensacola ERSM	Jim Goerd Greg Campbell	412-921-8425 850-452-3131 x3007	The Tetra Tech FOL shall contact the NAS Pensacola ERSM verbally or via e-mail at least 3 days prior to commencement of field work to arrange for access to the site for all field personnel.
Obtaining utility clearances	Tetra Tech FOL	Jim Goerd	412-921-8425	The Tetra Tech FOL shall submit a NAS Pensacola Excavation Permit to the NAS Pensacola ERSM at least 10 days prior to commencement of field work and also contact Florida One-Call at least 3 days prior to commencement of field work to complete a utility clearance ticket for the area(s) under investigation.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Stop Work due to Safety Issues	Tetra Tech FOL/Site Safety Officer (SSO) Tetra Tech PM Tetra Tech HSM Navy RPM NAS Pensacola ERSM	Jim Goerd Ralph Basinski Matt Soltis John Schoolfield Greg Campbell	412-921-8425 412-921-8308 412-921-8912 904-542-6418 850-452-3131 x3007	If Tetra Tech is the responsible party for a stop work command, the Tetra Tech FOL will inform onsite personnel, subcontractor(s), the NAS Pensacola Site Manager, and the identified Project Team members within 1 hour (verbally or by e-mail). If a subcontractor is the responsible party, the subcontractor PM must inform the Tetra Tech FOL within 15 minutes, and the Tetra Tech FOL will then follow the procedure listed above.
Sampling and Analyses Plan (SAP) Changes prior to Field/ Laboratory work	Tetra Tech FOL/SSO Tetra Tech PM Navy RPM	Jim Goerd Ralph Basinski John Schoolfield	412-921-8425 412-921-8308 904-542-6418	The Tetra Tech PM will document the proposed changes via a Field Task Modification Request (FTMR) form within 5 days and send the Navy RPM a concurrence letter within 7 days of identifying the need for change if necessary. SAP amendments will be submitted by the Tetra Tech PM to the Navy RPM for review and approval. The Tetra Tech PM will send scope changes to the Project Team via e-mail within 1 business day.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
SAP Changes in the Field	Tetra Tech FOL/SSO Tetra Tech PM Navy RPM NAS Pensacola ERSM	Jim Goerd Ralph Basinski John Schoolfield Greg Campbell	412-921-8425 412-921-8308 904-542-6418 850-452-3131 x3007	<p>The Tetra Tech FOL will verbally inform the Tetra Tech PM on the day that the issue is discovered. The Tetra Tech PM will inform the Navy RPM and the NAS Pensacola ERSM (verbally or via e-mail) within 1 business day of discovery.</p> <p>The Navy RPM will issue a scope change (verbally or via e-mail), if warranted. The scope change is to be implemented before further work is executed.</p> <p>The Tetra Tech PM will document the change via an FTMR form within 2 days of identifying the need for change and will obtain required approvals within 5 days of initiating the form.</p>
Field Corrective Actions	Tetra Tech PM Tetra Tech QAM Navy RPM	Ralph Basinski Tom Johnston John Schoolfield	412-921-8308 412-921-8615 904-542-6418	<p>The Tetra Tech QAM will notify the Tetra Tech PM verbally or by e-mail within one business day that the corrective action has been completed. The Tetra Tech PM will then notify the Navy RPM (verbally or by e-mail) within 1 business day</p>

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Analytical Corrective Actions	Laboratory PM Tetra Tech Project Chemist Tetra Tech DVM Tetra Tech PM Navy RPM	Brian Richard Ed Sedlmyer Joseph Samchuck Ralph Basinski John Schoolfield	615-345-1115 Ext. 249 412-921-8704 412-921-8510 412-921-8308 904-542-6418	<p>The Laboratory PM will notify (verbally or via e-mail) the Tetra Tech Project Chemist within 1 business day of when an issue related to laboratory data is discovered.</p> <p>The Tetra Tech Project Chemist will notify (verbally or via e-mail) the DVM and the Tetra Tech PM within 1 business day.</p> <p>Tetra Tech DVM or Project Chemist notifies Tetra Tech PM verbally or via e-mail within 48 hours of validation completion that a non-routine and significant laboratory quality deficiency has been detected that could affect this project and/or other projects. The Tetra Tech PM verbally advises the – Navy RPM within 24 hours of notification from the Tetra Tech Project Chemist or DVM. The Navy RPM takes corrective action appropriate for the identified deficiency. Examples of significant laboratory deficiencies include data reported that have a corresponding failed tune or initial calibration verification. Corrective actions may include a consult with the Navy Chemist.</p>

3.0 Project Planning Session Participants Sheet

(UFP-QAPP Manual Section 2.5.1 – Worksheet #9)

Project Name: Supplemental Site Inspection Site Name: Magazine Point Bombing Target, NAS Pensacola
 Projected Date(s) of Sampling: September 15 to September 30, 2011 Site Location: Pensacola, Florida
 Project Manager: Ralph Basinski
 Date of Session: July 29, 2011
 Scoping Session Purpose: Develop initial data quality objectives

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
John Schoolfield	RPM	NAVFAC	904-542-6418	john.schoolfield1@navy.mil	Navy oversight
David Grabka	PM	FDEP	850-245-8997	david.grabka@dep.state.fl.us	FDEP oversight
Julie Corkran	PM	USEPA	404-562-8547	Corkran.julie@epa.gov	EPA oversight
Terry Zdon	EPA Consultant	Tech Law	404-562-8547	tzdon@techlawinc.com	EPA consultant
Ralph Basinski	PM	Tetra Tech NUS	412-621-8308	ralph.basinski@tetrattech.com	Project Manager
Amber Igoe	Environmental Scientist	Tetra Tech NUS	850-385-9866	amber.igoe@tetrattech.com	Scribe

Background:

According to the SI, the Magazine Point Bombing Target site was first denoted on a 1933 historical map, but was not shown on a 1939 historical map, indicating the period of use was approximately the early 1930s. It is believed that only practice bombs were used at the site. During the initial SI, a detector-aided surface survey was conducted on 100 percent of the accessible site. No MEC or other munitions debris was observed during the investigation. Limited sampling at the site was recommended in the SI Report (Tetra Tech, 2010) to ensure no munitions constituents (MC) (i.e., metals and explosives) associated with the practice bombs used at the site are present in the soil.

Action Items:

- 1) Determine appropriate sampling methodology
- 2) Determine constituents to be analyzed
- 3) Decide on location of sample area

Comments/Decisions:

- 1) Consensus was reached by the Project Team that the best soil sampling approach would be the utilization of an Incremental Sampling Methodology.
- 2) Because of the relatively small size of the site (approximately 1 acre), a single Decision Unit was identified.
- 3) Prior to sample collection, a trained UXO technician will clear the area. A portion of the area has been covered with concrete construction material to prevent beach erosion and will limit the use of the Schonstedt and ground penetrating radar. The UXO technician will perform a visual inspection in this area.
- 4) The soil samples will be analyzed for RCRA 8 metals and explosives to confirm that explosives were not used in the practice bombs. A separate metals sample will be collected prior to the grinding step.
- 5) The sample collection depth will be 0 to 6 inches below ground surface (bgs) unless instructed otherwise, and the proposed number of increment samples is a minimum of 30 and a maximum of 100 (approximately 60).

Note: Subsequent to the meeting, a review of the munitions ordnance data sheets for potential metallic constituents resulted in a revised list of metals as presented in Section 9.0.

4.0 Conceptual Site Model

(UFP-QAPP Manual Section 2.5.2 – Worksheet #10)

4.1 SITE DESCRIPTION

The Magazine Point Bombing Target is located at Naval Air Station (NAS) Pensacola in Pensacola, Florida (**Figure 1**). The entire Magazine Point Bombing Target site occupies a 72-acre area located on Magazine Point Peninsula. The bombing target center was located within the boundaries of the main NAS Pensacola installation (**Figure 2**). The Magazine Point Bombing Target was first denoted on a 1933 historical map as a chevron-shaped target located adjacent to Pensacola Bay along with one powder magazine and a radio spotting system (**Figure 3**). The Magazine Point Bombing Target was not shown on a 1939 historical map, indicating the period of use for the Magazine Point Bombing Target was approximately the early 1930s. No additional archival records or references to the range were located during the Preliminary Assessment (PA) that indicated munitions used or construction details. The location of the former Magazine Point Bombing Target site currently encompasses the waste water treatment plant (WWTP) located northwest of the chevron-shaped bombing target (indicated by circular structures on **Figure 3**), undeveloped areas of Magazine Point, and a portion of Pensacola Bay. Based on the location of the bombing target in relation to Chevalier Field (**Figures 2 and 3**), it is likely that the Magazine Point Bombing Target site was used as a practice bombing range where practice bombs were dropped from aircraft with the intent of hitting a target on the ground.

Site 13 (Rubble Disposal Area) is located along the eastern shoreline of Magazine Point, and a portion of it bisects the Bombing Target Area. The Site consists of scattered dumped rubble, concrete, asphalt, and shore-washed garbage.

A remedial investigation has been conducted at Site 13. The Final Remedial Investigation Report (RIR), dated September 1995, states that the Site 13 soil conditions were characterized by generally non-detect organic concentrations with isolated detections of PAHs and phenols, and non-detect to trace concentrations of heavy metals. The RIR concluded that additional assessment work at Site 13 was not required, given the low detected concentrations in soil and no risk related pathways. Moreover, contaminants were absent in groundwater.

A letter of concurrence regarding No Further Action was received from the U.S. EPA Region IV on June 21, 1996, and a letter of concurrence regarding approval of the Final RIR was received from the Florida Department of Environmental Protection on August 14, 1996.

The location of Site 13 within the Bombing Target Area does not affect the current sampling plan.

The Magazine Point Bombing Target is located in a relatively flat area. It gently slopes to the north towards a bayou that flows into Bayou Grande and to the east to Pensacola Bay ([Figure 2](#)). Magazine Point is a peninsula which has little natural relief. No natural surface water features were noted in the Magazine Point area, although various drainage ditches and storm water detention ponds are present. The drainage ditches are located primarily around buildings and developed areas. A portion of Pensacola Bay is included within the site boundary. Surface water runoff from the site drains directly into Pensacola Bay. A portion of the site is located within a 100-year floodplain that occurs along Pensacola Bay. Depth to groundwater at Building 3644 was measured at approximately 5 to 7 feet below ground surface (bgs); however, Building 3644 is located 1,300 feet west of the Bombing Target and groundwater may be closer to the surface at the site given its proximity to Pensacola Bay.

Whereas proximity to Chevalier Field probably limited munitions used at the site to practice bombs with inert fillers, those bombs may have included spotting charges, which would be defined as munitions and explosives of concern (MEC). Therefore, as recently as 2009, the area within the 500-foot scoring arc was thought to be an area potentially containing MEC.

4.2 SITE INSPECTION RESULTS

A visual survey of the area around the Magazine Point Bombing Target was conducted on November 30, 2007 as part of the PA. The area from the shoreline of Pensacola Bay to the heavy vegetation line adjacent to the WWTP fence was visually surveyed. Much of the area was covered with various storm debris washed onto the shore. Concrete and asphalt pieces were also present in this area. These materials have been deliberately placed there for shoreline stabilization. A large mound of dirt was observed just south of the Bombing Target; the history and use of the mound is unknown. The heavily vegetated area included thick growth of slash pines, vines, and various shrubs such as saltbrush. Because of inaccessibility, the heavily vegetated area and the area inside the WWTP were not surveyed. Tetra Tech personnel conducted a site walk on March 27, 2009 as part of a Site Inspection (SI) and confirmed the observations from the PA. No MEC, munitions potentially presenting an explosive hazard (MPPEH), or related debris was observed during either the PA or SI visual surveys.

An SI was conducted at the Magazine Point Bombing Target in February 2010. Survey transect lines were established using hand-held global positioning system (GPS) units. Survey areas were divided into approximately 100-foot by 100-foot survey grids, and temporary markings (e.g., plastic flagging, non-metallic pin flags, etc.) were used to mark locations of transects for vegetation management and surveying. The grids were further divided into 5-foot wide survey lanes ensuring maximum coverage with the survey instrument. A Schonstedt GA-52Cx was used as the primary survey instrument to conduct the surveys. Given the nature of the site and its known use of mostly ferrous munitions, this was the most appropriate technology for this operation based on industry standards. In addition to the Schonstedt

instrument, a White's Spectrum XLT all-metals detector was used in surface survey areas to assist in the location of metal targets with little or no ferrous metal content.

The metal detectors used by the Unexploded Ordnance (UXO) Team during the detector-aided surface survey had a detection depth that was limited by the size and orientation of the target and soil characteristics of the work area. The UXO Team completed the detector-aided surface survey over a 5-day period. Approximately 20 percent of the total accessible area at the Magazine Point Bombing Target site was surveyed every day, and 100 percent coverage of the targeted area was achieved.

The primary objective of the SI was to determine whether further response actions or a Remedial Investigation (RI) was appropriate to restore the site to an acceptable environmental condition. During the SI, the background information provided in the PA Report was evaluated. In addition, supplemental site-specific environmental data were collected to determine types and rough orders of magnitude of MEC quantities at the site, and to refine site boundaries (footprint reduction).

Although no detections of MEC, MPPEH, or munitions debris (MD) were noted at the Magazine Point Bombing Target during the geophysical investigation, limited sampling at the site was recommended in the SI Report (Tetra Tech, 2010) to confirm that no MC (i.e., metals) associated with the practice bombs used at the site are present in the soil, and to verify that explosives (i.e., TNT, RDX, HMX, etc.) were not present in bombs dropped at the Magazine Point Bombing Target site.

4.3 CONCEPTUAL SITE MODEL (CSM)

The results of the February 2010 SI indicate that MEC have not been detected and are not expected to be present at the site. Practice bombs do not contain explosive fillers; however, MC can originate from small quantities of black powder or pyrotechnics potentially contained in the bomb casings to serve as spotting charges. These spotting charges provide visual indication of a bomb impacting the ground.

Many bombs were filled with inert sand or water; however, some bombs were filled with practice bomb fillers and spotting charge formulations, which would have been released or discharged upon impact of the bomb with the ground, and are potential sources of MC contamination. Black powder (a mixture of charcoal, potassium nitrate, and sulfur) and pyrotechnic formulations (some of which may have contained black powder), may have been used as signaling or spotting charges. The charcoal (i.e., wood and carbon) and sulfur components of black powder are relatively inert and pose no human health threat. Potassium nitrate is very soluble in water and is expected to have been washed away by storm surges or precipitation. Some bombs may have contained titanium tetrachloride. After release from a bomb, titanium tetrachloride reacts with water to form hydrochloric acid and titanium dioxide, a relatively inert, white mineral commonly used as paint pigment. Other chemicals used in components of practice

bombes include chlorates, red phosphorus, and nitrocellulose. It is expected that chlorates, which are generally very soluble in water, have been washed out of the soil and are not present at environmentally significant concentrations. Neither red phosphorus nor nitrocellulose represents a significant environmental hazard. The phosphorus is oxidized to phosphate over time and forms phosphate salts with metals in soil, many of which are insoluble in water except at very low concentrations. Nitrocellulose is relatively insoluble. Phosphates and nitrocellulose are essentially non-toxic, in part because of their low solubility, and do not represent a significant human health risk.

Metals commonly associated with practice bombs are components of spotting charges, and components and alloying elements of the metal bomb shells. These metals are copper and zinc in the shotgun cartridges of spotting charges; and cadmium, chromium, iron, manganese, molybdenum, nickel, and vanadium in the steel bomb shells. Additional trace metals may be present in the brass and steel components of the bombs, but they do not represent a significant human health risk because of the small quantities that they would have released. Another metal commonly associated with munitions is lead, although lead is not necessarily a component of steel practice bombs.

The release of chemicals at the Magazine Point Bombing Target occurred primarily to the air with the discharge of the spotting charges, and to surface soil as metal practice bomb shells and shell fragment. Metals are the contaminants most likely to have been released; however, there is a chance that live bombs were used on occasion. The use of live bombs could have released nitramine or nitroaromatic explosives to the air and to surface and shallow subsurface soil.

MC released to the air would have settled onto the ground surface. Therefore, most MC contamination at the Magazine Point Bombing Target is expected to be located in shallow surface soil. The spatial distribution of MC concentrations is likely to be very heterogeneous. If MC are present, migration may occur via surface soil erosion or by human activities (including mowing, grading, or other site work). MC can also percolate into deeper soil under the influence of precipitation; organic explosive compounds and the more mobile metals would be the most likely to percolate. Future construction, excavation, and maintenance workers at the site could be exposed to MC, especially MC in surface soil where the MC concentrations are expected to be the greatest. At the Magazine Point Bombing Target site, MC are most likely to be transported into Pensacola Bay as the result of storm surges that cause the water level to rise up over normally dry land. Construction debris has been deposited over a large portion of the site to prevent shoreline erosion; this may have resulted in the release of contaminants. It is impractical to distinguish construction debris metal contamination from practice bomb contamination. Organic explosive compounds do not occur naturally, and are very unlikely to have been components of the debris. Metals, however, do occur naturally in soil and can leach from the soil into groundwater. A background soil investigation at NAS Pensacola determined that soil background concentrations of metals likely to be

associated with practice bombs do not exceed standards for acceptable exposure of humans to soil. The background concentrations are also less than FDEP leachability criteria; exceedances of these criteria indicate that leaching to groundwater presents a potential threat to groundwater quality.

5.0 Data Quality Objectives/Systematic Planning Process Statements
(UFP-QAPP Manual Section 2.6.1 – Worksheet #11)

5.1 PROBLEM STATEMENT

The Project Team must address the two problem statements described below.

Problem Statement #1:

The Project Team plans to collect and analyze milled incremental soil samples which should better represent site conditions. The Project Team must therefore also confirm that available NAS Pensacola background metals concentrations data are representative of site soil that is not contaminated, and that they can be accurately compared to metals concentrations data obtained from milled incremental soil samples. NAS Pensacola background concentrations of metals in soil are available; however, they were obtained from the analysis of discrete (unmilled) soil samples. For some metals, milling can increase the detected metals concentration because milling releases metals that occur naturally in the soil. Detected background concentrations of these metals in milled samples would appear to be greater than the NAS Pensacola background concentrations obtained from discrete samples, even when there is no real difference.

Therefore, the Project Team will compare the metals concentrations from milled incremental soil samples at the site to the metals concentrations obtained from unmilled incremental soil samples from the same sample locations. If this comparison indicates that milling increases the metal concentrations relative to unmilled samples, the team will conclude that the currently available NAS Pensacola metals background data, which are based on unmilled discrete samples, are not truly representative of background and will collect new background data from milled samples. If milling does not increase metal concentrations in the soil samples, the currently available NAS Pensacola background metal concentrations will be considered acceptable. The soil background data that are concluded to best represent background metal concentrations will be used as the project action limits (PALs) if the metals concentration exceeds a risk-based concentration (see Problem Statement #2).

Problem Statement #2: Malleable metals, such as aluminum, copper, and lead could smear in the grinding chamber during the milling process if a significant amount of larger particle size metal particles are present in the ISM samples. This could result in low results in some samples and carryover issues in other samples. The Project Team will review field and laboratory observations regarding the presence of metallic particles and compare the concentrations of aluminum, copper and lead in the triplicate samples. If this evaluation indicates that smearing effects may be occurring, additional sieving and fractional analysis will be considered or alternate sample preparation techniques investigated.

Problem Statement #3:

MC that are potentially present in surface soil from historical bombing practices could pose an unacceptable level of risk to human receptors. The human receptors that could potentially be exposed to contamination are: future construction, maintenance, and site occupational workers; and hypothetical future residents. Exposure pathways of significance for these receptors to MC in surface soil are:

- Future construction workers: incidental ingestion, inhalation, and dermal contact.
- Maintenance workers: ingestion, inhalation, and dermal contact.
- Site occupational workers: incidental ingestion and inhalation.
- Hypothetical future residents: incidental ingestion, inhalation, and dermal contact.

The hypothetical future residents would experience the most frequent exposure and their exposure durations would likely be the longest per exposure; therefore, the residents are considered to be the most sensitive of these receptors. The Project Team will determine whether concentrations of select MC as identified in the CSM could pose an unacceptable level of risk to any of the receptors by comparing site data to PALs (described in Section 5.2). Responses will be initiated based on sample results, unacceptable risks may be evaluated in greater detail, or options for reducing the risk to a level that is protective of human health may be recommended.

5.2 DECISION INPUTS

To address Problem Statements #1 and #2 presented in Section 5.1, the following data are needed:

- Mean concentrations of potential site MC metals (see Section 9.0) obtained without milling of soil samples. These data will be compared to milled site soil metals concentrations to address Problem Statement #1.
- Mean concentrations of potential MC (select metals and explosives) at the Magazine Point Bombing Target (from milled samples). The list of surface soil MC that are potentially site-related (based on

the CSM of Section 4.3) are presented in Section 9.0. Incremental sampling with milling (grinding) is required to obtain the mean site concentrations with minimal data variability (while minimizing analytical costs) to address Problem Statement #2.

- Project Action Levels (PALs). Comparison of site MC concentrations to PALs will determine whether MC concentrations in surface soil are high enough to pose a potentially unacceptable level of human health risk (Problem Statement #2). For all background metal concentrations that are greater than risk-based PALs, the risk-based PAL will be replaced with the background metal concentration as determined by resolution of Problem Statement #1.
- Location data for sampling points (Problem Statements #1 and #2). Vertical elevation measurements are not required. Because incremental sampling is planned, the vertices of the grid over which incremental samples are collected must be documented. The centroid of these vertices must also be documented. Use of a GPS with sub-meter accuracy (or better) is sufficient for this. The coordinates will be documented in the Florida North State Plane, NAD 83.

Note: Background MC concentrations are not needed for organic explosives because these chemicals do not occur naturally in soil. The metals targeted for this investigation are identified in Section 9.0.

5.3 STUDY BOUNDARIES

The area that represents the greatest potential human health risk is the center line and surrounding area of the bombing target because most bombs presumably landed there, and most MC releases would have occurred there. An Sample Unit approximately 1 acre in size oriented along the bombing target center line represents the greatest exposure risk for the most sensitive receptor: the hypothetical future resident. Therefore, the soil population that must be represented by mean MC concentrations is the Magazine Point Bombing Target soil within the top 6 inches of the ground surface in this area.

For the comparison described in Problem Statement #2 to be valid, the soil MC data obtained from milled and unmilled samples must be as comparable as is reasonably possible. To achieve this, the unmilled soil must be composited from the same samples included in the milled incremental samples. Milled samples may exhibit higher metals concentrations than the unmilled samples as a result of milling; therefore, the comparison to screening criteria may be conservative in that it would tend to indicate an exceedance of criteria than would be indicated by data from unmilled samples.

Vegetation and rocks/sticks, etc. with a grain size of 2 millimeter (mm) or larger should be removed as much as practicable prior to subsampling in the laboratory because grain sizes less than 2 mm represent the greatest human health risk for ingestion and inhalation.

5.4 ANALYTIC APPROACH

The following decision rule will be used to address Problem Statement #1 presented in Section 5.1:

If any mean site metal concentration obtained from milled site incremental samples exceeds the mean site metal concentration from unmilled site incremental samples by more than 20 percent, conclude that the milled sample and unmilled sample data are not comparable and collect a milled sample background metal data set for the affected metals; otherwise, use the available NAS Pensacola unmilled background metal concentrations (obtained from discrete samples) to represent background metal concentrations

The following decision rule will be used to address Problem Statement #2 presented in Section 5.1:

If field and laboratory data indicate that aluminum, lead or copper metallic particles may be present, and comparisons of concentrations of these metals indicate that smearing effects may be occurring, conclude that smearing effects may be occurring. Therefore additional samples must be collected, and additional sieving and fractional analysis or alternate sample collection techniques will be considered.

The following decision rule will be used to address Problem Statement #3 presented in Section 5.1:

If the mean surface soil concentration (based on milled incremental site samples) of any of the select metal or explosive MC target analytes exceeds its PAL (see Section 9.0), then convene the Project Team to evaluate whether to recommend conducting an immediate response action to reduce risks quickly, or further evaluation to more accurately estimate risks; otherwise, recommend no further action.

The Project Team will generally recommend more immediate or aggressive actions as the concentrations of target analytes increase relative to PALs and background concentrations.

6.0 Field Quality Control Samples

(UFP-QAPP Manual Section 2.6.2 – Worksheet #12)

Measurement Performance Criteria Table – Field QC Samples

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
Field Replicates ⁽¹⁾	All fractions	One per grinding batch	Representativeness	Percent Relative Standard Deviation (RSD) of $\leq 20\%$	S
Cooler Temperature Indicator	All analytical groups	One per cooler	Representativeness	Temperature must be between 0 and 6 degrees Celsius (°C).	S&A

(1) One duplicate and one triplicate sample are collected for each type of activity.

Note:

Equipment rinsate blanks are not needed because the Navy accepts the liability of accidentally contaminating a sample such that its concentration appears to exceed a media cleanup standard (MCS), when it really does not exceed the PSL.

7.0 Sampling Design and Rationale

(UFP-QAPP Manual Section 3.1.1 - Worksheet #17)

The sampling design for evaluating potential risks (Problem Statement #2 and Decision Rule #2) requires collection of multiple soil aliquots (increments) over a regular grid. These samples, each consisting of 60 separate increments, will be combined through milling and blending to obtain a representative average concentration of the area covered by the grid. This approach limits analytical costs yet provides assurance that the estimate of average concentration over the sampled area is a reasonable estimate of the mean concentration with relatively low variability compared to discrete sample collection. The sampling design also requires collection of two additional samples (duplicate and triplicate) in the same manner from the same gridded area to obtain a direct measurement of the variability in the estimate of mean concentration.

The proposed soil sampling program is focused on the area encompassing the former main target area at the Magazine Point Bombing Target site as shown on [Figure 3](#). The collection of the samples will provide information about any potential contamination in the surface soil at the site. All referenced field standard operating procedures (SOPs) are presented in [Appendix A](#). The soil samples from each individual grid cell will be collected from the 0 to 6-inch bgs interval in accordance with [SOP 05](#) presented in [Appendix A](#). As presented on [Figure 4](#), the Sampling Unit measures 375 feet by 120 feet and covers approximately 1 acre. Individual sample grid cells measure 25 feet by 30 feet. The information below provides details on the sampling effort for the incremental sample collection.

As a safety measure, prior to conducting the activities associated with the sampling event, a UXO Technician will perform a visual inspection of the sample areas to ensure the safety of the sampling team.

Sample Collection

The individual sample aliquots will be obtained by pushing the step probe sampler to a depth of 6 inches bgs. The aliquot samples will then be placed into a large sealable plastic bag labeled with the corresponding sample ID, date, and time. An attempt will be made in the field to remove all vegetation and rocks/sticks greater than 2 mm in size. All sample increments will be collected from 0 to 6 inches bgs. The complete incremental sample will consist of a total mass of approximately 1.5 to 2 kg of soil. The sample will be placed on ice and shipped to the laboratory in accordance with [SOP 03](#).

Prior to beginning sample collection, the Sampling Unit boundaries will be accurately determined by use of a hand-held GPS unit and marked by stakes, flagging, or some other means of clear visual reference in the field. The individual evenly-sized grid cells will then be located utilizing a measuring tape. The

proposed Sampling Unit will contain 60 cells with each individual cell measuring 30 feet by 25 feet (see [Figure 4](#)).

To begin actual sample collection, starting with the northwestern most cell, the sample team will begin collection of the original sample increments (denoted as “0” on [Figure 4](#)). The location of the sample increment will be consistent in each subsequent cell as the sample collection moves from west to east across the sample unit. When the sample crew reaches the eastern most cell in the row, the sample team will move to the sample cell directly to the south and then begin moving east to west while maintaining the consistent sample location within each cell. This movement of side to side increment sample collection will continue until the sample team has reached the last cell which will be the southeastern most cell. At this point, the collection of the original incremental sample (X1-IS-001A) will be complete. The sample bag will then be placed in a cooler on ice and the sample probe will undergo field decontamination as described in [SOP-06 \(Appendix A\)](#).

The next incremental sample to be collected will be the duplicate sample (denoted as “Δ” on [Figure 4](#)). Again, the sample team will begin in the northwestern most cell; however, the sample location within the cell will differ from the original sample (see [Figure 4](#)). Sample collection will move south down through the cells. When the sample team reaches the southernmost cell, the sample team will move to the sample cell directly to the east and then begin moving north up through the cells while maintaining the consistent sample location within each cell. This movement of up and down the sample unit will continue until the sample team has reached the last cell which will be the northeastern most cell. At this point, the collection of the duplicate incremental sample (X1-IS-002A) will be complete. The sample bag will be placed in a cooler on ice and the sample probe will undergo field decontamination as described in [SOP-06 \(Appendix A\)](#).

The final incremental sample collected will be the triplicate sample (denoted as “X” on [Figure 4](#)). The sample team will begin in the northeastern most cell with the sample location again different from the original and duplicate sample location (see [Figure 4](#)). Sample collection will move east to west across the grid. When the sample team reaches the western most cell in the row, the sample team will move to the sample cell directly to the south and then begin moving west to east while maintaining the consistent sample location within each cell. This movement of side to side will continue until the sample team has reached the last cell which will be the southwestern most cell. At this point, the collection of the triplicate incremental sample (X1-IS-003A) will be complete. The sample bag will be placed in a cooler on ice and the sample probe will undergo field decontamination as described in [SOP-06 \(Appendix A\)](#).

Placement of the grid is not critical as the deposition of contamination on the scale of sampling is a reasonably random process such that any regular grid of sampling locations effectively represents a random sample.

Sample Analysis

To allow for determining whether unmilled metals discrete samples are adequately representative of unmilled sample background metal concentrations, the three incremental samples that are collected will also be sampled in a way that removes a minor amount of mass from each sample to be milled, yet is representative of the incremental sample mass as a whole.

Approximately 1.5 to 2 kg of soil (possibly containing vegetation such as roots, small twigs, and grass plus small stones) will be delivered to the laboratory for each of three samples. The laboratory shall follow SW-836 Method 8330B for air drying samples and sieving to remove vegetation and particles greater than 2 mm in size. Each of the three samples will be processed further as described below.

After sieving, but prior to further processing, the laboratory technician will remove at least thirty, 1-gram subaliquots of sample from the total sample mass that has been air-dried and sieved. The subaliquots shall be obtained by spreading out the dried and sieved sample and removing approximately 1 gram of mass from each of 30 different randomly selected locations. These subaliquots will be mixed thoroughly without grinding, and then two subaliquots of sample equal to approximately 5 grams each shall be removed from this submass.

The remaining dried and sieved sample mass (nominally 1.5 to 2 kg mass) shall then be processed further by milling in a ring mill and blending the milled portions to yield a nominal 1.5 to 2 kg of milled and well-mixed sample mass. Upon completion of all milling and subsampling, the laboratory will have the following from each of the samples submitted for analysis:

- Two 5-gram submasses of soil that have not been milled but are representative of the entire 1.5 to 2 kg incremental sample mass.
- One nominal 1.5 to 2 kg mass of milled and blended soil.

The laboratory shall digest and analyze a 5-gram aliquot of milled and a 5-gram aliquot of unmilled sample for each of the three samples submitted for metals analysis. Metal target analytes are listed in Section 9.0. The extra unmilled 5-gram mass from each sample is a backup sample to be used in the event that the analytical sample preparation process fails for the original 5-gram unmilled sample mass.

The laboratory shall also extract and analyze a 10-gram aliquot of milled sample for each of the three samples submitted for explosives analysis. Explosives target analytes are listed on Section 9.0.

In summary, three incremental samples will be collected from a 1-acre sampling grid (original, duplicate, and triplicate). Each incremental sample will represent 60 separate soil increments. Analysis of each site incremental sample will yield one milled and one unmilled concentration measurement for each metal target analyte. Unmilled samples will not be analyzed for target analyte explosives.

8.0 Field Project Implementation (Field Project Instructions)

(UFP-QAPP Manual Section 2.8.1 – Worksheet #14)

8.1 FIELD PROJECT TASKS

Site-specific SOPs have been developed for the proposed field activities at NAS Pensacola (Magazine Point Bombing Target) and are located in [Appendix A](#). Field tasks are summarized below with a short description for each task.

- Mobilization / Demobilization
- Excavation Permit / Utility Clearance
- Site-Specific Health and Safety Training
- Sample Collection Tasks
- Incremental Soil Sampling
- GPS Locating
- Investigation-Derived Waste Management
- Field Equipment Decontamination
- Field Documentation Procedures
- Sample Handling
- QC Tasks

Mobilization / Demobilization

Mobilization will consist of: the delivery of all equipment, materials, and supplies to the site; complete assembly in satisfactory working order of all such equipment at the site; and satisfactory storage at the site of all such materials and supplies. The Tetra Tech FOL or designee will coordinate with the NAS Pensacola Site Manager to identify appropriate locations for the storage of equipment and supplies. Site-specific health and safety training for all Tetra Tech field personnel and subcontractors will be provided as part of site mobilization.

Demobilization will 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 performance of the investigation.

Excavation Permit / Utility Clearance

At least 10 days prior to commencement of any intrusive activities, the Tetra Tech FOL or designee will submit a completed NAS Pensacola Excavation Permit to the ERSM for processing. Also, at least 3 days prior to commencement of any intrusive activities, the Tetra Tech FOL or designee will contact the Florida

Sunshine One-Call to complete a utility clearance ticket for the area under investigation. Work permits, if required by the facility, will be obtained prior to conducting field activities. The Tetra Tech FOL will be responsible for coordinating these activities.

Site-Specific Health and Safety Training

There are no specialized/non-routine project-specific training requirements or certifications needed by personnel to successfully complete the project or tasks. All field personnel will have appropriate training to conduct the field activities to which they are assigned. Each site worker will be required to have completed the Occupational Safety and Health Administration (OSHA) 40-hour course (and 8-hour refresher, if applicable) in health and safety training. All field crews will be required to attend a short (less than 30 minutes) safety briefing to be conducted by the on-site UXO Technician. Safety requirements are addressed in greater detail in the site-specific Health and Safety Plan (HASP).

Sample Collection Tasks

The sampling and analysis program is outlined in [Section 7.0](#) and [Section 8.3](#). Sample collection will be in accordance with the site-specific SOPs listed in [Section 8.2](#) and provided in [Appendix A](#). The sampling requirements for each type of analysis (i.e., bottleware, preservation, holding time) are listed in [Section 8.5](#).

Incremental Soil Sampling

The incremental sampling methodology will be utilized during this field sampling event. A total of three incremental samples will be collected: the original sample, a duplicate sample, and a triplicate sample. Individual increments will be collected from the surface soil (0 to 6-inches bgs) in accordance with [SOP-05](#) (Incremental Sampling, [Appendix A](#)). The individual increments that make up a single sample will be collected from the sample area grid consisting of 60 evenly sized cells.

Global Positioning System Locating

A GPS unit will be used to locate the four corners of the proposed Sampling Unit in accordance with [SOP-07](#) (Global Positioning System, [Appendix A](#)). The GPS equipment will be checked on control monuments before and after each day's use; these checks will be documented in the field notebook. To ensure sub-meter accuracy, the GPS SOP requires a minimum of six satellites to capture a position.

Investigation-Derived Waste (IDW) Management

Since all sample material collected within the sample probe is to be utilized in the incremental sample, no solid or semi-solid IDW in the form of soil will be generated during the field activities.

IDW generated will include personal protective equipment (PPE) and decontamination fluids, which will be handled in accordance with [SOP-08](#) (Management of Investigation-Derived Waste, [Appendix A](#)).

Field Decontamination Procedures

Decontamination of sampling equipment will not be necessary for dedicated and disposable hand trowels. Decontamination of reusable sampling equipment (e.g., soil probes) will be conducted prior to sampling and when switching between collection of the original sample and the duplicate or triplicate sample. Decontamination of equipment will be conducted according to the sequence established in [SOP-06](#) (Decontamination of Field Sampling Equipment, [Appendix A](#)).

Field Documentation Procedures

Field documentation will be performed in accordance with [SOP-03](#) (Sample Custody and Documentation of Field Activities, [Appendix A](#)).

Sample Handling

Methods for sample handling will be in accordance with [SOP-03](#) (Sample Custody and Documentation of Field Activities). Sample labeling will be in accordance with [SOP-01](#) (Sample Labeling), and the sample numbering scheme will be in accordance with [Section 8.3](#) and [SOP-02](#) (Sample Identification and Nomenclature). The selection of sample containers, sample preservation, packaging, and shipping will be in accordance with [Section 8.5](#) and [SOP-04](#) (Sample Preservation, Packaging, and Shipping). All above referenced SOPs can be found in [Appendix A](#) of this Tier II UFP-SAP.

Quality Control Tasks

QC samples in the form of a duplicate and a triplicate sample will be collected for analytical comparison.

ADDITIONAL PROJECT-RELATED TASKS

Additional project-related tasks will include:

- Analytical Tasks
- Data Management
- Data Tracking
- Data Storage, Archiving and Retrieval
- Data Security
- Electronic Data

- Data Review
- Project Reports

Analytical Tasks

Chemical analyses will be performed by Empirical Labs, which is a Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP)-accredited laboratory. A copy of Empirical Labs SOPs are included in **Appendix B**. Analyses will be performed in accordance with the analytical methods identified in **Section 8.5**. Empirical Labs will meet the MCSs specified in **Section 9.0** and will perform the chemical analyses following laboratory-specific SOPs (see **Section 8.5** and **Section 10.0**) developed based on the methods listed in **Section 8.5**.

All soil results will be reported by the laboratory on an adjusted dry-weight basis. Results of percent moisture will be reported in each analytical data package and associated electronic data files. This information will also be captured in the project database, which will eventually be uploaded to the Naval Installation Restoration Information Solution (NIRIS) database. Percent moisture information will also be captured in the project report.

The analytical data packages provided by Empirical Labs will be in a Contract Laboratory Program-like format and will be fully validatable and contain raw data, summary forms for all sample and laboratory method blank data, and summary forms containing all method-specific QC [results, recoveries, relative percent differences (RPDs), relative standard deviations (RSD), and/or percent differences, etc.].

Data Management

The principal data generated for this project will be from field data and laboratory analytical data. Field sampling log sheets will be organized by date and medium, and filed in the project files. The field logbooks for this project will be used only for this site 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 Empirical Labs will meet the requirements of the technical specifications. Electronic data results will be automatically downloaded into the Tetra Tech database in accordance with the proprietary Tetra Tech processes.

The Tetra Tech PM (or designee) is responsible for the overall tracking and control of data generated for the project.

Data Tracking

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

Data Storage, Archiving, and Retrieval

The data packages received from Empirical Labs will be tracked in the data validation logbook. After the data are validated, the data packages will be entered into the Tetra Tech Navy CLEAN file system and archived in secure files. The field records including field log books, sample logs, chain-of-custody records, and field calibration logs will be submitted by the Tetra Tech FOL to be entered into the Navy CLEAN file system prior to archiving in secure project files. Project files will be audited for accuracy and completeness. At the completion of the Navy contract, the records will be stored by Tetra Tech.

Data Security

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

Electronic Data

All electronic data will be compiled into a NIRIS Electronic Data Deliverable (NEDD) and loaded into NIRIS.

Data Review

This review will comprise data verification, validation, and usability assessment. The data verification and validation processes and requirements are described in [Section 12.0](#). The data usability assessment will, at a minimum, constitute evaluation of the following characteristics to ensure that the amount, type, and quality of data are sufficient to achieve project objectives. The means of conducting these evaluations will vary depending on the nature of the data. For example, soil boring logs will generally be evaluated qualitatively or semiquantitatively whereas precision, accuracy, and sensitivity of analytical data will generally be evaluated quantitatively and may be based on, or may supplement, data validation findings. Examples include:

- Comparing actual to intended sampling locations, and verifying that the correct datum was used to delineate contamination.
- Evaluating trends across sample delivery groups or sampling events.
- Assessing quantitative relationships between parameters.
- Identifying potential errant or outlier data points.
- Assessing planning assumption validity.
- Evaluating the potential for contamination of samples by samplers.

Data quality indicators to be evaluated during this assessment include:

Precision

A semi quantitative estimate of the uncertainty in contaminant concentrations as a function of location will be made.

Accuracy

Accuracy data will be evaluated to ensure sampling and measurement accuracy is within or exceeds analytical method specifications, and may depend in part on the data validation findings.

Representativeness

This evaluation will assess whether the data are adequately representative of intended populations based on the sample collection and data generation requirements specified in this SAP.

Completeness

Failure to obtain critical data from planned locations will be documented. Minor variations in actual versus intended sampling locations (or depths) that do not adversely affect the attainment of project objectives will not be documented.

Comparability

This will be accomplished by comparing overall precision and bias among data sets for the matrix and analytical fraction for each sampled area. This will not require quantitative comparisons unless the Tetra Tech Project Chemist indicates that such quantitative analysis is beneficial to the project and the Tetra Tech PM agrees.

Sensitivity

The Tetra Tech Project Chemist will determine whether project sensitivity goals were achieved by comparing non-detect values to MCSs.

Other Quantitative Characteristics

These may include quantities such as verification of soil volume calculations, soil disposal cost estimates, etc., that are used to determine whether the contaminants are sufficiently well delineated to estimate remediation costs.

If significant data quality deficiencies are detected that prevent the attainment of project objectives, the limitations on the affected data will be described in the project report. The Tetra Tech PM will bring these deficiencies to the attention of the Project Team for their evaluation, and the team will determine an appropriate corrective action depending on the circumstances.

Project Reports

Draft and final versions of the Project Report will be prepared. These reports will include the following sections:

- Executive Summary – will include a brief description of the work conducted and the findings.
- Introduction and Background – will include a description of the history of operations and activities at the site and a summary of any previous investigations and removal actions.
- Description of Field Investigations – will include a summary of the work performed in accordance with the approved Tier II UFP-SAP and any field modifications as documented by the Tetra Tech FOL. This section will include maps showing the sampling locations and tables summarizing the data collected.
- Data Quality – will include a summary of quantitative analytical performance indicators such as completeness, precision, bias, and sensitivity; and qualitative indicators such as representativeness and comparability. This section will include a reconciliation of project data with the data quality objectives (DQOs) and an identification of deviations from this Tier II UFP-SAP.
- A data usability assessment will be used to identify significant deviations in analytical performance that could affect the ability to meet project objectives.

- Human Health Risk Screening Assessment – data will be compared to human health screening values.
- Project Attainment.

8.2 Field SOPs Reference Table

(UFP-QAPP Manual Section 3.1.2 – Worksheet #21)

Reference Number	Title, Revision Date, and/or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP-01	Sample Labeling, 09/11, Revision 0	Tetra Tech	Not Applicable (NA)	N	Contained in Appendix A
SOP-02	Sample Identification Nomenclature, 09/11, Revision 0	Tetra Tech	NA	Y	Contained in Appendix A
SOP-03	Sample Custody and Documentation, 09/11, Revision 0	Tetra Tech	Field log book, sample log sheets	N	Contained in Appendix A
SOP-04	Sample Preservation, Packaging, and Shipping 09/11, Revision 0	Tetra Tech	NA	N	Contained in Appendix A
SOP-05	Incremental Composite Sampling, 09/11, Revision 0	Tetra Tech	CRREL or equivalent sample tool	N	Contained in Appendix A
SOP-06	Decontamination, 09/11, Revision 0	Tetra Tech	NA	N	Contained in Appendix A
SOP-07	Global Positioning System, 09/11, Revision 0	Tetra Tech	GPS unit (sub-meter)	N	Contained in Appendix A
SOP-08	Investigation-Derived Waste, 09/11, Revision 0	Tetra Tech	NA	Y	Contained in Appendix A

8.3 Sample Details Table

(UFP-QAPP Manual Sections 3.1.1 and 3.5.2.3 – Worksheets #18, 19, 20 and 30)

Sample Location	Sample ID ⁽¹⁾	Analyses ⁽²⁾		
		Explosives	Metals (milled)	Metals (un-milled)
X1-IS-001 (original)	X1-IS-001A-0006	1	1	---
	X1-IS-001B-0006	---	---	1
X1-IS-002 (duplicate)	X1-IS-002A-0006	1	1	---
	X1-IS-002B-0006	---	---	1
X1-IS-003 (triplicate)	X1-IS-003A-0006	1	1	---
	X1-IS-003B-0006	---	---	1

- (1) "A" indicates sample was milled during the analytical process. "B" indicates sample was not milled during the analytical process.
- (2) The analytical laboratory will receive the three "A" samples from the field and will then be responsible for collecting the "B" subsamples for the non-milled metals analysis.

8.4 Field Quality Control Sample Summary

Matrix	Analytical Group	No. of Samples⁽¹⁾	No. of MS/MSDs⁽²⁾	No. of Duplicate Samples⁽³⁾	Total No. of Samples to Lab
Soil	Explosives	3	1/1	---	3
	Metals	3	1/1	---	3

- 1 Although MS/MSDs are not typically considered field QC samples, they are included here because location determination is often established in the field. The MS/MSDs are not included in the total number of samples sent to the laboratory.
- 2 Three samples will be collected in the field. Each sample will be submitted to the FBL for both explosives and metals analysis.
- 3 The number of samples includes the original, duplicate, and triplicate samples collected in the field. No additional duplicates will be collected.

8.5 Analytical SOP Requirements

Laboratory point of contact, e-mail address, and phone number: Brian Richard, brichard@empirlabs.com, 615-345-1115 Ext. 249

Laboratory Name and Address:

Empirical Laboratories, LLC
 621 Mainstream Drive, Suite 270 Nashville, TN 37228

Data Package Turnaround time: 21 days

Tentative Sampling Dates: Fall 2011

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)
Soil	Explosives	SW-846 8330B/ Empirical SOP-327	Plastic bag or other container	1 to 2 kg	Cool to ≤ 6 °C	14 days until extraction, 40 days to analysis
Soil	Metals	SW-846 3050B/6010C Empirical SOP-100/105	Plastic bag or other container	1 to 2 kg	Cool to ≤ 6 °C	180 days to analysis

9.0 Reference Limits and Evaluation Tables

(UFP-QAPP Manual Section 2.8.1 – Worksheet # 15)

Analyte	Chemical Abstract Service (CAS) number	Project Action Limit (PAL) (mg/kg)	PAL Reference ⁽¹⁾	Project Quantitation Limit Goal (PQLG) (mg/kg)	Empirical Labs LOQ (mg/kg)	Empirical Labs LOD (mg/kg)	Empirical Labs DL (mg/kg)
Inorganics							
Aluminum	7229-90-5	7700	EPA RSL	2600	10	5	2.5
Antimony	7440-36-0	0.27	EPA RSL Migration	0.09	0.50	0.4	0.25
Cadmium	7440-43-9	0.38	EPA RSL Migration	0.13	0.25	0.1	0.05
Copper	7440-50-8	46	EPA RSL Migration	15	0.5	0.4	0.2
Total Chromium	7440-47-3	38	SCTL Leach	13	0.5	0.2	0.1
Iron	7439-89-6	640	EPA RSL Migration	210	5	3	1.5
Lead	7439-92-1	14	EPA RSL Migration	4.7	0.25	0.15	0.075
Manganese	7439-96-5	57	EPA RSL Migration	19	0.75	0.3	0.15
Molybdenum	7439-98-7	3.7	EPA RSL Migration	1.2	1	0.5	0.25
Nickel	7440-02-0	48	EPA RSL Migration	16	0.5	0.3	0.15
Thallium	7440-28-0	0.078	EPA RSL	0.026	0.4	0.2	0.15
Vanadium	7440-62-2	39	EPA RSL	13	0.625	0.5	0.25
Explosives							
1,3,5-Trinitrobenzene	99-35-4	3.9	EPA RSL Migration	1.3	0.080	0.040	0.020
1,3-Dinitrobenzene	99-65-0	0.0033	EPA RSL Migration	0.0011	0.080	0.040	0.020
2,4,6-Trinitrotoluene	118-96-7	0.013	EPA RSL Migration	0.0043	0.080	0.040	0.020
2,4-Dinitrotoluene	121-14-2	0.00029	EPA RSL Migration	9.7E-05	0.080	0.040	0.020
2,6-Dinitrotoluene	606-20-2	0.05	EPA RSL Migration	0.017	0.080	0.040	0.020

Analyte	Chemical Abstract Service (CAS) number	Project Action Limit (PAL) (mg/kg)	PAL Reference ⁽¹⁾	Project Quantitation Limit Goal (PQLG) (mg/kg)	Empirical Labs LOQ (mg/kg)	Empirical Labs LOD (mg/kg)	Empirical Labs DL (mg/kg)
2-Amino-4,6-dinitrotoluene	35572-78-2	0.056	EPA RSL Migration	0.019	0.080	0.040	0.020
2-Nitrotoluene	88-72-2	0.9	SCTL Leach	0.3	0.080	0.040	0.020
4-Amino-2,6-dinitrotoluene	19406-51-0	0.056	EPA RSL Migration	0.019	0.080	0.040	0.020
4-Nitrotoluene	99-99-0	0.0039	EPA RSL Migration	0.0013	0.080	0.040	0.020
3-Nitrotoluene	99-08-1	0.0034	EPA RSL Migration	0.0011	0.080	0.040	0.020
HMX	2691-41-0	2.3	EPA RSL Migration	0.77	0.080	0.040	0.020
Nitrobenzene	98-95-3	0.000079	EPA RSL Migration	2.6E-05	0.080	0.040	0.020
RDX	121-82-4	0.00023	EPA RSL Migration	7.7E-05	0.080	0.040	0.020
Tetryl	479-45-8	1.4	EPA RSL Migration	0.47	0.080	0.040	0.020

(1) The PAL references are: SCTL-Leach – FDEP Soil Cleanup Target Level, Leachability to Groundwater (FDEP, 2005); EPA-RSL – Regions 3, 6, and 9 Regional Screening Level, Direct Contact Residential, adjusted to 1/10 of value for noncarcinogens (USEPA, 2011); EPA RSL Migration – Regions 3, 6, and 9 Soil Screening Level, Risk-Based Migration-to-Groundwater, Dilution Attenuation Factor (DAF) = 1 (USEPA, 2011).

Bolded rows indicate that the PAL is between the laboratory LOQ and DL. The Partnering Team has agreed to accept this data for decision making as long as results below the LOQ are "J" qualified and discussed in the uncertainties section of the RI Report.

Shaded and Bold row indicate the PAL is less than the DL; therefore, the Partnering Team has agreed to replace the PALs with the laboratory LOQs for decision making purposes, as suggested in "Guidance for the Selection of Analytical Methods for the Evaluation of Practical Quantitation Limits" (FDEP, October 2004).

10.0 Analytical SOP Reference Table

(UFP-QAPP Manual Section 3.2.1 – Worksheet #23)

Lab SOP Number	Title, revision date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM? (Y or N)	Modified for Project Work? (Y/N)
Empirical SOP-100	Metals Digestion/ Preparation, Methods 3005A/ USEPA CLP ILMO 4.1 Aqueous, 3010A, 3030C, 3050B, USEPA CLP ILMO 4.1 (Soil/Sediment), 200.7, Standard Methods 3030C (Revision 21, 09/01/10)	Definitive	Soil/ Metals Digestion	NA/Preparation	Empirical Labs	N	N
Empirical SOP-105	Metals by Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES) Technique, SW-846 Methods 6010B, 6010C, USEPA Method 200.7, Standard Methods 19 th Edition 2340B, USEPA CLP ILMO 4.1 (Revision 16, 04/11/10)	Definitive	Soil/ Metals	ICP-AES	Empirical Labs	N	N
Empirical SOP-327	Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC) Method 8330, 8330A, 8330B, and 8332 (Revision 18, 09/07/10)	Definitive	Soil/ Explosives	HPLC	Empirical Labs	N	N

11.0 Laboratory QC Samples Tables
 (UFP-QAPP Manual Section 3.4 – Worksheet #28)

Matrix	Soil					
Analytical Group	Explosives					
Analytical Method / SOP Reference	SW-846 8330B Empirical SOP-327					
QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	Measurement Performance Criteria
Method Blank	One per preparatory batch of 20 or fewer samples.	All analytes must be $\leq \frac{1}{2}$ LOQ.	Investigate source of contamination and rerun method blank prior to analysis of samples, if possible. Evaluate the samples and associated QC: if blank results are above LOQ, then report sample results that are $< LOQ$ or $> 10X$ the blank concentration. Re-prepare and reanalyze blank and those samples that were $> LOQ$ and $< 10X$ the blank.	Analyst, Supervisor	Bias/ Contamination	Same as QC Acceptance Limits
Soil Grinding Blank	Between each sample.	All analytes must be $\leq \frac{1}{2}$ LOQ.	All blank results must be reported and the affected samples must be flagged accordingly if blank criteria is not met.	Analyst, Supervisor	Bias/ Contamination	Same as QC Acceptance Limits
Soil sample triplicate	At the subsampling step, one sample per batch.	The %RSD for results above the LOQ must not exceed 20%.	Corrective action must be taken if this is not met. The grinding process must be investigated to make sure the samples are being reduced to the appropriate particle size.	Analyst, Supervisor	Accuracy/ Bias Precision	Same as QC Acceptance Limits

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	Measurement Performance Criteria
Laboratory Control Sample (LCS) Laboratory Control Sample Duplicate (LCSD) (not required)	One per preparatory batch of 20 or fewer samples.	%Rs must meet the DoD Quality Systems Manual for Environmental Laboratories (QSM) Version 4.1 limits as per Appendix G of the DoD QSM. RPD must be $\leq 30\%$ (for LCS/LCSD, if LCSD is performed).	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Refer to DOD QSM Version 4.1 Table G-1 for number of marginal exceedances allowed. Contact Client if samples cannot be reprepared within hold time.	Analyst, Supervisor	Accuracy/ Bias Precision also, if LCSD is analyzed	Same as QC Acceptance Limits
MS/MSD	One per preparatory batch of 20 or fewer samples per matrix.	%Rs must meet the DoD QSM Version 4.1 limits as per Appendix G of the DoD QSM. The RPD between MS and MSD should be $\leq 30\%$.	Flag the parent sample with a "J" flag for failed analytes which exceed the acceptance criteria.	Analyst, Supervisor	Accuracy/ Bias/ Precision	Same as QC Acceptance Limits
Surrogate Spikes	All field and QC samples - one per sample.	%Rs must meet the DoD QSM Version 4.1 limits as per Appendix G of the DoD QSM.	If surrogate recovery falls outside acceptance criteria, the sample should be re-extracted and re-analyzed.	Analyst, Supervisor	Accuracy/ Bias	Same as QC Acceptance Limits
Second Column Confirmation	All positive results must be confirmed.	Results between primary and second column - RPD must be $\leq 40\%$.	None. Apply "J" flag if RPD $>40\%$ and discuss in the case narrative.	Analyst, Supervisor	Precision	Same as QC Acceptance Limits

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch of 20 or fewer samples of similar matrix.	All target analytes must be $\leq \frac{1}{2}$ LOQ.	If the blank value > LOQ, then report sample results. If the blank value < LOQ or > 10x the blank value, then redigest. If blank value is less than negative LOQ, then report sample results. If > 10x the absolute value of the blank result, then redigest and reanalyze.	Analyst, Supervisor	Bias/ Contamination	Same as QC Acceptance Limits
LCS	One per preparatory batch of 20 or fewer samples of similar matrix.	%R must be within 80-120% of true value.	Evaluate and reanalyze, if possible. If the LCS recoveries are high, but the sample results are < LOQ, then narrate. Otherwise, re-digest and reanalyze all associated samples for failed target analyte(s).	Analyst, Supervisor	Accuracy/ Bias	Same as QC Acceptance Limits
MS	One per preparatory batch of 20 or fewer samples of similar matrix.	%R should be within 80-120% of true value (if sample is < 4x spike added).	Flag results for affected analytes for all associated samples with "N".	Analyst, Supervisor	Accuracy/ Bias	Same as QC Acceptance Limits
Sample Duplicate	One per preparatory batch of 20 or fewer samples of similar matrix.	The RPD should be $\leq 20\%$ for duplicate samples for both water and soils.	Narrate any results that are outside control limits.	Analyst, Supervisor	Precision	Same as QC Acceptance Limits
Serial Dilution	One per preparatory batch with sample concentration(s) >50x LOD.	The 5-fold dilution result must agree within ± 10 percent difference or percent drift (%D) of the original sample result if result is >50x LOD.	Perform post spike addition.	Analyst, Supervisor	Accuracy/ Bias	Same as QC Acceptance Limits

Matrix	Soil					
Analytical Group	Metals					
Analytical Method / SOP Reference	SW-846 6010C Empirical SOP-105					
QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria
Post Spike	One is performed when serial dilution fails or target analyte concentration(s) in all samples are < 50x LOD.	The %R must be within 75-125% of expected value to verify the absence of an interference. Spike addition should produce a concentration of 10-100x LOQ.	Flag results for affected analytes for all associated samples with "J".	Analyst, Supervisor	Accuracy/ Bias	Same as QC Acceptance Limits
Results between DL and LOQ	NA.	Apply "J" qualifier to results between DL and LOQ.	NA.	Analyst, Supervisor	Accuracy	Same as QC Acceptance Limits

12.0 Data Verification and Validation (Steps I and IIa/IIb) Process Table

(UFP-QAPP Manual Section 5.2.1, UFP-QAPP Manual Section 5.2.2., Figure 37 UFP-QAPP Manual, Table 9 UFP-QAPP Manual – Worksheets #34, 35, 36)

Data Review Input	Description	Responsible for Verification (name, organization)	Internal/ External
Chain of Custody Forms	The Tetra Tech FOL or designee will review and sign the chain-of-custody form to verify that all samples listed are included in the shipment to the laboratory and the sample information is accurate. The forms will be signed by the sampler and a copy will be retained for the project file, the Tetra Tech PM, and the Tetra Tech Data Validators. The Tetra Tech FOL or designee will review the chain-of-custody form to verify that all samples listed in the SAP have been collected. All deviations should be documented in the report.	Sampler and FOL, Tetra Tech	Internal
Chain of Custody Forms	1 - The Laboratory Sample Custodian will review the sample shipment for completeness and integrity, and sign accepting the shipment. 2- The Tetra Tech Data Validators will check that the chain-of-custody form was signed and dated by the Tetra Tech FOL or designee relinquishing the samples and also by the Laboratory Sample Custodian receiving the samples for analyses.	1 - Laboratory Sample Custodian, (Empirical Labs) 2 - Data Validators, Tetra Tech	External
Chain of Custody Forms and SAP	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. Review that the samples were shipped and stored at the required temperature and preservation conditions for chemically-preserved samples meet the requirements listed in the SAP. Ensure that the analyses were performed within the holding times listed in the SAP.	Data Validators, Tetra Tech	External

Data Review Input	Description	Responsible for Verification (name, organization)	Internal/ External
Sample Log Sheets, Chain of Custody Forms, SAP, and Laboratory sample login documentation	Verify that information recorded in the log sheets is accurate and complete. 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. Document any discrepancies in the final report.	PM, FOL, or designee, Tetra Tech	Internal
SAP, Analytical SOPs, and Analytical Data Packages	Ensure that all laboratory SOPs were followed. Verify that the correct analytical methods/SOPs were applied. Establish that all method QC samples were analyzed and in control as listed in the analytical SOPs. If method QA is not in control, the Laboratory QAM will contact the Tetra Tech PM verbally or via e-mail for guidance prior to report preparation.	Laboratory QAM, (Empirical Labs)	Internal
SAP/ Chain-of-Custody Forms	Check that all field QC samples determined necessary were collected as required.	FOL or designee, Tetra Tech	Internal
Analytical Data Package	Verify all analytical data packages for completeness. The Laboratory QAM will sign the case narrative for each data package.	Laboratory QAM, RTI	Internal
Electronic Data Deliverables (EDDs)/ Analytical Data Packages	Check each EDD against the chain-of-custody and hard copy data package for accuracy and completeness. Compare laboratory analytical results to the electronic analytical results to verify accuracy. Evaluate sample results for laboratory contamination and qualify false detections using the laboratory method/preparation blank summaries. Qualify analyte concentrations between the DL and the LOQ as estimated. Remove extraneous laboratory qualifiers from the validation qualifier.	Data Validators, Tetra Tech	External
Analytical Data Package	Verify each data package for completeness. Request missing information from the Laboratory PM.	Data Validators, Tetra Tech	External

Data Review Input	Description	Responsible for Verification (name, organization)	Internal/ External
SAP/ Laboratory Data Packages/ EDDs	Ensure that the laboratory QC samples were analyzed and that the MPCs listed in Sections 9.0 and 11.0 were met for all field samples and QC analyses. Check that specified field QC samples were collected and analyzed and that the analytical QC criteria set up for this project were met.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	Check the field sampling precision by calculating RPDs for field duplicate samples. Check laboratory precision by reviewing the RPD or percent difference values from laboratory duplicate analyses; MS/MSDs; and LCS/LCSD, if available. Ensure compliance with the methods and project MPCs accuracy goals listed in Sections 9.0 and 11.0.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	Check that the laboratory recorded the temperature at sample receipt and the pH of samples preserved with acid or base to ensure sample integrity from sample collection to analysis.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	Review the chain-of-custody forms generated in the field to ensure that the required analytical samples have been collected, appropriate sample identifications have been used, and correct analytical methods have been applied. The Tetra Tech Data 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. Check that all data have been transferred correctly and completely to the Tetra Tech SQL database.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	Ensure that the project LOQs listed in SAP were achieved.	Data Validators, Tetra Tech	External

Data Review Input	Description	Responsible for Verification (name, organization)	Internal/ External
SAP/ Laboratory Data Packages/ EDDs	Discuss the impact on DLs that are elevated because of matrix interferences, if any. Be especially cognizant of and evaluate the impact of sample dilutions on low-concentration analytes when the dilution was performed because of the high concentration of one or more other contaminants. Document this usability issue and inform the Tetra Tech PM. Flag samples and notify the Tetra Tech PM of samples that exceed PALs listed in SAP.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	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 QAM shall have contacted the Tetra Tech PM.	Data Validators, Tetra Tech	External
SAP/ Laboratory Data Packages/ EDDs	Summarize deviations from methods, procedures, or contracts in the Data Validation Report. Determine the impact of any deviation from sampling or analytical methods and SOPs requirements and matrix interferences effect on the analytical results. Qualify data results based on method or QC deviation and explain all the data qualifications. Print a copy of qualified data stored the project database to depict data qualifiers and data qualifier codes that summarize the reason for data qualifications. Determine if the data met the MPCs and determine the impact of any deviations on the technical usability of the data.	Data Validators, Tetra Tech	External
Surface Soil – Metals and Explosives	Validation will be performed using criteria for SW-846 Methods 8330B listed in this SAP and the current DoD QSM. The logic outlined in USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review USEPA-540/R-99-008, (USEPA, October 1999) will be used to apply qualifiers to data to the extent possible.	Data Validators, Tetra Tech	External

Data Review Input	Description	Responsible for Verification (name, organization)	Internal/ External
Surface Soil – Metals and Explosives	Validation will be performed using criteria for SW-846 Method 8330B listed in this SAP and the current DoD QSM. The logic outlined in USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, October 2004) will be used to apply qualifiers to data to the extent possible.	Data Validators, Tetra Tech	External

12.1 Validation Summary

Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
Explosives	100% validation will be performed using criteria for SW-846 Methods 8330B listed in this SAP and the current DoD QSM. If not included in the aforementioned, the logic outlined in USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review USEPA-540/R-99-008, (USEPA, October 1999) will be used to apply qualifiers to data to the extent possible.	Data Validation Specialist, Tetra Tech
Metals	100% limited validation will be performed using criteria for SW-846 Method 6010C listed in this SAP and the current DoD QSM. If not included in the aforementioned, the logic outlined in USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, October 2004) will be used to apply qualifiers to data to the extent possible.	Data Validation Specialist, Tetra Tech

REFERENCES

Tetra Tech (Tetra Tech NUS, Inc.), 2010. Site Inspection Report for Munitions Response Program Site Inspections at 13 Sites Outlying Landing Fields Bronson, Corry Station, and Saufley Field, Naval Air Station Pensacola, Pensacola, Florida. September.

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FDEP, 2005. Final Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C. Prepared for the Division of Waste Management, Florida Department of Environmental Protection; Prepared by Center for Environmental & Human Toxicology, University of Florida, Gainesville, FL. February 26.

United States Environmental Protection Agency (USEPA), 2011. Regions 3, 6, and 9 Regional Screening Levels for Chemical Contaminants at Superfund Sites. June 2011 RSL Table Update: <http://epa-prgs.ornl.gov/chemicals/index.shtml>



DRAWN BY	DATE
S. STROZ	9/25/09
CHECKED BY	DATE
Y. MARTINEZ	1/25/11
REVISED BY	DATE
MK BOND	9/14/11
SCALE AS NOTED	



AREA LOCATION MAP
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
067	
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_____	_____
APPROVED BY	DATE
_____	_____
FIGURE NO.	REV
1	0

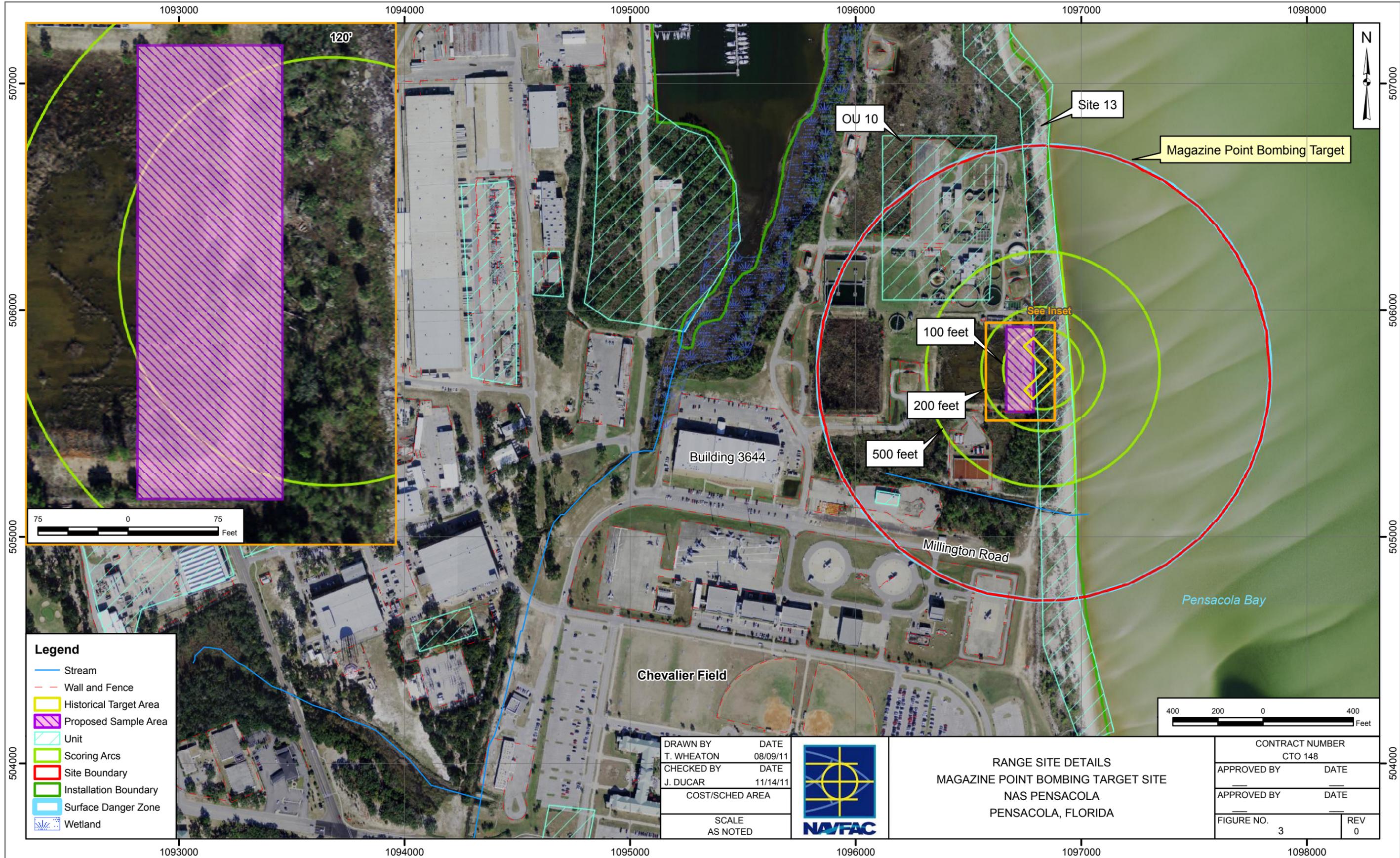


DRAWN BY S. STROZ	DATE 9/25/09
CHECKED BY J. GOERDT	DATE 9/25/09
REVISED BY MK BOND	DATE 9/14/11
SCALE AS NOTED	



SITE LOCATION MAP
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO. 2	REV 0



- Legend**
- Stream
 - - - Wall and Fence
 - Historical Target Area
 - Proposed Sample Area
 - Unit
 - Scoring Arcs
 - Site Boundary
 - Installation Boundary
 - Surface Danger Zone
 - ~ Wetland

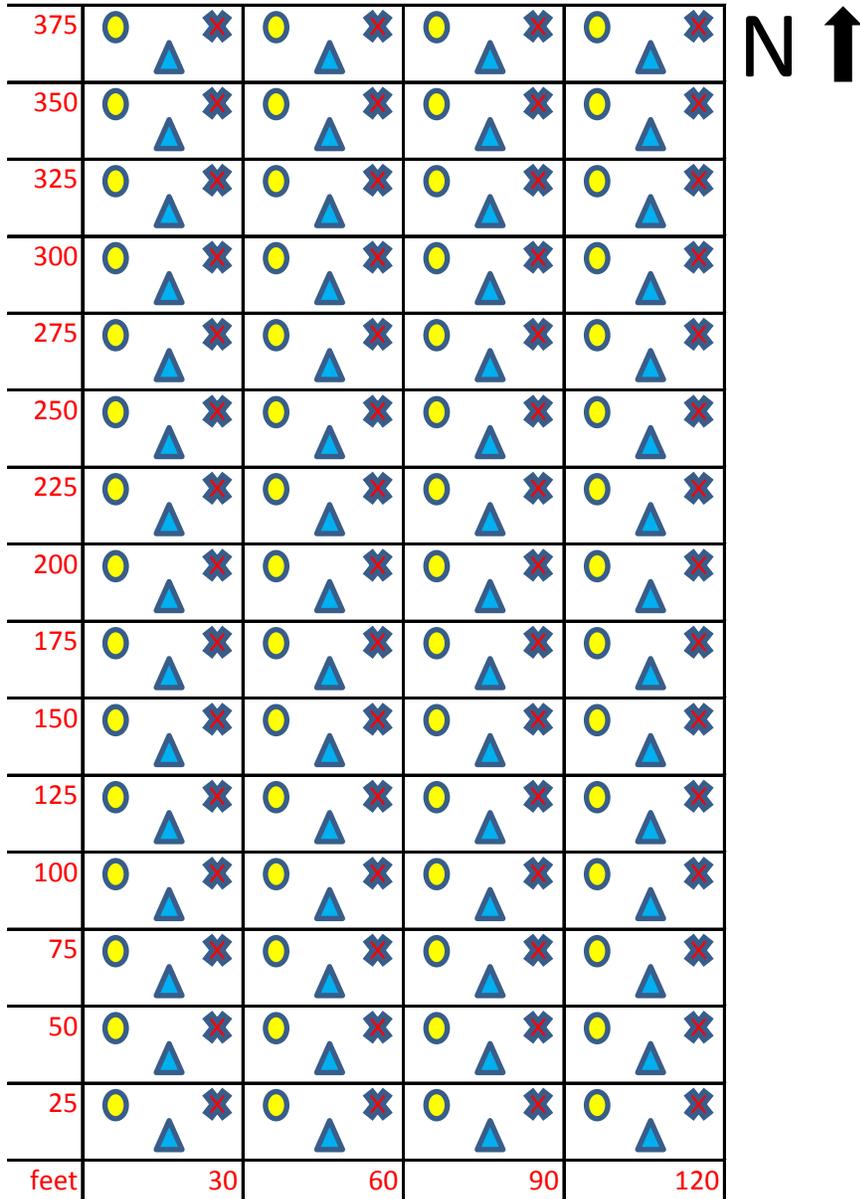
DRAWN BY T. WHEATON	DATE 08/09/11
CHECKED BY J. DUCAR	DATE 11/14/11
COST/SCHED AREA	
SCALE AS NOTED	



RANGE SITE DETAILS
MAGAZINE POINT BOMBING TARGET SITE
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER CTO 148	
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO. 3	REV 0

Figure 4
Incremental Composite Sample Layout
Magazine Point Bombing Target Site
NAS Pensacola



- = Original Sample (X1-IS-001A0006)
- = Duplicate Sample (X1-IS-002A0006)
- = Triplicate Sample (X1-IS-003A0006)

APPENDIX A

SITE-SPECIFIC FIELD STANDARD OPERATING PROCEDURES

TABLE OF CONTENTS

SOP-01	Sample Labeling
SOP-02	Sample Identification Nomenclature
SOP-03	Sample Custody and Documentation of Field Activities
SOP-04	Sample Preservation, Packaging, and Shipping
SOP-05	Incremental Composite Sampling for Soil and Sediment
SOP-06	Decontamination of Field Sampling Equipment
SOP-07	Global Positioning System
SOP-08	Management of Investigation-Derived Waste

STANDARD OPERATING PROCEDURE

SOP-01

SAMPLE LABELING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures to be used for labeling sample containers. Sample labels are used to document the sample identification number (ID), date, time, analysis to be performed, preservative, matrix, sampler, and the analytical laboratory. A sample label will be attached to each sample container.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil (preferably black pen with indelible ink)

Disposable medical-grade gloves (e.g. latex, nitrile)

Sample log sheets

Required sample containers: All sample containers for analysis by fix-based laboratories will be supplied and deemed certified-clean by the laboratory.

Sample labels

Chain-of-custody records

Sealable polyethylene bags

Heavy-duty cooler

Ice

3.0 PROCEDURES

3.1 The following information will be electronically printed on each sample label prior to mobilizing for field activities. Additional "generic" labels will also be printed prior to mobilization to be used for field QC and backups.

- Project Number
- Sample Location ID
- Contract Task Order Number (CTO 148)
- Sample ID

- Sample Matrix
- Preservative
- Analysis to be Performed
- Laboratory Name

3.2 Select the container(s) that are appropriate for a given sample. Select the sample-specific ID label(s), complete date, time, and sampler name, and affix to the sample container(s).

3.3 Fill the appropriate containers with sample material. Securely close the container lids without overtightening.

3.4 Place the sample container in a sealable polyethylene bag and place in a cooler containing ice.

Example of a sample label is attached at the end of this SOP.

4.0 ATTACHMENTS

1. Sample Label

ATTACHMENT 1 SAMPLE LABEL

Tetra Tech NUS, Inc. 661 Andersen Drive Pittsburgh, 15220 (412)921-7090		Project:
		Location:
		CTO:
Sample No:		Matrix:
Date:	Time:	Preserve:
Analysis:		
Sampled by:		Laboratory

STANDARD OPERATING PROCEDURE SOP-02

SAMPLE IDENTIFICATION NOMENCLATURE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish a consistent sample nomenclature system that will facilitate subsequent data management at the Naval Air Station (NAS) Pensacola. The sample nomenclature system has been devised such that the following objectives can be attained.

- Sorting of data by site, location, or matrix.
- Maintenance of consistency (field, laboratory, and database sample numbers).
- Accommodation of all project-specific requirements.
- Accommodation of laboratory sample number length constraints.
- Ease of sample identification.

The Florida Department of Environmental Protection (FDEP) must approve any deviations from this procedure.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Pen with indelible ink

Sample tags

Sample container labels

3.0 SAMPLE IDENTIFICATION NOMENCLATURE

3.1 Soil Samples

All samples will be properly labeled with a sample label affixed to the sample container. Each sample will be assigned a unique sample tracking number.

3.1.1 Sample Numbering Scheme

The sample tracking number will consist of a four- or five-segment alpha-numeric code that identifies the sample's associated site, sample type, location, and sample depth. For soil samples, the final four tracking numbers will identify the depth in units of inches below ground surface (bgs) at which the sample was collected.

The alphanumeric coding to be used is explained in the following diagram and subsequent definitions:

AN	AA	NNN	NNNN
Site ID	Matrix	Sample Location Number	Sequential depth interval from freshly exposed surface (inches)

Character Type:

A = Alpha

N = Numeric

Site IDs (AN):

X1 = UXO 01 (Magazine Point Bombing Target)

Matrix Code (AA):

IS = Incremental Soil Sample

Location Number (NNN):

Sequential number beginning with "001"

Depth Interval (NNNN):

For the soil samples, the final four tracking numbers will identify the depth in units of inches.

The depth code is used to note the depth bgs at which a soil sample is collected. The first two numbers of the four-number code specify the top interval, and the third and fourth specify the bottom interval of the sample depth. The depths will be noted in whole numbers only; further detail, if needed, will be recorded on the sample log sheet, boring log, logbook, etc.

3.1.2 Examples of Surface Soil Sample Nomenclature

The first incremental soil sample collected from Magazine Point Bombing Target at a depth of 0 to 6 inches bgs would be labeled as "X1-IS001A-0006".

3.2 Field Quality Control (QC) Sample Nomenclature

Field QC samples (duplicate and triplicate) are described in the UFP-SAP. These samples will be collected within the same grid as the original sample, but in a separate consistent location within the grid. These QC samples will incorporate the same nomenclature scheme as the original sample in numerical order. For instance, the location ID for the duplicate sample will be "002", and the location ID for the triplicate sample will be "003". No other QC samples are planned for this field event.

STANDARD OPERATING PROCEDURE

SOP-03

SAMPLE CUSTODY AND DOCUMENTATION OF FIELD ACTIVITIES

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes the procedures for sample custody and documentation of field sampling and field analyses activities.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

The following logbooks, forms, labels, and equipment are required.

Writing utensil (preferably black pen with indelible ink)

Site logbook

Field logbook

Sample label

Chain-of-Custody Form

Custody seals

Equipment calibration log

Soil Boring Log

Soil and Sediment Sample Log Sheet

3.0 PROCEDURES

This section describes custody and documentation procedures. All entries made into the logbooks, custody documents, logs, and log sheets described in this SOP must be made in indelible ink (black is preferred). No erasures are permitted. If an incorrect entry is made, the entry will be crossed out with a single strike mark, initialed, and dated.

3.1 **Site Logbook**

The site logbook is a hard-bound, paginated, controlled-distribution record book in which all major on-site activities are documented. At a minimum, the following activities and events will be recorded (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start or completion of sampling activities
- Daily on-site activities performed each day
- Sample pickup information
- Health and safety issues
- Weather conditions

The site logbook is initiated at the start of the first on-site activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day that on-site activities take place.

The following information must be recorded on the cover of each site logbook:

- Project name
- Project number
- Book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). At the completion of each day's entries, the site logbook must be signed and dated by the Tetra Tech Field Operations Leader (FOL).

3.2 Field Logbooks

The field logbook is a separate, dedicated notebook used by field personnel to document his or her activities in the field. This notebook is hardbound and paginated. At a minimum, the following activities and events will be recorded (daily) in the field logbooks:

- Field personnel for activities in the field logbook
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start or completion of sampling activities
- Daily on-site activities performed each day
- Sample pickup information
- Health and safety issues
- Weather conditions

Entries are to be made for every day that on-site activities take place.

The following information must be recorded on the cover of each field logbook:

- Project name
- Project number
- Book number
- Start date
- End date

3.3 Sample Labels

Adhesive sample container labels must be completed and applied to every sample container. Information on the label includes the project name, location, sample number, date, time, preservative, analysis, matrix, sampler's initials, and the name of the laboratory performing the analysis. Sample labeling and nomenclature are described in SOP-01 and SOP-02, respectively.

3.4 Chain-of-Custody Form

The Chain-of-Custody Form (COC) is initiated as samples are acquired and accompanies a sample (or group of samples) as it is transferred from person to person. This form must

accompany any samples collected for laboratory chemical analysis. Each COC will be uniquely numbered. A copy of a blank COC form is attached at the end of this SOP.

The FOL must include the name of the laboratory in the upper right hand corner section to ensure that the samples are forwarded to the correct location. If more than one COC is necessary for any cooler, the FOL will indicate "Page ___ of ___" on each COC. The original (top) signed copy of the COC will be placed inside a sealable polyethylene bag and taped inside the lid of the shipping cooler. Once the samples are received at the laboratory, the sample custodian checks the contents of the cooler(s) against the enclosed COC(s). Any problems are noted on the enclosed COC Form (bottle breakage, discrepancies between the sample labels, COC form, etc.) and will be resolved through communication between the laboratory point-of-contact and the Tetra Tech Project Manager (PM). The COC form is signed and retained by the laboratory and becomes part of the sample's corresponding analytical data package.

3.5 Custody Seal

The custody seal is an adhesive-backed label and is part of the chain-of-custody process. Custody seals are used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transit to the laboratory. Custody seals will be signed and dated by the samplers and affixed across the opening edges of each cooler (two seals per cooler on opposite sides) containing environmental samples. The laboratory sample custodian will examine the custody seal for evidence of tampering and will notify the Tetra Tech PM if evidence of tampering is observed.

3.6 Equipment Calibration Log

The Equipment Calibration Log is used to document calibration of measuring equipment used in the field. The Equipment Calibration Log documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be maintained for each electronic measuring device requiring calibration. Entries must be made for each day the equipment is used.

3.7 Sample Log Sheets

The Soil and Sediment Sample Log Sheets are used to document the sampling of the soil. A copy of the sample log sheet is attached at the end of this SOP. A sample log sheet will be prepared for each sample collected and submitted for laboratory analysis.

4.0 ATTACHMENTS

1. Chain-of-Custody Record
2. Equipment Calibration Log
3. Soil and Sediment Sample Log

STANDARD OPERATING PROCEDURE

SOP-04

SAMPLE PRESERVATION, PACKAGING, AND SHIPPING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures for sample preservation, packaging, and shipping to be used in handling soil, sediment, and aqueous samples.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Shipping labels

Custody seals

Chain-of-custody (COC) form(s)

Sample containers with preservatives: All sample containers for analysis by fixed-base laboratories will be supplied, with preservatives added (if required) and deemed certified clean by the laboratory.

Sample shipping containers (coolers): All sample shipping containers are supplied by the laboratory.

Packaging material: Bubble wrap, sealable polyethylene bags, strapping tape, etc.

3.0 PROCEDURES FOR SAMPLE PRESERVATION, PACKAGING, AND SHIPPING

- 3.1 The laboratory provides sample containers with preservative already included (as required) for the analytical parameter for which the sample is to be analyzed. All samples will be held, stored, and shipped at a temperature not to exceed 6 degrees Celsius (°C). This will be accomplished through refrigeration (used to hold samples prior to shipment) and/or ice.
- 3.2 The sampler shall maintain custody of the samples until the samples are relinquished to another custodian or to the common carrier.
- 3.3 Check that each sample container is properly labeled, the container lid is securely fastened, and the container is sealed in a polyethylene bag.
- 3.4 If the container is glass, place the sample container into a bubble-out shipping bag and seal the bag using the self-sealing, pressure sensitive tape supplied with the bag.

- 3.5 Inspect the insulated shipping cooler. Check for any cracks, holes, broken handles, etc. If the cooler has a drain plug, make certain it is sealed shut, both inside and outside of the cooler. If the cooler is questionable for shipping, the cooler must be discarded.
- 3.6 Line the cooler with a large plastic bag, and line the bottom of the cooler with a layer of bubble wrap. Place the sample containers into the shipping cooler in an upright position (containers will be upright, with the exception of any 40-milliliter vials). Continue filling the cooler with ice until the cooler is nearly full and the movement of the sample containers is limited.
- 3.7 Wrap the large plastic bag closed and secure with tape.
- 3.8 Place the original (top) signed copy of the COC form inside a sealable polyethylene bag. Tape the bag to the inside of the lid of the shipping cooler.
- 3.9 Close the cooler and seal the cooler with approximately four wraps of strapping tape at each end of the cooler. Prior to wrapping the last wrap of strapping tape, apply a signed and dated custody seal to each side of the cooler (one per side). Cover the custody seal with the last wrap of tape. This will provide a tamper evident custody seal system for the sample shipment.
- 3.10 Affix shipping labels to each of the coolers, ensuring all of the shipping information is filled in properly. Overnight (e.g., FedEx Priority Overnight) courier services will be used for all sample shipments.
- 3.11 All samples will be shipped to the laboratory no more than 72 hours after collection. Under no circumstances should sample hold times be exceeded.

STANDARD OPERATING PROCEDURE NUMBER SOP-05

INCREMENTAL SAMPLING (IS) FOR SOIL AND SEDIMENT

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes the procedure for collecting incremental sampling (IS) methodology surface soil and/or sediment samples using a hand-operated coring device to support the field investigation at the Magazine Point Bombing Target site located at Naval Air Station (NAS) Pensacola. This SOP complies with United States Environmental Protection Agency (USEPA) SW-846 Method 8330B, Appendix A, and United States Army Corps of Engineers (USACE) guidance documents.

The most widely-known description of IS for environmental use is SW-846 Method 8330B, Appendix A. The specific sample collection and processing procedures described in Method 8330B were based primarily on studies by the USACE Cold Regions Research Engineering Laboratory (CRREL). These studies were designed to demonstrate and develop the methodology for application to the investigation of explosive compounds at active military testing and training ranges.

This technique will assist in estimating mean munitions constituent (MC) concentrations which can be used to assess whether potential MC:

- Are present within the sample area at an average concentration greater than the analytical method detection limit (MDL) or reporting limit (RL).
- May pose an unacceptable risk to human health, or ecological receptors.
- May contribute to significant contaminant concentrations in groundwater.
- Exhibit concentrations that exceed mean background or ambient concentrations unrelated to munitions activities.

A Sampling Unit (SU) [sometimes synonymous with a Decision Unit (DU)] is the area and depth of soil to be represented by the IS samples. SUs must be delineated so that the mean analyte concentrations obtained are directly relevant to well-defined project objectives. Typical SUs could be as small as 3 feet by 3 feet, or as large as 300 feet by 300 feet.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

The following field forms and equipment are required for IS of soil and/or sediment.

Disposable medical-grade gloves (e.g., latex, nitrile)

Indelible marker

CRREL coring device or equivalent

One coring shoe (size predetermined before sampling commences, based on number of increments, sample depth interval, and required sample size)

Plastic storage bags

Sample labels/tags

Shipping containers with ice (i.e., coolers)

Sample containers: Sample containers are certified clean by the laboratory supplying the containers

Field Forms: Soil and Sediment Sample Log (SOP-03)

3.0 SAMPLING PROCEDURES

Hand coring will be employed to collect incremental soil cores of cohesive soils and/or sediments using a coring device and properly-sized coring shoe (or equivalent). This will ensure the increments of soil or sediment are collected in a consistent manner across the entire SU. This consistency maximizes the representativeness of the IS sample. Although the use of a hand trowel or hand auger may be unavoidable for some material, such tools are not recommended because they do not control the amount of material per increment, and uniform increments are critical to IS. If the soils and/or sediments are not cohesive, this SOP should not be used and an alternate procedure should be followed that ensures a representative sampling scheme that is appropriate for the situation at hand.

Practical limitations and unforeseen field conditions may require modifying the delineation of a SU as defined during planning. Conditions of this nature may include the presence of pavement, buildings, or exposed bedrock surface without soil. In general, significantly changing the total sampling area should be avoided. Changes and their rationale should be fully described in a field task modification request (FTMR) and in the project report.

A 1 to 2 kilogram (dry weight) IS sample usually ensures that sufficient mass has been collected to adequately represent the SU mean concentration.

The sampler will wear clean, disposable, medical-grade gloves and the coring device will undergo decontamination procedures according to SOP-06 at the beginning of each sample day and prior to

collection of subsequent samples. Decontamination of the coring device is not required between collection of the individual increments making up a single IS sample.

3.1 **INCREMENTAL SAMPLING PROCEDURES**

3.1.1 The correct size coring shoe (or equivalent) was determined based on the number of sample increments required, the sampling depth, and the average density of the soil or sediment. Since a 1 to 2 kilogram (dry weight) IS sample is preferred, the following table matches the project-specific need to the correct coring shoe size (or equivalent auger diameter and depth).

Coring Device Size Selection Based on Number of Increments and Sample Depth

Number of Increments	Sample Depth (inches)	Soil Density* (g/cc)	Minimum Corer Diameter - 1,000 grams total (nearest ¼ inch)	Maximum Corer Diameter - 2,000 grams total (nearest ¼ inch)
60 (15 x 4)	6	1.5	0.50	0.50

* Assumed soil density = 1.50 grams per cubic centimeter (g/cc) and assumed percent moisture is less than 10 percent. At the discretion of the Tetra Tech FOL, the coring device size may be adjusted based on site conditions that differ from these assumptions, but must be the same throughout the entire SU.

3.1.2 A hand-held Global Positioning System (GPS) (see SOP-07) meter will be utilized to locate the corners of the SU. Utilizing a measuring tape, grid off the 375 foot long by 120 foot wide SU into 60 increments (cells) of equal size (4 squares wide by 15 squares long, resulting in each grid cell being 30 feet wide and 25 feet long). Stakes, flagging, or other means of clear visual reference should be used so the field sampler can accurately identify each grid.

3.1.3 Starting in one cell (a corner cell is recommended), systematically sample each grid cell as described in Steps 3.1.3.1 through 3.1.3.4. A successful systematic increment collection scheme is to start in one corner of the SU and work in a back-and-forth path, traveling to each successive cell until an increment has been collected from each grid cell.

3.1.3.1 Randomly select a single increment sampling point in the initial grid cell, then collect all subsequent increments from the same relative location within each of the other grid cells.

- 3.1.3.2 Turn or push the coring device into the ground to the desired depth (i.e., 6 inches). Remove the coring device and visually verify that the entire core was retained. If the coring device is not filled with soil, collect remaining soil from the hole to fill the coring device with the intended soil volume.
- 3.1.3.3 Eject the soil increment into a labeled sample container such as a large sealable plastic bag or other suitable container which must be large enough to hold all of the increments to be collected from the SU (between 1 and 2 kilograms).
- 3.1.3.4 Field triplicate samples must be collected at a minimum frequency of 1 per 10 IS samples in order to provide precision data that will be used to support the data evaluation process. Field triplicates for IS are not field split samples; rather, they are independently collected incremental samples from the same SU. At the NAS Pensacola Magazine Point Bombing Target site, this will be accomplished by randomly selecting a single increment sampling point for the duplicate in the initial grid cell that is different than the original sample location, then collecting all subsequent increments from the same relative location within each of the other grid cells. Collect the triplicate sample in the same manner as the original and duplicate samples, but in a random location within the initial cell grid that is different than the original and duplicate sample locations. Collect all subsequent increments from the same relative location within each of the other grid cells.
- 3.1.4 Repeat steps 3.1.3.1 to 3.1.3.4 in the designated SU until the entire sample grid has been sampled.
- 3.1.5 For each of the three replicate ISs collected from the SU, package the entire lot of collected soil in accordance with SOP-04 and ship them to the laboratory via overnight courier for processing and analysis.
- 3.1.6 Complete the required information on the Soil and Sediment Sample Log Sheet (see attachment). Although it is not necessary to record the locations of individual increments with the GPS, the location of the individual increments within the grid will be noted in the "OBSERVATIONS/NOTES" section of the Soil and Sediment Sample Log Sheet. Only the notes added within the sample analysis block on the Soil and Sediment Sample Log Sheet should be visible on the Chain-of-Custody form for review by laboratory personnel.

3.1.7 Decontaminate the coring device in accordance with SOP-06 between collection of each of the three IS samples (original, duplicate, triplicate).

4.0 REFERENCES

GPL Laboratories, LLC. 2009. SOP No. G.22: General Laboratory Multi Incremental Sampling (MIS) sub-sampling procedure. January.

US Army Corps of Engineers (USACE). 2004. Field Sampling Tools for Explosives Residues Developed at CRREL. ERDC/CRREL TN-04-1. April.

USACE. 2007. Protocols for Collection of Surface Soil Samples at Military Training and Testing Ranges for the Characterization of Energetic Munitions Constituents. ERDC/CRREL TR-07-10. July.

USACE. 2009. Interim Guidance 09-02: Implementation of Incremental Sampling (IS) of Soil for the Military Munitions Response Program. July.

United States Environmental Protection Agency (USEPA), 2006. SW-846 Method 8330B, Appendix A. Office of Solid Waste and Emergency Response, Washington, DC. October.

5.0 ATTACHMENTS

1. Soil and Sediment Sample Log Sheet

STANDARD OPERATING PROCEDURE

SOP-06

DECONTAMINATION OF FIELD SAMPLING EQUIPMENT

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes the procedures to be followed when decontaminating non-dedicated field sampling equipment during the field investigations.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil (preferably black pen with indelible ink)

Non-latex rubber or plastic gloves

Cotton gloves

Field logbook

Potable water

Deionized water

Isoproponal (optional)

Liqui-Nox® or Alconox® detergent

Brushes, spray bottles, paper towels, etc.

Container to collect and transport decontamination fluids

3.0 DECONTAMINATION PROCEDURES

3.1 Don non-latex and/or cotton gloves and decontaminate sampling equipment (in accordance with the following steps) prior to field sampling and between samples.

3.2 Rinse the equipment with potable water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the potable water rinsate into a container.

3.3 Wash the equipment with a solution of Liqui-Nox® or Aloconox® detergent. Prepare the detergent wash solution in accordance with the instructions on the detergent container. Collect the wash solution into a container. Use brushes or sprays as appropriate for the equipment. If

oily residue has accumulated on the sampling equipment, remove the residue with an isopropanol wash and repeat the detergent wash.

- 3.4 Rinse the equipment with potable water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the potable water rinsate into a container.
- 3.5 Rinse the equipment with deionized water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the deionized water rinsate into a container.
- 3.6 Remove excess water by air drying and shaking or by wiping with paper towels as necessary.
- 3.7 Document decontamination by recording it in the field logbook.
- 3.8 Containerized decontamination solutions will be managed in accordance with the procedures described in SOP-08.

STANDARD OPERATING PROCEDURE

SOP-07

GLOBAL POSITIONING SYSTEM

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the field personnel with basic instructions for operating a handheld Global Positioning System (GPS) unit allowing them to set GPS parameters in the receiver, record GPS positions on the field device, and update existing Geographic Information System (GIS) data. This SOP is specific to GIS quality data collection for Trimble®-specific hardware and software.

If possible, the Trimble® GeoXM™ or GeoXH™ operators manual should be downloaded onto the operator's personal computer for reference before or while in the field. The manual can be downloaded at <http://trl.trimble.com/docushare/dsweb/Get/Document-311749/TerraSyncReferenceManual.pdf>

Unless the operator is proficient in the setup and operation of the GPS unit, the Project Manager (or designee) should have the GPS unit shipped to the project-specific contact listed below in the Pittsburgh, Pennsylvania, office at least five working days prior to field mobilization so project-specific shape files, data points, background images, and correct coordinate systems can be uploaded into the unit.

Tetra Tech NUS, Inc.
Attn: John Wright
661 Anderson Drive, Bldg #7
Pittsburgh, PA 15220

2.0 REQUIRED EQUIPMENT

The following hardware and software should be utilized for locating and establishing GPS points in the field:

2.1 Required GPS Hardware

- Hand-held GPS unit capable of sub-meter accuracy (i.e. Trimble® GeoXM™ or Trimble® GeoXH™). This includes the docking cradle, A/C adapter, stylus, and USB cable for data transfer.

Optional Accessories:

- External antenna
- Range pole
- Hardware clamp (for mounting GPS unit to range pole)
- GeoBeacon
- Writing utensil (preferably black pen with indelible ink)
- Non-metallic pin flags for temporary marking of positions

2.2 Required GPS Software

The following software is required to transfer data from the handheld GPS unit to a personal computer:

- Trimble® TerraSync version 2.6 or later (pre-loaded onto GPS unit from vendor)
- Microsoft® ActiveSync® version 4.5 or later. Download to personal computer from:
<http://www.microsoft.com/windowsmobile/en-us/downloads/microsoft/activesync-download.mspx>
- Trimble® Data Transfer Utility (freeware version 2.1 or later). Download to personal computer from:
<http://www.trimble.com/datatransfer.shtml>

3.0 START-UP PROCEDURES

Prior to utilizing the GPS in the field, ensure the unit is fully charged. The unit may come charged from the vendor, but an overnight charge is recommended prior to fieldwork.

The Geo-series GPS units require a docking cradle for both charging and data transfer. The Geo-series GPS unit is docked in the cradle by first inserting the domed end in the top of the cradle, then gently seating the contact end into the latch. The power charger is then connected to the cradle at the back end using the twist-lock connector. Attach a USB cable as needed between the cradle (B end) and the laptop/PC (A end).

It is recommended that the user also be familiar and check various Windows Mobile settings. One critical setting is the Power Options. The backlight should be set as needed to conserve power when not in use.

Start Up:

- 1) Power on the GPS unit by pushing the small green button located on the lower right front of the unit.
- 2) Utilizing the stylus that came with the GPS unit, launch **TerraSync** from the Windows Operating System by tapping on the start icon located in the upper left hand corner of the screen and then tap on **TerraSync** from the drop-down list.
- 3) If the unit does not default to the Setup screen, tap the Main Menu (uppermost left tab, just below the Windows icon) and select Setup.
- 4) If the unit was previously shipped to the Pittsburgh office for setup, you can skip directly to Section 4.0. However, to confirm or change settings, continue on to Section 3.1.

3.1 Confirm Setup Settings

Use the Setup section to confirm the TerraSync software settings. To open the Setup section, tap the Main Menu and select Setup.

- 1) Coordinate System
 - a. Tap on the Coordinate System.
 - b. Verify the project specs are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu.
Note: It is always best to utilize the Cancel tab rather than the OK tab if no changes are made since configurations are easily changed by mistake.
 - c. Tap on the Units.
 - d. Verify the user preferences are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu.
 - e. Tap Real-time Settings.
 - f. Verify the Real-time Settings are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu.
 - g. The GPS unit is now configured correctly for your specific project.

4.0 ANTENNA CONNECTION

- 1) If a connection has been properly made with the internal antenna, a satellite icon along with the number of usable satellites will appear at the top of the screen next to the battery icon. If no connection is made (e.g.: no satellite icon), tap on the GPS tab to connect antenna.
- 2) At this point the GPS unit is ready to begin collecting data.

5.0 COLLECTING NEW DATA IN THE FIELD

- 1) From the Main Menu select Data.
- 2) From the Sub Menu (located below the Data tab) select New which will bring up the New Data File menu.
- 3) An auto-generated filename appears and should be edited for your specific project. If the integral keyboard does not appear, tap the small keyboard icon at the bottom of the screen.
- 4) After entering the file name, tap Create to create the new file.
- 5) Confirm antenna height if screen appears. Antenna height is the height that the GPS unit will be held from the ground surface (Typically 3 to 4 feet).
- 6) The Choose Feature screen appears.

5.1 Collecting Features

- 1) If not already open, the Collect Feature screen can be opened by tapping the Main Menu and selecting Data. The Sub Menu should default to Collect.
- 2) **Do not begin the data logging process until you are at the specific location for which you intend to log the data.**
- 3) A known reference or two should be shot at the beginning and at the end of each day in which the GPS unit is being used. This allows for greater accuracy during post-processing of the data.
- 4) Upon arriving at the specific location, tap on Point_generic as the Feature Name.
- 5) Tap Create to begin data logging.
- 6) In the Comment Box enter sample ID or location-specific information.
- 7) Data logging can be confirmed by viewing the writing pencil icon in the upper part of the screen. Also, the logging counter will begin. As a Rule of Thumb, accumulate a minimum of 20 readings on the counter, per point, as indicated by the logging counter before saving the GPS data.
- 8) Once the counter has reached a minimum number of counts (i.e. 20), tap on OK to save the data point to the GPS unit. Confirm the feature. All data points are automatically saved within the GPS unit.

- 9) Repeat steps 2 through 8, giving each data point a unique name or number.

Note: If the small satellite icon or the pencil icon is blinking, this is an indication the GPS unit is not collecting data. A possible problem may be too few satellites. While still in data collection mode, tap on Main Menu in upper left hand corner of the screen and select Status. Skyplot will display as the default showing the number of available satellites. To increase productivity (number of usable satellites) use the stylus to move the pointer on the productivity and precision line to the left. This will decrease precision, but increase productivity. The precision and productivity of the GPS unit can be adjusted as the number of usable satellites changes throughout the day. To determine if GPS is correctly recording data, see Section 5.2.

5.2 Viewing Data or Entering Additional Data Points to the Current File

- 1) To view the stored data points in the current file, tap on the Main Menu and select Map. Stored data points for that particular file will appear. Use the +/- and <-/-> icons in lower left hand corner of screen to zoom in/out and to manipulate current view.
- 2) To return to data collection, tap on the Main Menu and select Data. You are now ready to continue to collect additional data points.

5.3 Viewing Data or Entering Data Points from an Existing File

- 1) To view data points from a previous file, tap on Main Menu and select Data, then select File Manager from the Sub Menu.
- 4) Highlight the file you want to view and select Map from the Main Menu.
- 5) To add data points to this file, tap on Main Menu and select Data. Continue to collect additional data points.

6.0 NAVIGATION

This section provides instructions on navigating to saved data points in an existing file within the GPS unit.

- 1) From the Main Menu select Map.
- 2) Using the Select tool, pick the point on the map to where you want to navigate.
- 3) The location you select will have a box placed around the point.
- 4) From the Options menu, choose the Set Nav Target (aka set navigation target).
- 5) The location will now have double blue flags indicating this point is you navigation target.

- 6) From the Main Menu select Navigation.
- 7) The dial and data on this page will indicate what distance and direction you need to travel to reach the desired target.
- 8) Follow the navigation guide until you reach the point you select.
- 9) Repeat as needed for any map point by going back to Step 1.

7.0 PULLING IN A BACKGROUND FILE

This section provides instructions on pulling in a pre-loaded background file. These files are helpful in visualizing your current location.

- 1) From the Main Menu select Map, then tap on Layers, select the background file from drop down list.
- 2) Select the project-specific background file from the list of available files.
- 3) Once the selected background file appears, the operator can manipulate the screen utilizing the +/- and <-/> functions at the bottom of the screen.
- 4) In operating mode, the operator's location will show up on the background file as a floating "x".

8.0 DATA TRANSFER

This section provides instructions on how to transfer stored data on the handheld GPS unit to a personal computer. Prior to transferring data from the GPS unit to a computer, Microsoft ActiveSync and Trimble Data Transfer Utility software must be downloaded to the computer from the links provided in Section 2.2 (Required GPS Software). If a leased computer is utilized in which the operator cannot download files, see the Note at the end of Section 8.0.

- 1) See Attachment A at the end of this SOP for instructions on how to transfer data from the GPS to a personal computer.

Note: If you are unable to properly transfer data from the GPS unit to a personal computer, the unit should be shipped to the project-specific contact listed in Section 1.0 where the data will be transferred and the GPS unit then shipped back to the vendor.

9.0 SHUTTING DOWN

This section provides instruction for properly shutting down the GPS unit.

- 1) When shutting down the GPS unit for the day, first click on the "X" in the upper right hand corner.
- 2) You will be prompted to ensure you want to exit TerraSync. Select Yes.
- 3) Power off the GPS unit by pushing the small green button located on the bottom face of the unit.
- 4) Place the GPS unit in its cradle to recharge the battery overnight. Ensure the green charge light is visible on the charging cradle.

ATTACHMENT A

How to Transfer Trimble GPS Data between Data Collector and PC original 11/21/06 (5/1/08 update) – John Wright

Remember – Coordinate System, Datum, and Units are critical!!!

Trimble Data Collection Devices:

Standard rental systems include the Trimble® ProXR/XRS backpack and the newer handheld GeoXT™ or GeoXH™ units. Some of the older backpack system may come with either a RECON “PDA-style” or a TSCe or TSC1 alpha-numeric style data collector.

The software on all of the above units should be Trimble® TerraSync (v 2.53 or higher – current version is 3.20) and to the user should basically look and function similar. The newer units and software versions (which should always be requested when renting) include enhancements for data processing, real-time display functions, and other features.

Data Transfer:

Trimble provides a free transfer utility program to aid in the transfer of GIS and field data. The Data Transfer Utility is a standalone program that will run on a standard office PC or laptop.

To connect a field data collector such as a RECON, GeoXM, GeoXT, GeoXH, or ProXH, you must first have Microsoft® ActiveSync® installed to allow the PC and the data collector to talk to one another. A standard USB cable is also needed to connect the two devices.

A CD or USB drive is provided with the data collector for use in data transfer. If needed, these programs are also available without charge via the web at:

- **Trimble Data Transfer Utility** (v 1.38) program to download the RECON or GeoXH field data to your PC: <http://www.trimble.com/datatransfer.shtml>

- **ActiveSync** from Microsoft to connect the data collector to the PC. The latest version (v4.5) can be found at: <http://www.microsoft.com/windowsmobile/en-us/downloads/microsoft/activesync-download.msp>

(see page 2 for data transfer instructions)

To Transfer Data Collected in the Field:

- Install the Data Transfer and ActiveSync software installed on your PC
- Connect the RECON or GeoXH to your PC via an A/B USB cable (blade end and square end type "HP printer" style)
- ActiveSync should auto-detect the connection and recognize the data collector
- Make sure the data file desired is CLOSED in TerraSync prior to transfer
- Connect via ActiveSync as a guest (not a partnership)
- Run the Trimble Data Transfer Utility program on your PC
- Select "**GIS Datalogger on Windows CE**" or similar selection
- Hit the green connect icon to the right - the far right area should say "**Connected to**" if successful
- Select the "**Receive**" data tab (under device)
- Select "**Data**" from file types on the right
- Find the file(s) needed for data transfer. You can sort the data files by clicking on the date/time header
- Select or browse to a C-drive folder you can put this file for emailing
- When the file appears on the list, hit the "**Transfer All**"
- Go to your Outlook or other email, send a message to: John.Wright@tetrattech.com (or GIS department)
- Attach the file(s) you downloaded from your C-drive. For each TerraSync data file created you should have a packet of multiple data files. All need to be sent as a group – make sure you attach all files (the number of files may vary – examples include: ssf, obx, obs, gix, giw, gis, gip, gic, dd, and car)

To Transfer GIS Data from PC to the Field Device (must be converted in Pathfinder Office):

- Obtain GIS file(s) desired from GIS Department and have converted to Trimble extension
- Contact John Wright (John.Wright@tetrattech.com) if needed for file conversion and upload support
- The GIS file(s) can be quickly converted if requested and sent back to the field user in the needed "Trimble xxx.imp" extension via email – then quickly downloaded from Outlook to your PC for transfer
- Install the Data Transfer and ActiveSync software installed on your PC
- Connect the RECON or GeoXH to your PC via an A/B USB cable (blade end and square end type "HP printer" style)
- ActiveSync should auto-detect the connection and recognize the data collector
- Connect via ActiveSync as a guest (not a partnership)
- Run the Trimble Data Transfer Utility program on your PC
- Select "**GIS Datalogger on Windows CE**" or similar selection
- Hit the green connect icon to the right - the far right area should say "**Connected to**" if successful
- Select the "**Send**" data tab (under device)
- Select "**Data**" from file types on the right (you can also send background files)
- Browse to the location of the data on your PC (obtain the file from Pathfinder Office or from the person who converted the data for field use)
- Select the options as appropriate for the name and location of the data file to go on the data collector (usually you can choose main memory or a data storage card)
- When the file(s) appears on the list, hit the "**Transfer All**"
- Run TerraSync on the field device and open the existing data files. Your transferred file should appear (make sure you have selected Main Memory, Default, or Storage Card as appropriate)

STANDARD OPERATING PROCEDURE

SOP-08

MANAGEMENT OF INVESTIGATION-DERIVED WASTE

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes how investigation-derived waste (IDW) will be collected, segregated, classified, and managed during the field investigations at Naval Air Station (NAS) Pensacola. The following types of IDW may be generated during this investigation:

- Decontamination solutions
- Personal protective equipment (PPE) and clothing
- Miscellaneous trash and incidental items

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Health and safety equipment (with PPE)

CRREL coring device or similar Bucket (with collected development/purge water)

Decontamination equipment

Field logbook

Writing utensil (preferably black pen with indelible ink)

Plastic sheeting and/or tarps

55-gallon drums with sealable lids

IDW labels for drums

Plastic garbage bags

3.0 PROCEDURES

Management of IDW includes the collection, segregation, temporary storage, classification, final disposal, and documentation of the waste-handling activities if necessary.

3.1 Liquid Wastes

Liquid wastes that may be generated during the site activities include decontamination solutions from sampling equipment. These wastes will be collected and containerized in a central location at NAS Pensacola for proper disposal.

3.2 Solid Wastes

No solid wastes are expected to be generated during this investigation.

3.3 PPE and Incidental Trash

All PPE wastes and incidental trash materials (e.g., wrapping or packing materials from supply cartons, waste paper, etc.) will be decontaminated (if contaminated), double bagged, securely tied shut, and placed in a designated waste receptacle at NAS Pensacola.

APPENDIX B

LABORATORY DoD ELAP ACCREDITATION



**LABORATORY
ACCREDITATION
BUREAU**

Certificate of Accreditation

ISO/IEC 17025:2005

Certificate Number L2226

Empirical Laboratories, LLC

621 Mainstream Drive, Suite 270
Nashville, TN 37228

has met the requirements set forth in L-A-B's policies and procedures, all requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP).*

The accredited lab has demonstrated technical competence to a defined "Scope of Accreditation" and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation Granted through: November 30, 2012

**R. Douglas Leonard, Jr., Managing Director
Laboratory Accreditation Bureau
Presented the 30th of November 2009**

*See the laboratory's Scope of Accreditation for details of the DoD ELAP requirements
Laboratory Accreditation Bureau is found to be in compliance with ISO/IEC 17011:2004 and recognized by ILAC (International Laboratory Accreditation Cooperation) and NACLA (National Cooperation for Laboratory Accreditation).

Scope of Accreditation For Empirical Laboratories, LLC

621 Mainstream Drive, Suite 270
Nashville, TN 37228
Marcia K. McGinnity
877-345-1113

In recognition of a successful assessment to ISO/IEC 17025:2005 and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.1) based on the National Environmental Laboratory Accreditation Conference Chapter 5 Quality Systems Standard (NELAC Voted Revision June 5, 2003), accreditation is granted to Empirical Laboratories, LLC to perform the following tests:

Accreditation granted through: **November 30, 2012**

Testing - Environmental

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,1-Trichloroethane (1,1,1-TCA)
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113; Freon 113)
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane (1,1-DCA)
GC/MS	EPA 8260B	1,1-Dichloroethene (1,1-DCE)
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromo-3-chloropropane (DBCP)
GC/MS	EPA 8260B	1,2-Dibromoethane (EDB)
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane (EDC)
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane
GC/MS	EPA 8260B	1-Chlorohexane
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Butanone (Methyl ethyl ketone; MEK)
GC/MS	EPA 8260B	2-Chloroethyl vinyl ether
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone (Methyl butyl ketone; MBK)
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone (Methyl isobutyl ketone; MIBK)
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Acetonirile
GC/MS	EPA 8260B	Acrolein
GC/MS	EPA 8260B	Acrylonitrile
GC/MS	EPA 8260B	Allyl chloride
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Bromobenzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon Disulfide
GC/MS	EPA 8260B	Carbon Tetrachloride
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	Chloroprene
GC/MS	EPA 8260B	cis-1,2-Dichloroethene (cis-1,2-DCE)
GC/MS	EPA 8260B	cis-1,3-Dichloropropene
GC/MS	EPA 8260B	cis-1,4-Dichloro-2-butene

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane (CFC-12)
GC/MS	EPA 8260B	Di-isopropyl ether
GC/MS	EPA 8260B	ETBE
GC/MS	EPA 8260B	Ethyl methacrylate
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Hexachlorobutadiene
GC/MS	EPA 8260B	Hexane
GC/MS	EPA 8260B	Iodomethane
GC/MS	EPA 8260B	Isobutyl alcohol
GC/MS	EPA 8260B	Isopropylbenzene (Cumene)
GC/MS	EPA 8260B	Methacrylonitrile
GC/MS	EPA 8260B	Methyl Acetate
GC/MS	EPA 8260B	Methyl methacrylate
GC/MS	EPA 8260B	Methyl Tertiary Butyl Ether (MTBE)
GC/MS	EPA 8260B	Methylcyclohexane
GC/MS	EPA 8260B	Methylene Chloride, or Dichloromethane
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	n-Propylbenzene
GC/MS	EPA 8260B	p-Isopropyltoluene
GC/MS	EPA 8260B	Propionitrile
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	t-Butyl alcohol
GC/MS	EPA 8260B	tert-Amyl methyl ether
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene (PCE; PERC)
GC/MS	EPA 8260B	Tetrahydrofuran
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene (trans-1,2-DCE)

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	trans-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Trichloroethene (TCE)
GC/MS	EPA 8260B	Trichlorofluoromethane (CFC-11)
GC/MS	EPA 8260B	Vinyl acetate
GC/MS	EPA 8260B	Vinyl Chloride (VC)
GC/MS	EPA 8260B	Xylenes (Total)
GC/MS	EPA 8270C/D	1,1'-Biphenyl
GC/MS	EPA 8270C/D	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C/D	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C/D	1,2-Dichlorobenzene
GC/MS	EPA 8270C/D	1,2-Diphenylhydrazine
GC/MS	EPA 8270C/D	1,3-Dichlorobenzene
GC/MS	EPA 8270C/D	1,4-Dichlorobenzene
GC/MS	EPA 8270C/D	1,4-Dioxane
GC/MS	EPA 8270C/D	1-Methylnaphthalene
GC/MS	EPA 8270C/D	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C/D	2,4,5-Trichlorophenol
GC/MS	EPA 8270C/D	2,4,6-Trichlorophenol (TCP)
GC/MS	EPA 8270C/D	2,4-Dichlorophenol (DCP)
GC/MS	EPA 8270C/D	2,4-Dimethylphenol
GC/MS	EPA 8270C/D	2,4-Dinitrophenol
GC/MS	EPA 8270C/D	2,4-Dinitrotoluene (DNT)
GC/MS	EPA 8270C/D	2,6-Dichlorophenol
GC/MS	EPA 8270C/D	2,6-Dinitrotoluene
GC/MS	EPA 8270C/D	2-Chloronaphthalene
GC/MS	EPA 8270C/D	2-Chlorophenol
GC/MS	EPA 8270C/D	2-Methylnaphthalene
GC/MS	EPA 8270C/D	2-Methylphenol (o-Cresol)
GC/MS	EPA 8270C/D	2-Nitroaniline
GC/MS	EPA 8270C/D	2-Nitrophenol (ONP)
GC/MS	EPA 8270C/D	3,3'-Dichlorobenzidine (DCB)
GC/MS	EPA 8270C/D	3-Methylphenol

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8270C/D	3-Nitroaniline
GC/MS	EPA 8270C/D	4,6-Dinitro-2-methylphenol (DNOC)
GC/MS	EPA 8270C/D	4-Bromophenyl phenyl ether
GC/MS	EPA 8270C/D	4-Chloro-3-methylphenol
GC/MS	EPA 8270C/D	4-Chloroaniline
GC/MS	EPA 8270C/D	4-Chlorophenyl phenyl ether
GC/MS	EPA 8270C/D	4-Methylphenol (p-Cresol)
GC/MS	EPA 8270C/D	4-Nitroaniline (PNA)
GC/MS	EPA 8270C/D	4-Nitrophenol (PNP)
GC/MS	EPA 8270C/D	7,12-Dimethylbenz(a)anthracene
GC/MS	EPA 8270C/D	Acenaphthene
GC/MS	EPA 8270C/D	Acenaphthylene
GC/MS	EPA 8270C/D	Acetaphenone
GC/MS	EPA 8270C/D	Aniline
GC/MS	EPA 8270C/D	Anthracene
GC/MS	EPA 8270C/D	Atrazine
GC/MS	EPA 8270C/D	Benzaldehyde
GC/MS	EPA 8270C/D	Benzdine
GC/MS	EPA 8270C/D	Benzo(a)anthracene
GC/MS	EPA 8270C/D	Benzo(a)pyrene
GC/MS	EPA 8270C/D	Benzo(b)fluoranthene
GC/MS	EPA 8270C/D	Benzo(g,h,i)perylene
GC/MS	EPA 8270C/D	Benzo(k)fluoranthene
GC/MS	EPA 8270C/D	Benzoic Acid
GC/MS	EPA 8270C/D	Benzyl alcohol
GC/MS	EPA 8270C/D	bis(2-Chloroethoxy)methane
GC/MS	EPA 8270C/D	bis(2-Chloroethyl)ether (BCEE)
GC/MS	EPA 8270C/D	Bis(2-chloroisopropyl)ether, or 2,2'-oxybis (1-Chloropropane)
GC/MS	EPA 8270C/D	bis(2-Ethylhexyl)phthalate (BEHP)
GC/MS	EPA 8270C/D	Butyl benzyl phthalate (BBP)
GC/MS	EPA 8270C/D	Caprolactam
GC/MS	EPA 8270C/D	Carbazole

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8270C/D	Chrysene
GC/MS	EPA 8270C/D	Dibenz(a,h)anthracene
GC/MS	EPA 8270C/D	Dibenzofuran (DBF)
GC/MS	EPA 8270C/D	Diethyl phthalate (DEP)
GC/MS	EPA 8270C/D	Dimethyl phthalate (DMP)
GC/MS	EPA 8270C/D	Di-n-butyl phthalate (DBP)
GC/MS	EPA 8270C/D	Di-n-octyl phthalate (DNOP)
GC/MS	EPA 8270C/D	Fluoranthene
GC/MS	EPA 8270C/D	Fluorene
GC/MS	EPA 8270C/D	Hexachlorobenzene (HCB)
GC/MS	EPA 8270C/D	Hexachlorobutadiene (HCBD)
GC/MS	EPA 8270C/D	Hexachlorocyclopentadiene (HCCPD)
GC/MS	EPA 8270C/D	Hexachloroethane (HCE)
GC/MS	EPA 8270C/D	Indeno(1,2,3-cd)pyrene
GC/MS	EPA 8270C/D	Isophorone
GC/MS	EPA 8270C/D	Naphthalene
GC/MS	EPA 8270C/D	Nitrobenzene
GC/MS	EPA 8270C/D	N-Nitrosodimethylamine
GC/MS	EPA 8270C/D	N-Nitroso-di-n-propylamine (NDPA)
GC/MS	EPA 8270C/D	N-nitrosodiphenylamine (NDPHA)
GC/MS	EPA 8270C/D	Pentachlorophenol
GC/MS	EPA 8270C/D	Phenanthrene
GC/MS	EPA 8270C/D	Phenol
GC/MS	EPA 8270C/D	Pyrene
GC/MS	EPA 8270C/D	Pyridine
GC/ECD	EPA 8081A/B	4,4'-DDD
GC/ECD	EPA 8081A/B	4,4'-DDE
GC/ECD	EPA 8081A/B	4,4'-DDT
GC/ECD	EPA 8081A/B	Aldrin
GC/ECD	EPA 8081A/B	alpha-BHC (alpha-HCH)
GC/ECD	EPA 8081A/B	alpha-Chlordane
GC/ECD	EPA 8081A/B	beta-BHC (beta-HCH)
GC/ECD	EPA 8081A/B	delta-BHC (delta-HCH)

Non-Potable Water		
Technology	Method	Analyte
GC/ECD	EPA 8081A/B	Dieldrin
GC/ECD	EPA 8081A/B	Endosulfan I
GC/ECD	EPA 8081A/B	Endosulfan II
GC/ECD	EPA 8081A/B	Endosulfan sulfate
GC/ECD	EPA 8081A/B	Endrin
GC/ECD	EPA 8081A/B	Endrin aldehyde
GC/ECD	EPA 8081A/B	Endrin ketone
GC/ECD	EPA 8081A/B	gamma-BHC (Lindane; gamma-HCH)
GC/ECD	EPA 8081A/B	gamma-Chlordane
GC/ECD	EPA 8081A/B	Heptachlor
GC/ECD	EPA 8081A/B	Heptachlor epoxide
GC/ECD	EPA 8081A/B	Methoxychlor
GC/ECD	EPA 8081A/B	Chlordane
GC/ECD	EPA 8081A/B	Toxaphene
GC/ECD	EPA 8082 /A	Aroclor-1016
GC/ECD	EPA 8082 /A	Aroclor-1221
GC/ECD	EPA 8082 /A	Aroclor-1232
GC/ECD	EPA 8082 /A	Aroclor-1242
GC/ECD	EPA 8082 /A	Aroclor-1248
GC/ECD	EPA 8082 /A	Aroclor-1254
GC/ECD	EPA 8082 /A	Aroclor-1260
GC/ECD	EPA 8082 /A	Aroclor-1262
GC/ECD	EPA 8082 /A	Aroclor-1268
GC/ECD	EPA 8151A	2,4,5-T
GC/ECD	EPA 8151A	2,4,5-TP (Silvex)
GC/ECD	EPA 8151A	2,4-D
GC/ECD	EPA 8151A	2,4-DB
GC/ECD	EPA 8151A	Dalapon
GC/ECD	EPA 8151A	Dicamba
GC/ECD	EPA 8151A	Dichlorprop
GC/ECD	EPA 8151A	Dinoseb
GC/ECD	EPA 8151A	MCPA
GC/ECD	EPA 8151A	MCP (Mecoprop)

Non-Potable Water		
Technology	Method	Analyte
HPLC/UV	EPA 8330A/B	1,3,5-Trinitrobenzene
HPLC/UV	EPA 8330A/B	1,3-Dinitrobenzene
HPLC/UV	EPA 8330A/B	2,4,6-Trinitrophenylmethylnitramine (Tetryl)
HPLC/UV	EPA 8330A/B	2,4,6-Trinitrotoluene (TNT)
HPLC/UV	EPA 8330A/B	2,4-Dinitrotoluene (DNT)
HPLC/UV	EPA 8330A/B	2,6-Dinitrotoluene
HPLC/UV	EPA 8330A/B	2-Amino-4,6-dinitrotoluene
HPLC/UV	EPA 8330A/B	2-Nitrotoluene (ONT)
HPLC/UV	EPA 8330A/B	3,5-Dinitroaniline
HPLC/UV	EPA 8330A/B	3-Nitrotoluene
HPLC/UV	EPA 8330A/B	4-Amino-2,6-dinitrotoluene
HPLC/UV	EPA 8330A/B	4-Nitrotoluene (PNT)
HPLC/UV	EPA 8330A/B	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
HPLC/UV	EPA 8330A/B	Nitrobenzene
HPLC/UV	EPA 8330A/B	Nitroglycerin
HPLC/UV	EPA 8330A/B	Nitroguanidine
HPLC/UV	EPA 8330A/B	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
HPLC/UV	EPA 8330A/B	3,5-Dinitroaniline
HPLC/UV	EPA 8330A/B	PETN
GC/FID	FLPRO	Petroleum Range Organics
GC/FID	EPA 8015B	TPH DRO
GC/FID	EPA 8015B	TPH GRO
GC/FID	RSK-175	Methane
GC/FID	RSK-175	Ethane
GC/FID	RSK-175	Ethene
GC/ECD	EPA 8011	1,2-Dibromoethane (EDB)
GC/ECD	EPA 8011	1,2-Dibromo-3-chloropropane (DBCP)
HPLC/MS	EPA 6850	Perchlorate
ICP	EPA 6010B/C	Aluminum
ICP	EPA 6010B/C	Antimony
ICP	EPA 6010B/C	Arsenic
ICP	EPA 6010B/C	Barium
ICP	EPA 6010B/C	Beryllium



Non-Potable Water		
Technology	Method	Analyte
ICP	EPA 6010B/C	Boron
ICP	EPA 6010B/C	Cadmium
ICP	EPA 6010B/C	Calcium
ICP	EPA 6010B/C	Chromium, total
ICP	EPA 6010B/C	Cobalt
ICP	EPA 6010B/C	Copper
ICP	EPA 6010B/C	Iron
ICP	EPA 6010B/C	Lead
ICP	EPA 6010B/C	Magnesium
ICP	EPA 6010B/C	Manganese
CVAA	EPA 7470A	Mercury
ICP	EPA 6010B/C	Molybdenum
ICP	EPA 6010B/C	Nickel
ICP	EPA 6010B/C	Potassium
ICP	EPA 6010B/C	Selenium
ICP	EPA 6010B/C	Silver
ICP	EPA 6010B/C	Sodium
ICP	EPA 6010B/C	Strontium
ICP	EPA 6010B/C	Thallium
ICP	EPA 6010B/C	Tin
ICP	EPA 6010B/C	Titanium
ICP	EPA 6010B/C	Vanadium
ICP	EPA 6010B/C	Zinc
IC	EPA 300.0	Chloride
IC	EPA 300.0	Fluoride
IC	EPA 300.0	Nitrate
IC	EPA 300.0	Nitrite
IC	EPA 300.0	Sulfate
IC	EPA 9056A	Chloride
IC	EPA 9056A	Fluoride
IC	EPA 9056A	Nitrate
IC	EPA 9056A	Nitrite
IC	EPA 9056A	Sulfate

Non-Potable Water		
Technology	Method	Analyte
Titration	SM 2320B 20 th /21 st edition	Alkalinity
Colorimetric	SM 4500 B, G, 20 th /21 st edition	Ammonia
Colorimetric	EPA 410.4	COD
UV/Vis	EPA 7196A	Hexavalent Chromium
Colorimetric	EPA 353.2	Nitrocellulose
Colorimetric	EPA 353.2	Nitrate/Nitrite
Gravimetric	EPA 1664A	O&G
Titration	Chap.7, Sect. 7.3.4 Mod.	Reactive Sulfide
Titration	SM 4500 S-2CF, 20 th /21 st edition	Sulfide
UV/Vis	SM 4500 P B5, E, 20 th /21 st edition	Total Phosphorus (as P)
UV/Vis	SM 4500 PE, 20 th /21 st edition	Ortho-Phosphate (as P)
TOC	9060A/SM5310C, 20 th /21 st edition	Total Organic Carbon
Gravimetric	SM 2540C, 20 th /21 st edition	TDS
Gravimetric	SM 2540D, 20 th /21 st edition	TSS
Colorimetric	EPA 9012A/B	Cyanide
Physical	EPA 1010A	Ignitability
Physical	EPA 9095B	Paint Filter
Probe	EPA 9040B/C	pH
Preparation	Method	Type
Preparation	EPA 1311	TCLP
Preparation	EPA 3005A	Metals digestion
Preparation	EPA 3010A	Metals digestion
Preparation	EPA 3510C	Organics Liquid Extraction
Preparation	EPA 5030A/B	Purge and Trap Water

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8260B	1,1,1-Trichloroethane (1,1,1-TCA)

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113; Freon 113)
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane (1,1-DCA)
GC/MS	EPA 8260B	1,1-Dichloroethene (1,1-DCE)
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromo-3-chloropropane (DBCP)
GC/MS	EPA 8260B	1,2-Dibromoethane (EDB)
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane (EDC)
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Butanone (Methyl ethyl ketone; MEK)
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone (Methyl butyl ketone; MBK)
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone (Methyl isobutyl ketone; MIBK)
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Acetonitrile
GC/MS	EPA 8260B	Acrolein
GC/MS	EPA 8260B	Acrylonitrile
GC/MS	EPA 8260B	Allyl chloride

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Bromobenzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon Disulfide
GC/MS	EPA 8260B	Carbon Tetrachloride
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	Chloroprene
GC/MS	EPA 8260B	cis-1,2-Dichloroethene (cis-1,2-DCE)
GC/MS	EPA 8260B	cis-1,3-Dichloropropene
GC/MS	EPA 8260B	cis-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane (CFC-12)
GC/MS	EPA 8260B	Ethyl methacrylate
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Hexachlorobutadiene
GC/MS	EPA 8260B	Hexane
GC/MS	EPA 8260B	Iodomethane
GC/MS	EPA 8260B	Isobutyl alcohol
GC/MS	EPA 8260B	Isopropylbenzene (Cumene)
GC/MS	EPA 8260B	Methacrylonitrile
GC/MS	EPA 8260B	Methyl Acetate
GC/MS	EPA 8260B	Methyl methacrylate
GC/MS	EPA 8260B	Methyl Tertiary Butyl Ether (MTBE)
GC/MS	EPA 8260B	Methylcyclohexane

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8260B	Methylene Chloride, or Dichloromethane
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	n-Propylbenzene
GC/MS	EPA 8260B	p-Isopropyltoluene
GC/MS	EPA 8260B	Propionitrile
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene (PCE; PERC)
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene (trans-1,2-DCE)
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	trans-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Trichloroethene (TCE)
GC/MS	EPA 8260B	Trichlorofluoromethane (CFC-11)
GC/MS	EPA 8260B	Vinyl acetate
GC/MS	EPA 8260B	Vinyl Chloride (VC)
GC/MS	EPA 8260B	Xylenes (Total)
GC/MS	EPA 8270C/D	Bis(2-chloroisopropyl)ether, or 2,2'-oxybis (1-Chloropropane)
GC/MS	EPA 8270C/D	1,1'-Biphenyl
GC/MS	EPA 8270C/D	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C/D	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C/D	1,2-Dichlorobenzene
GC/MS	EPA 8270C/D	1,2-Diphenylhydrazine
GC/MS	EPA 8270C/D	1,3-Dichlorobenzene
GC/MS	EPA 8270C/D	1,4-Dichlorobenzene
GC/MS	EPA 8270C/D	1,4-Dioxane
GC/MS	EPA 8270C/D	1-Methylnaphthalene
GC/MS	EPA 8270C/D	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C/D	2,4,5-Trichlorophenol
GC/MS	EPA 8270C/D	2,4,6-Trichlorophenol (TCP)

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8270C/D	2,4-Dichlorophenol (DCP)
GC/MS	EPA 8270C/D	2,4-Dimethylphenol
GC/MS	EPA 8270C/D	2,4-Dinitrophenol
GC/MS	EPA 8270C/D	2,4-Dinitrotoluene (DNT)
GC/MS	EPA 8270C/D	2,6-Dichlorophenol
GC/MS	EPA 8270C/D	2,6-Dinitrotoluene
GC/MS	EPA 8270C/D	2-Chloronaphthalene
GC/MS	EPA 8270C/D	2-Chlorophenol
GC/MS	EPA 8270C/D	2-Methylnaphthalene
GC/MS	EPA 8270C/D	2-Methylphenol (o-Cresol)
GC/MS	EPA 8270C/D	2-Nitroaniline
GC/MS	EPA 8270C/D	2-Nitrophenol (ONP)
GC/MS	EPA 8270C/D	3,3'-Dichlorobenzidine (DCB)
GC/MS	EPA 8270C/D	3-Methylphenol
GC/MS	EPA 8270C/D	3-Nitroaniline
GC/MS	EPA 8270C/D	4,6-Dinitro-2-methylphenol (DNOC)
GC/MS	EPA 8270C/D	4-Bromophenyl phenyl ether
GC/MS	EPA 8270C/D	4-Chloro-3-methylphenol
GC/MS	EPA 8270C/D	4-Chloroaniline
GC/MS	EPA 8270C/D	4-Chlorophenyl phenyl ether
GC/MS	EPA 8270C/D	4-Methylphenol (p-Cresol)
GC/MS	EPA 8270C/D	4-Nitroaniline (PNA)
GC/MS	EPA 8270C/D	4-Nitrophenol (PNP)
GC/MS	EPA 8270C/D	Acenaphthene
GC/MS	EPA 8270C/D	Acenaphthylene
GC/MS	EPA 8270C/D	Acetaphenone
GC/MS	EPA 8270C/D	Aniline
GC/MS	EPA 8270C/D	Anthracene
GC/MS	EPA 8270C/D	Atrazine
GC/MS	EPA 8270C/D	Benzaldehyde
GC/MS	EPA 8270C/D	Benzidine
GC/MS	EPA 8270C/D	Benzo(a)anthracene

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8270C/D	Benzo(a)anthracene
GC/MS	EPA 8270C/D	Benzo(a)pyrene
GC/MS	EPA 8270C/D	Benzo(b)fluoranthene
GC/MS	EPA 8270C/D	Benzo(g,h,i)perylene
GC/MS	EPA 8270C/D	Benzo(k)fluoranthene
GC/MS	EPA 8270C/D	Benzoic Acid
GC/MS	EPA 8270C/D	Benzyl alcohol
GC/MS	EPA 8270C/D	bis(2-Chloroethoxy)methane
GC/MS	EPA 8270C/D	bis(2-Chloroethyl)ether (BCEE)
GC/MS	EPA 8270C/D	bis(2-Ethylhexyl)phthalate (BEHP)
GC/MS	EPA 8270C/D	Butyl benzyl phthalate (BBP)
GC/MS	EPA 8270C/D	Caprolactam
GC/MS	EPA 8270C/D	Carbazole
GC/MS	EPA 8270C/D	Chrysene
GC/MS	EPA 8270C/D	Dibenz(a,h)anthracene
GC/MS	EPA 8270C/D	Dibenzofuran (DBF)
GC/MS	EPA 8270C/D	Diethyl phthalate (DEP)
GC/MS	EPA 8270C/D	Dimethyl phthalate (DMP)
GC/MS	EPA 8270C/D	Di-n-butyl phthalate (DBP)
GC/MS	EPA 8270C/D	Di-n-octyl phthalate (DNOP)
GC/MS	EPA 8270C/D	Fluoranthene
GC/MS	EPA 8270C/D	Fluorene
GC/MS	EPA 8270C/D	Hexachlorobenzene (HCB)
GC/MS	EPA 8270C/D	Hexachlorobutadiene (HCBD)
GC/MS	EPA 8270C/D	Hexachlorocyclopentadiene (HCCPD)
GC/MS	EPA 8270C/D	Hexachloroethane (HCE)
GC/MS	EPA 8270C/D	Indeno(1,2,3-cd)pyrene
GC/MS	EPA 8270C/D	Isophorone
GC/MS	EPA 8270C/D	Naphthalene
GC/MS	EPA 8270C/D	Nitrobenzene
GC/MS	EPA 8270C/D	N-Nitrosodimethylamine
GC/MS	EPA 8270C/D	N-Nitroso-di-n-propylamine (NDPA)

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8270C/D	N-nitrosodiphenylamine (NDPHA)
GC/MS	EPA 8270C/D	Pentachlorophenol
GC/MS	EPA 8270C/D	Phenanthrene
GC/MS	EPA 8270C/D	Phenol
GC/MS	EPA 8270C/D	Pyrene
GC/MS	EPA 8270C/D	Pyridine
GC/ECD	EPA 8081A/B	4,4'-DDD
GC/ECD	EPA 8081A/B	4,4'-DDE
GC/ECD	EPA 8081A/B	4,4'-DDT
GC/ECD	EPA 8081A/B	Aldrin
GC/ECD	EPA 8081A/B	alpha-BHC (alpha-HCH)
GC/ECD	EPA 8081A/B	alpha-Chlordane
GC/ECD	EPA 8081A/B	beta-BHC (beta-HCH)
GC/ECD	EPA 8081A/B	delta-BHC (delta-HCH)
GC/ECD	EPA 8081A/B	Chlordane
GC/ECD	EPA 8081A/B	Dieldrin
GC/ECD	EPA 8081A/B	Endosulfan I
GC/ECD	EPA 8081A/B	Endosulfan II
GC/ECD	EPA 8081A/B	Endosulfan sulfate
GC/ECD	EPA 8081A/B	Endrin
GC/ECD	EPA 8081A/B	Endrin aldehyde
GC/ECD	EPA 8081A/B	Endrin ketone
GC/ECD	EPA 8081A/B	gamma-BHC (Lindane; gamma-HCH)
GC/ECD	EPA 8081A/B	gamma-Chlordane
GC/ECD	EPA 8081A/B	Heptachlor
GC/ECD	EPA 8081A/B	Heptachlor epoxide
GC/ECD	EPA 8081A/B	Methoxychlor
GC/ECD	EPA 8081A/B	Toxaphene
GC/ECD	EPA 8082 /A	Aroclor-1016
GC/ECD	EPA 8082 /A	Aroclor-1221
GC/ECD	EPA 8082 /A	Aroclor-1232
GC/ECD	EPA 8082 /A	Aroclor-1242

Solid and Chemical Materials		
Technology	Method	Analyte
GC/ECD	EPA 8082 /A	Aroclor-1248
GC/ECD	EPA 8082 /A	Aroclor-1254
GC/ECD	EPA 8082 /A	Aroclor-1260
GC/ECD	EPA 8082 /A	Aroclor-1262
GC/ECD	EPA 8082 /A	Aroclor-1268
GC/ECD	EPA 8151A	2,4,5-T
GC/ECD	EPA 8151A	2,4,5-TP (Silvex)
GC/ECD	EPA 8151A	2,4-D
GC/ECD	EPA 8151A	2,4-DB
GC/ECD	EPA 8151A	Dalapon
GC/ECD	EPA 8151A	Dicamba
GC/ECD	EPA 8151A	Dichlorprop
GC/ECD	EPA 8151A	Dinoseb
GC/ECD	EPA 8151A	MCPA
GC/ECD	EPA 8151A	MCPP (Mecoprop)
HPLC/UV	EPA 8330A	1,3,5-Trinitrobenzene
HPLC/UV	EPA 8330A	1,3-Dinitrobenzene
HPLC/UV	EPA 8330A	2,4,6-Trinitrophenylmethylnitramine (Tetryl)
HPLC/UV	EPA 8330A	2,4,6-Trinitrotoluene (TNT)
HPLC/UV	EPA 8330A	2,4-Dinitrotoluene (DNT)
HPLC/UV	EPA 8330A	2,6-Dinitrotoluene
HPLC/UV	EPA 8330A	2-Amino-4,6-dinitrotoluene
HPLC/UV	EPA 8330A	2-Nitrotoluene (ONT)
HPLC/UV	EPA 8330A	3-Nitrotoluene
HPLC/UV	EPA 8330A	3,5-Dinitroaniline
HPLC/UV	EPA 8330A	4-Amino-2,6-dinitrotoluene
HPLC/UV	EPA 8330A	4-Nitrotoluene (PNT)
HPLC/UV	EPA 8330A	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
HPLC/UV	EPA 8330A	Nitroglycerin
HPLC/UV	EPA 8330A	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
HPLC/UV	EPA 8330A	Nitrobenzene
HPLC/UV	EPA 8330A	Nitroguanidine

Solid and Chemical Materials		
Technology	Method	Analyte
HPLC/UV	EPA 8330A	PETN
HPLC/UV	EPA 8330B	1,3,5-Trinitrobenzene
HPLC/UV	EPA 8330B	1,3-Dinitrobenzene
HPLC/UV	EPA 8330B	2,4,6-Trinitrophenylmethylnitramine (Tetryl)
HPLC/UV	EPA 8330B	2,4,6-Trinitrotoluene (TNT)
HPLC/UV	EPA 8330B	2,4-Dinitrotoluene (DNT)
HPLC/UV	EPA 8330B	2,6-Dinitrotoluene
HPLC/UV	EPA 8330B	2-Amino-4,6-dinitrotoluene
HPLC/UV	EPA 8330B	2-Nitrotoluene (ONT)
HPLC/UV	EPA 8330B	3-Nitrotoluene
HPLC/UV	EPA 8330B	3,5-Dinitroaniline
HPLC/UV	EPA 8330B	4-Amino-2,6-dinitrotoluene
HPLC/UV	EPA 8330B	4-Nitrotoluene (PNT)
HPLC/UV	EPA 8330B	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
HPLC/UV	EPA 8330B	Nitroglycerin
HPLC/UV	EPA 8330B	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
HPLC/UV	EPA 8330B	Nitrobenzene
HPLC/UV	EPA 8330B	Nitroguanidine
HPLC/UV	EPA 8330B	PETN
GC/FID	FLPRO	Petroleum Range Organics
GC/FID	EPA 8015B	TPH DRO
GC/FID	EPA 8015B	TPH GRO
HPLC/MS	EPA 6850	Perchlorate
ICP	EPA 6010B/C	Aluminum
ICP	EPA 6010B/C	Antimony
ICP	EPA 6010B/C	Arsenic
ICP	EPA 6010B/C	Barium
ICP	EPA 6010B/C	Beryllium
ICP	EPA 6010B/C	Boron
ICP	EPA 6010B/C	Cadmium
ICP	EPA 6010B/C	Calcium
ICP	EPA 6010B/C	Chromium, total

Solid and Chemical Materials		
Technology	Method	Analyte
ICP	EPA 6010B/C	Cobalt
ICP	EPA 6010B/C	Copper
ICP	EPA 6010B/C	Iron
ICP	EPA 6010B/C	Lead
ICP	EPA 6010B/C	Magnesium
ICP	EPA 6010B/C	Manganese
CVAA	EPA 7471A/B	Mercury
ICP	EPA 6010B/C	Molybdenum
ICP	EPA 6010B/C	Nickel
ICP	EPA 6010B/C	Potassium
ICP	EPA 6010B/C	Selenium
ICP	EPA 6010B/C	Silver
ICP	EPA 6010B/C	Sodium
ICP	EPA 6010B/C	Strontium
ICP	EPA 6010B/C	Tin
ICP	EPA 6010B/C	Titanium
ICP	EPA 6010B/C	Thallium
ICP	EPA 6010B/C	Vanadium
ICP	EPA 6010B/C	Zinc
UV/Vis	EPA 7196A	Hexavalent Chromium
TOC	Lloyd Kahn	Total Organic Carbon
Colorimetric	EPA 353.2	Nitrocellulose
Colorimetric	EPA 9012A/B	Cyanide
Titration	Chap.7, Sect. 7.3.4 Mod.	Reactive Sulfide
Titration	EPA 9034	Sulfide
Probe	EPA 9045C/D	pH
Preparation	Method	Type
Preparation	EPA 1311	TCLP
Preparation	EPA 1312	SPLP
Preparation	NJ Modified 3060A	Hexavalent Chromium
Preparation	EPA 3050B	Metals Digestion
Preparation	EPA 3546	Organics Microwave Extraction



Solid and Chemical Materials		
Technology	Method	Analyte
Preparation	EPA 3550B/C	Organics Sonication
Preparation	SM 2540B 20 th /21 st edition	Percent Solids (Percent Moisture)
Preparation	EPA 5035 /A	Purge and Trap Solid

Notes:

- 1) This laboratory offers commercial testing service.



Approved By: _____

R. Douglas Leonard
Chief Technical Officer

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